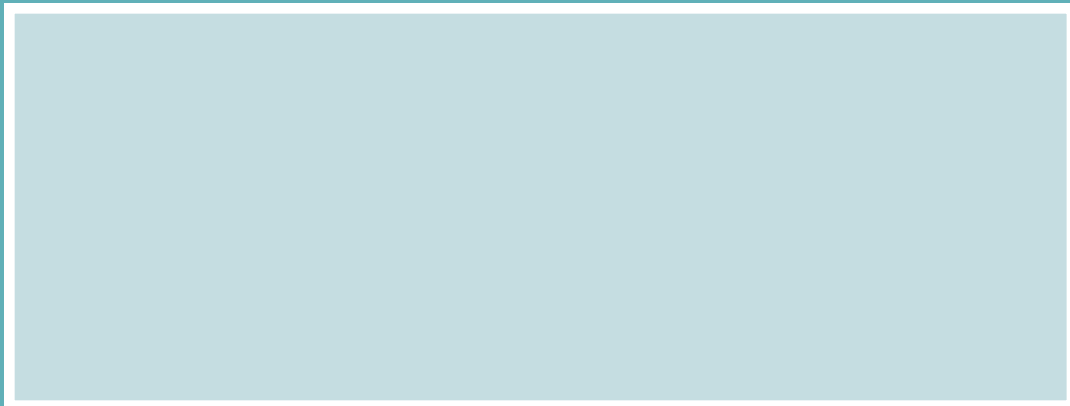
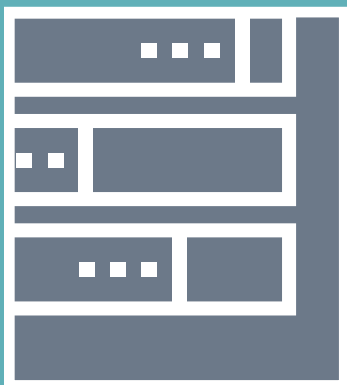




# Measuring What Matters

Case Studies on  
Data Innovations  
for Strengthening  
Primary Health Care



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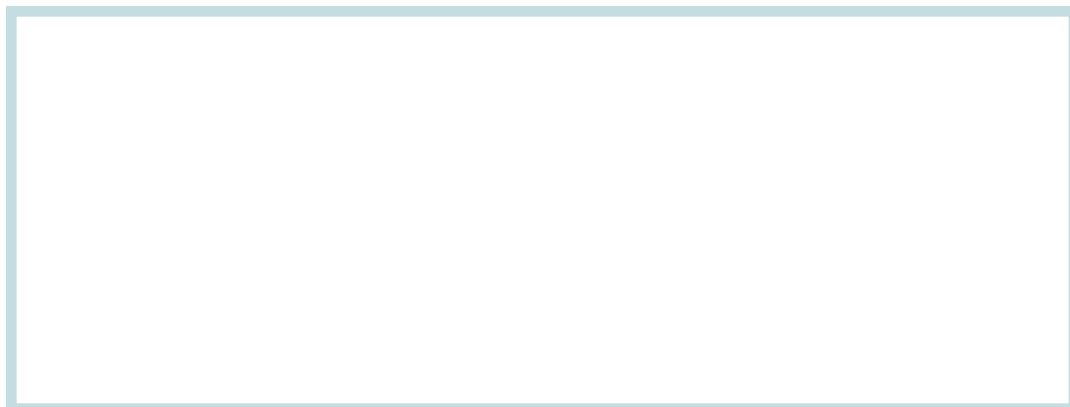
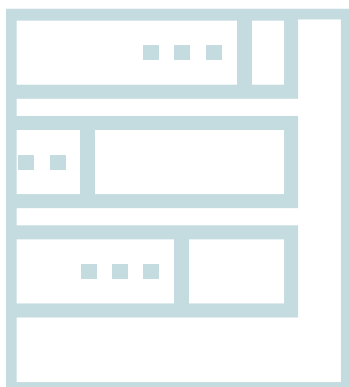
PRIMARY HEALTH CARE  
PERFORMANCE INITIATIVE





# Measuring What Matters

Case Studies on  
Data Innovations  
for Strengthening  
Primary Health Care



PRIMARY HEALTH CARE  
PERFORMANCE INITIATIVE

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Albert Tuyishime

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Melanie Joiner  
Maud Juquois  
Oumy Kalsoum Ndiaye Ndao

## **Tanzania**

Talhiya Yahya  
Eliudi Eliakimu  
Hanif Nazerali

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## EXECUTIVE SUMMARY



Health systems vary from country to country, but the backbone of each one—people’s first and main source of care—is primary health care (PHC). When grounded in an understanding of the context, challenges, and priorities of local communities, PHC can meet the vast majority of people’s health needs at all stages of life.

Communities can count on PHC providers for the majority of services they need, ranging from checkups during pregnancy and vaccines for children to management of chronic conditions or care at the end of life. With the necessary technology and equipment, well-trained PHC providers can track people’s health over time; refer them, when necessary, to more specialized care; and proactively engage with them to foster physical, mental, and social well-being. Achieving universal health coverage (UHC)—in which all people can obtain high-quality health care without risk of financial hardship—depends on effective PHC.

Comprehensively tracking population health and monitoring the delivery of PHC services is critical to improving PHC and achieving UHC. And yet, health programs have historically taken a “vertical” approach, focusing on achieving rapid results in priority areas such as family planning, tuberculosis, or malaria. This has resulted in fragmented service delivery and information systems, which can compromise patient care and outcomes. Weak measurement systems are both a cause and a result of system fragmentation: when care is not coordinated across facilities, providers struggle to track patient progress over time, and when historical data are not readily available, providers may make decisions without a complete understanding of the patient’s health. Moreover, a lack of coordinated information systems often leads to duplicative data collection. Many countries indicate that they are both overburdened with data collection and reporting requirements for vertically oriented programs and simultaneously lacking key information that would provide a more holistic view of PHC performance and help inform evidence-based decisions at the community, facility, district, and national levels.

In contrast, when data are effectively captured and communicated from the community or facility level to district, regional, and national levels, policymakers, health system managers, and frontline providers can more easily diagnose problems, strategically direct investments, and monitor improvements. They can identify changing population needs and make needed adjustments in policy and practice in response. From the patient perspective, integrated data systems that build on and link information from different health programs can increase continuity of care and ensure that PHC is the entry point for addressing the health and well-being of the whole person, serving as the first and main source of care for individuals throughout their lifetime.

Translating data into potent policy solutions that align with changing population health needs requires a culture of data use. Many countries recognize the valuable role that data can play in supporting responsive, person-centered PHC and have used data to address challenges in both system organization and service delivery. This report, prepared by the Primary Health Care Performance Initiative, features a collection of case studies that detail how countries have used data to spur innovations in PHC and accelerate progress toward UHC. These examples demonstrate that the core characteristics of high-performing PHC—including serving as people’s first and main point of entry into the health system, person-centeredness, comprehensiveness, continuity, accessibility, and coordination—can be supported and improved through better data collection, analysis, dissemination, and use. They also show that generating evidence and using information strategically are crucial to realizing the promise of PHC.

## CASE STUDIES: KEY THEMES

The seven case studies in this document represent five diverse countries—Argentina, Ghana, Rwanda, Senegal, and Tanzania—and demonstrate a broad range of ways that data can be used to improve PHC. Although these countries span a range of income levels and contexts, the case studies highlight a number of common themes:

- » **Incorporating local, regional, and national-level data into priority setting can help ensure that practices are sustainable and scalable while remaining relevant and appropriate at the community level.** Communicating information about local challenges and priorities to district, regional, and national health system managers helps ensure that solutions are responsive, scalable, and sustainable and can contribute to the national and global knowledge base. Case studies from Ghana, Argentina, and Tanzania describe how countries are balancing the use of both local and national data in their efforts to improve population health.
- » **Integrated data systems provide a comprehensive view of system performance and can help ensure that care is available when and where patients need it.** Effective PHC service delivery requires not only that care be geographically and financially accessible to patients and delivered in a timely manner but that providers have the requisite information to respond effectively to each patient’s health needs. This means that countries must work to overcome “siloed” information systems, in which data on patients and programs is collected but not communicated across providers or between initiatives. Case studies from Senegal and Tanzania describe how health system managers overcame siloed information systems to better track how people and commodities move through the system.

» **Coordinated and continuous care depends not only on technology solutions to connect patients across providers and levels of care but also on effectively collecting and disseminating data.** Telehealth technologies, including mobile devices, are allowing patients in remote areas to access high-quality medical advice and enabling community volunteers to convey health danger signs easily and effectively to higher levels of care. These methods of collecting data and providing care are fueled by strong data systems that allow patient information to be collected, aggregated, and analyzed easily and securely. Two case studies describe how Rwanda is using telehealth technologies and digital health solutions, along with robust data collection and sharing mechanisms, to redefine the gathering of patient information and the provision of care.

» **Strengthening PHC as the foundation for achieving UHC depends not only on the generation of new data but on the better analysis and use of existing data to identify areas of weakness and develop innovative solutions.** Strategies for data use range from measuring underprioritized elements of service delivery to linking patient data across providers and facilities to enhance coordination of care. The final section of this document describes a tool pioneered by these five countries that helps identify strengths, diagnose challenges, and monitor progress in strengthening PHC.



INTRODUCTION:  
GLOBAL  
COMMITMENT TO  
PHC FOR UHC



The idea that PHC is central to global health and development is not new. In 1978, health ministers from 134 countries signed the Alma-Ata Declaration, affirming the importance of PHC in the push for health for all by the year 2000. In 2018, 40 years after the declaration, the global community came together in Astana, Kazakhstan, to reaffirm its commitment to PHC through the Astana Declaration on Primary Health Care at the Global Conference on Primary Health Care. The new declaration acknowledges that the world has made significant progress in health outcomes since Alma Ata: the global decline in under-5 child mortality has outpaced predictions, maternal mortality has declined significantly, the number of lives lost to infectious diseases and malnutrition continues to decline, and diseases that were once a sure death sentence—such as HIV—have become manageable. Yet more work remains to be done.

The Astana Declaration outlines four pillars that will support the achievement of PHC for all: knowledge and capacity-building, human resources, technology, and sustainable financing. The better use of data lies at the intersection of these four elements. As people increasingly recognize and demand a right to accessible, high-quality health care, data will play a central role in holding policymakers and providers accountable for delivering on this promise.

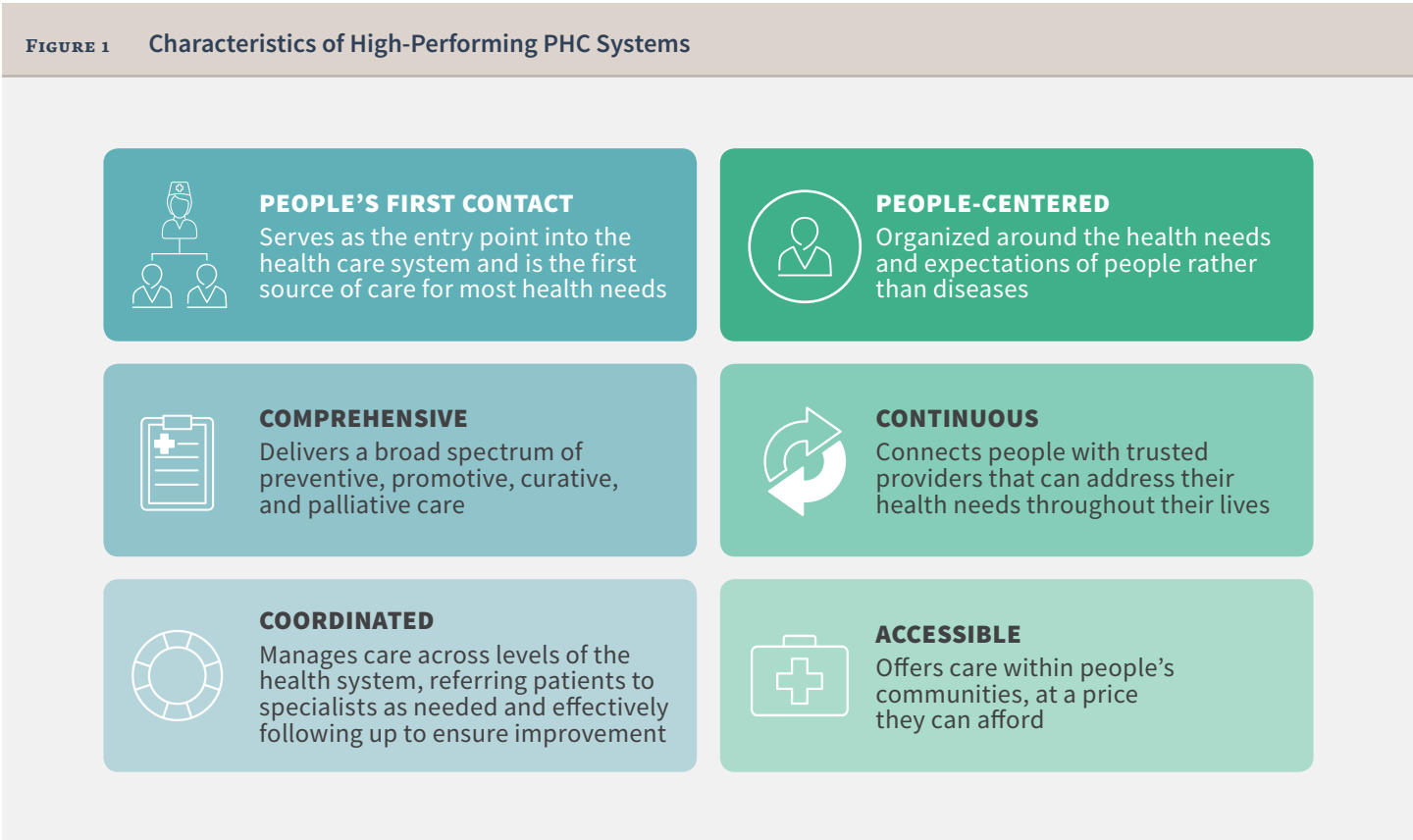
For countries to achieve health for all, their policymakers, technical experts, and health system managers must first understand what elements of their health system are working well and where more improvements are needed. This report, prepared by the Primary Health Care Performance Initiative (PHCPI), features a collection of case

studies that detail how five countries have used data to spur innovations in PHC and accelerate progress toward UHC. The examples demonstrate that the core characteristics of high-performing PHC—including serving as people’s first and main point of entry into the health system, person-centeredness, comprehensiveness, continuity, accessibility, and coordination—can be supported and improved through better data collection, analysis, dissemination, and use. (See Figure 1.) Going forward, policymakers, technical experts, and health system managers in those countries can use the new PHC Vital Signs Profiles developed by PHCPI—visual snapshots of PHC system strengths and weaknesses—to direct investments where they are most needed. The Vital Signs Profiles are described in more detail toward the end of this report.

DATA INNOVATIONS CASE STUDIES

The countries featured in this report—Argentina, Ghana, Rwanda, Senegal, and Tanzania—were selected because of their commitment to using data to improve PHC service delivery and their work with PHCPI to apply a series of measurement tools to reach their goals. While the efforts featured in this report were not directly supported by PHCPI, PHCPI has worked with each of the countries to produce a Vital Signs Profile, building on the country’s strong political will and technical commitment to data-driven improvement of PHC.

This report demonstrates the breadth of data innovation that is possible, and indeed necessary, to support stronger PHC service delivery. The case studies are intended to serve as a resource for policymakers and technical experts alike, highlighting innovation in both the public and private health sectors and the use of data at



different levels of the health system, as well as ways to collect, compile, analyze, disseminate, and use data to inform policy. Evidence for each case study was collected through a combination of document review and interviews with key government, private-sector, and development partner representatives in each country.

The case studies and their topics are as follows:

- » **Argentina:** Understanding the role of providers in delivering high-quality care
- » **Ghana:** Using data-driven decision-making to overcome implementation challenges
- » **Rwanda:** Using mobile technology to deliver high-quality PHC when and where patients need it
- » **Rwanda:** Giving community health workers the tools they need to deliver responsive, high-quality care to women and children
- » **Senegal:** Overcoming health system fragmentation by streamlining supply chain and information systems
- » **Tanzania:** Fostering quality improvement in PHC facilities and service delivery through facility accreditations
- » **Tanzania:** Using electronic medical records to ensure continuity of care between clinics and across borders

#### PHCPI: A GLOBAL PARTNERSHIP TO SUPPORT IMPROVEMENTS IN PHC DELIVERY

The Primary Health Care Performance Initiative is a partnership between the World Health Organization (WHO), the World Bank Group, and the Bill & Melinda Gates Foundation, with technical support from Ariadne Labs and Results for Development (R4D). The goal of PHCPI is to support improvements in PHC delivery in low- and middle-income countries through better measurement and knowledge sharing. Founded on the belief that understanding how and why systems work well is a critical first step in developing targeted improvements, PHCPI works closely with governments and development partners to provide the data, information, and support they need to measure PHC performance, make improvements, and advance global progress toward health for all.

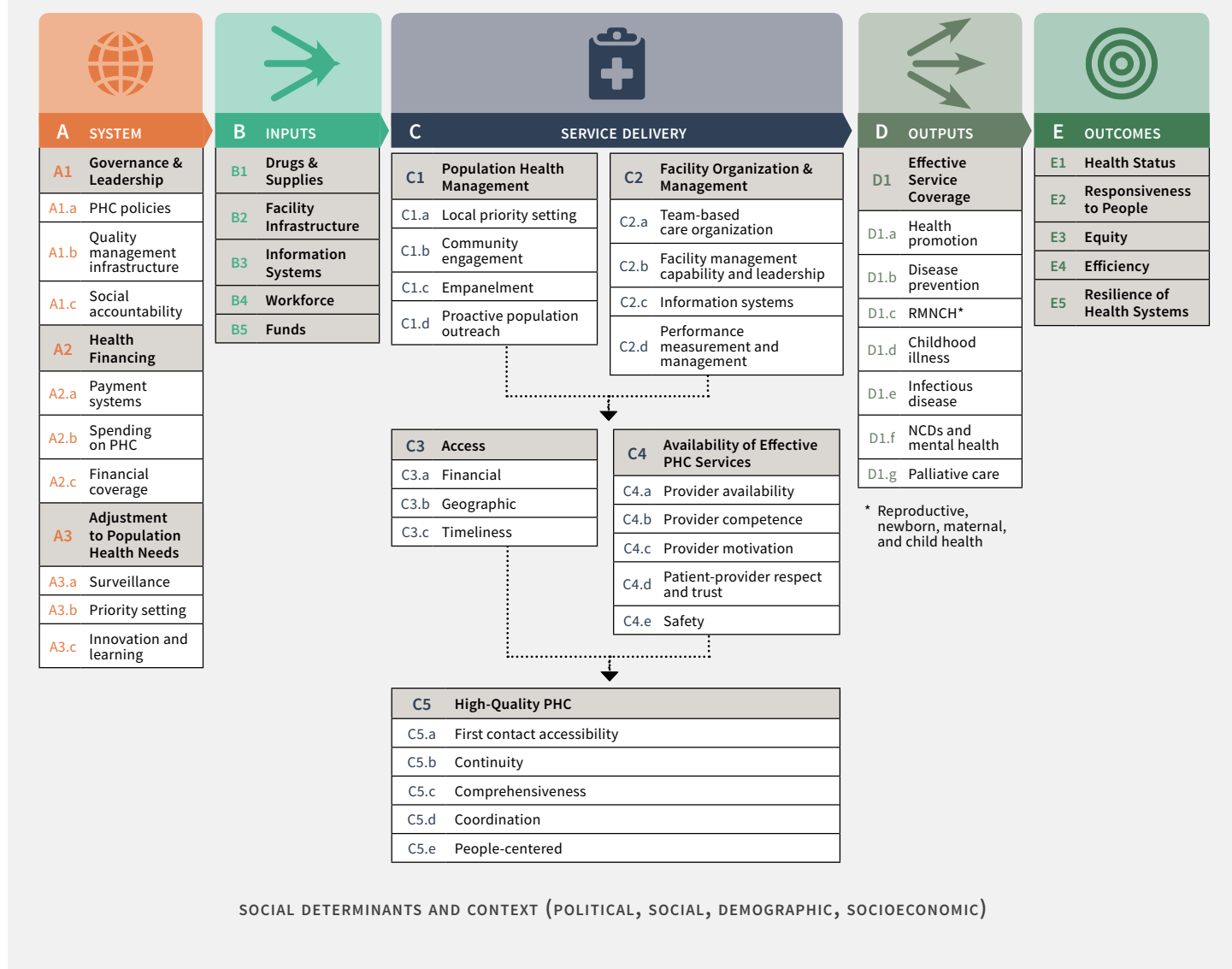
#### THE PHCPI CONCEPTUAL FRAMEWORK

To improve PHC, practitioners across all levels of the health system need regular access to current information on PHC performance. The PHCPI Conceptual Framework (Figure 2), which was developed by PHCPI to support comprehensive measurement of PHC performance, depicts the core components of a high-functioning PHC system and the relationships among them in five key measurement domains:

- » **System components** that affect PHC performance, from governance and policies to financing, surveillance, and priority setting
- » **Inputs** that are needed to deliver high-quality PHC services, from drugs and supplies to the health workforce
- » **Service delivery elements** that influence the delivery of high-quality PHC, such as community engagement, facility organization and management, and provider competence
- » **Outputs** in the form of effective coverage of high-quality preventive, promotive, and curative health services
- » **Outcomes** that include improved health status as well as greater efficiency, equity, responsiveness, and health system resilience

Health system managers typically have access to data on inputs (such as supplies, staff, and medicine) and outputs (such as children vaccinated or women who deliver in facilities), but they often lack data on service delivery (the process by which inputs are translated into outcomes, including the way care is accessed by patients and the quality of the patient-provider interaction). The unique contribution of the PHCPI Conceptual Framework is its emphasis on service delivery, as well as its recognition that PHC performance occurs within the larger health system, which itself lies within wider political, cultural, demographic, and socioeconomic contexts. Each case study indicates how the country's efforts map to the PHCPI Conceptual Framework.

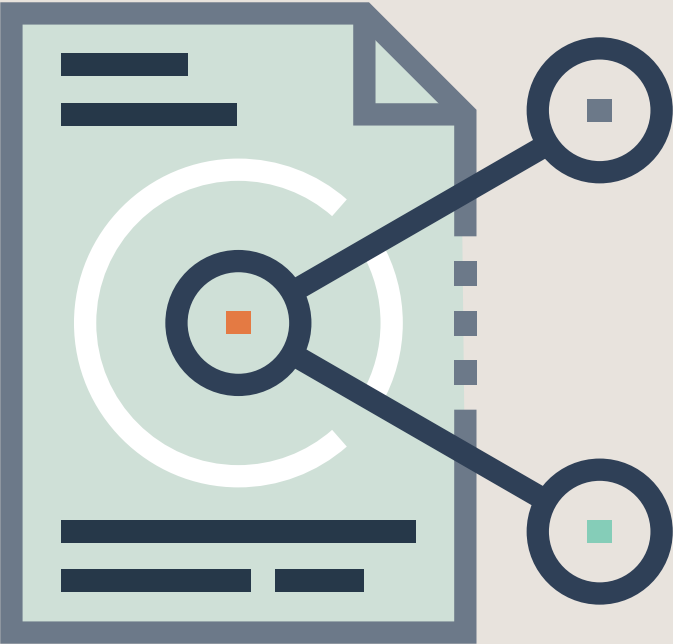
**FIGURE 2** The PHCPI Conceptual Framework



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CASE STUDIES



## CASE STUDY



# Evaluating the Role of Provider Motivation in Care Delivery

COUNTRY	 Argentina
INNOVATION	Evaluating provider motivation to strategically improve service delivery
IMPACT	Increased population coverage and better service delivery

**Provider motivation plays an important role in the delivery of high-quality PHC. Motivated health workers are more likely to be satisfied with their roles, have higher levels of job retention, and feel that their professional contributions are both socially and personally rewarding. High motivation can be driven by a variety of factors, including a sense of agency in day-to-day work activities. Conversely, if the workforce lacks motivation, care delivery may suffer even if all the right inputs are available.**

As a part its effort to work toward UHC, Argentina used data gathered from its flagship health program, Plan Nacer (now Programa SUMAR), to understand the factors affecting provider motivation and how a motivated workforce can improve access to and enhance the delivery of high-quality PHC.



*By seeking to understand provider satisfaction and motivation, Argentina demonstrated its commitment to strengthening human resources in health (B4) and the availability and delivery of effective PHC services (C4).*

## *The Challenge:*

# Understanding the Role of Provider Motivation in Strong Service Delivery

A competent primary care workforce, basic equipment availability, and good facility conditions are important elements that contribute to high-quality health outcomes, yet these factors alone do not explain how good health is achieved. Health system managers must also understand the service delivery process—how health system inputs are translated into outputs and outcomes. This broad domain includes important elements such as provider motivation, patient experience, provider competence, and continuity of care.

Historically, measuring service delivery processes has been challenging and thus not prioritized, but countries are increasingly recognizing the value of examining these important topic areas. Argentina

established an innovative incentive scheme that targets a frequently overlooked element of service delivery: provider motivation. Faced with deteriorating population health following economic and political crises in early 2001, Argentina used provider incentives to increase enrollment of key populations in financial protection schemes and ensure that these populations were exercising their right to basic effective health coverage. It then conducted a study to determine how the changes affected satisfaction and motivation among medical professionals, nurses, technicians, and other facility staff.

### ARGENTINA'S UHC STRATEGY

As a part of its national UHC strategy, Argentina implemented a series of innovative reforms to increase access to high-quality health services for all members of the population. Through this process, the country sought to increase decision-making power at the facility level to ensure that providers felt able to respond to community health needs and contribute meaningfully to both local and national health priorities.

In 2004, in response to an economic crisis that reversed gains in maternal and child health, Argentina launched Plan Nacer, a scheme to increase access to essential health services for pregnant women and children. A key element of Plan Nacer's success was the concept of "basic effective health coverage," defined as both the enrollment of an individual in a financial coverage scheme and the use of at least one essential health service that met established quality standards.

Provider payment in Argentina is closely linked with the concept of basic effective health coverage, using a combination of capitated payments and results-based financing incentives to motivate providers to provide high-quality care and improve access by enrolling more eligible individuals in their catchment area. At the provincial level, 60% of the capitation rate paid to providers is based on enrollment while the remaining 40% is conditional on meeting provincial performance targets based on a set of priority "tracer" indicators. These tracer indicators include performance targets for the entire provincial population, including services for child wellness, reproductive health, and noncommunicable diseases.

At the facility level, a fee-for-service model is used to motivate delivery of high-quality services on a benefits list established at the national level. The fee-for-service amounts vary by province, allowing incentives to align with the differing disease burdens across the country. The mixed payment approach allows Argentina to address the key priorities of its UHC scheme—enrollment, access, and quality—by targeting provider performance, which is a foundational factor influencing how patients interact with the health system and how care is delivered.

The second generation of the scheme, Programa SUMAR, has further increased coverage, expanding the number of covered services from 80 to 400 and increasing the covered population to include men and women under the age of 64 as well as children and adolescents. This approach emphasizes preventive services as a cost-effective way to improve population health.

Under federal regulation, the funds paid out under Programa SUMAR cannot be used to replace funds allocated to provinces through traditional fixed-budget financing. Instead, these funds must be directed toward quality improvement efforts, with facility staff playing a key role in the allocation of funds. The funds can be applied toward a range of improvements, including purchasing new equipment, improving facility organization and management, and paying performance bonuses to staff.

# The Innovation:

## Evaluating Provider Motivation

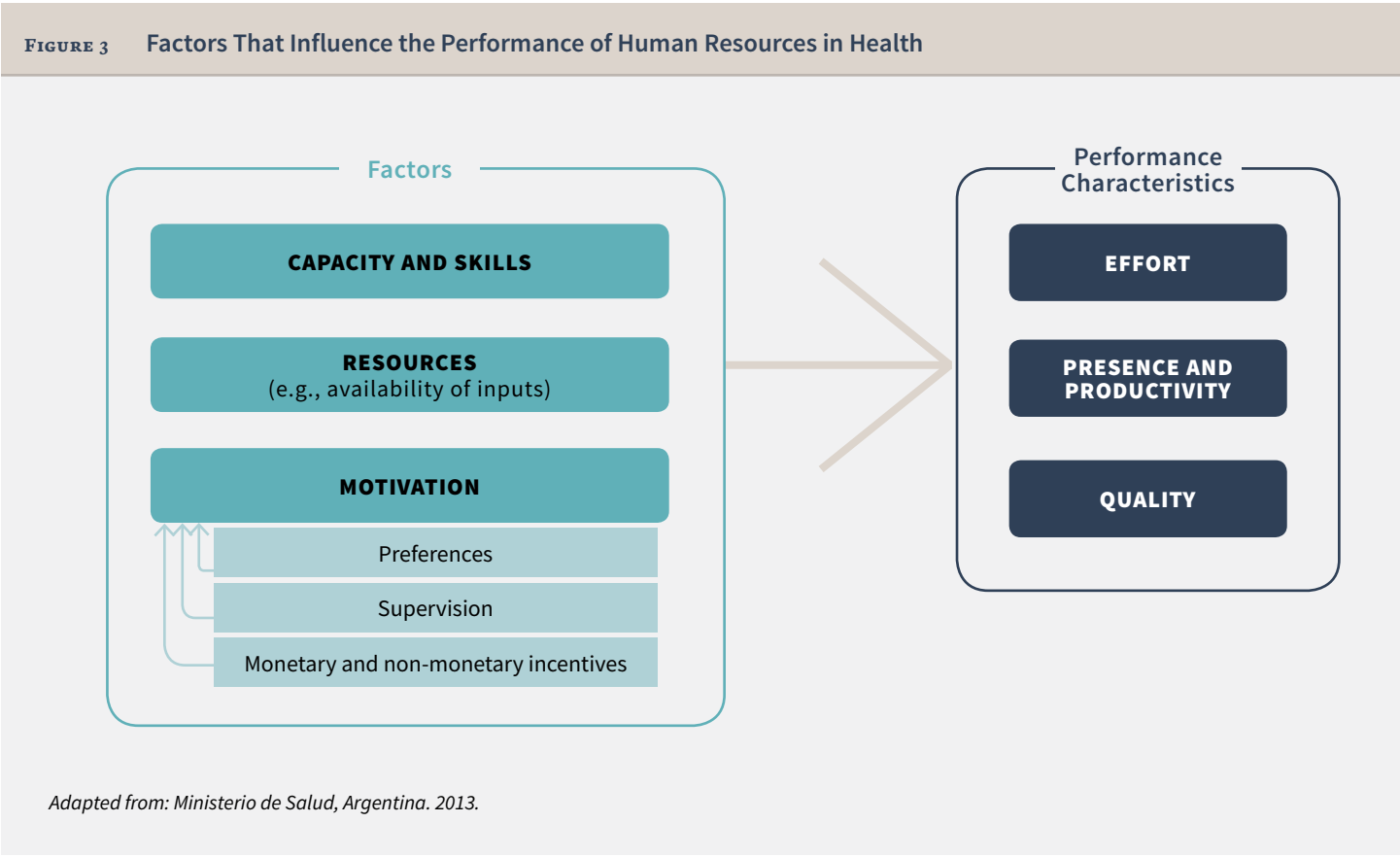
Plan Nacer’s blended capitation and fee-for-service payment model was intended to influence provider behavior to promote equity, access, and utilization of services. To understand how effectively these reforms had achieved their intended goals, the Ministry of Health worked with Universidad Isalud to implement a study assessing the determinants and levels of health provider motivation under the new payment model. An interdisciplinary team of medical doctors, public health professionals, policymakers, psychologists, and statisticians helped design the study, developing questions that explored the linkages between health provider motivation and patient care. Originally conducted in 2011 in nine of Argentina’s 23 provinces, the study was eventually scaled up nationwide.

The survey covered resource generation, fund allocation, decision-making processes, expenses, and fund reporting under Programa SUMAR and collected responses from facility directors as well as general staff. Using data from the study, the government constructed a Human Resource Satisfaction Index to measure levels of provider motivation under this new scheme. The Index included seven domains: the degree to which providers found their work to be personally rewarding and interesting; the acceptability of compensation and benefits offered; the feasibility of level of effort required to complete duties; the suitability of the physical environment; basic equipment

availability; perceived opportunities for growth and promotion; and participation in facility goal-setting and decision-making. Survey questions sought to understand both objective experiences of providers (e.g., “Which entities are involved in procurement procedures and the allocation of funds?”) and subjective opinions and experiences (e.g., “How would you characterize the province’s tender process for procuring supplies, equipment, and/or goods?”).

The findings confirmed the important role that provider motivation plays in fostering a positive work environment in which facility staff are engaged and present, and feel that their work is meaningful. Importantly, the study found that the ability of providers to deliver high-quality services depends not only on clinical skills and facility resources but also on a range of other motivating factors, such as satisfaction with the work atmosphere and a sense of personal agency.

No single factor emerged as the primary motivator of facility staff. Rather, the study found that provider motivation stems from a confluence of factors, including both financial and nonfinancial incentives, which were found to be similarly motivating. (See Figure 3.) The study also made an important distinction between extrinsic factors (such as satisfaction with one’s salary) and intrinsic factors (such as the degree to which staff members feel they are helping patients).



Adapted from: Ministerio de Salud, Argentina. 2013.



National guidelines stipulate that no more than 50% of funds received by facilities under Plan Nacer / Programa SUMAR can be distributed to health facility personnel as performance bonuses. Performance bonuses were not identified as a directly motivating factor in day-to-day work by providers, but the absence of bonuses correlated with lower levels of satisfaction and motivation. For health system managers and directors, bonuses were identified as an effective way to acknowledge hard work and promote job satisfaction. In provinces where performance bonuses were not permitted, using a portion of funds to pay for staff overtime was seen to have similarly positive effects. In practice, the limit on funds eligible for performance bonuses is not typically reached: on average, nearly 65% of total program funds were reinvested into the facility, contributing to procurement of additional supplies and equipment or facility improvements, with only a portion of the remaining amount being used as monetary incentives for providers.

Nonfinancial incentives were closely linked to day-to-day provider motivation. These included additional trainings for staff, improvements in workplace organization, procurement of additional supplies and equipment, and broad improvements to the work environment. Facility staff reported that these investments helped them feel that they could complete their work more effectively. Facility staff also reported that the information monitoring structure imposed under Plan Nacer / Programa SUMAR had broad-reaching benefits across the facility: reporting processes helped define the organizational and work patterns of the facility as well as the way health teams interacted with one another, which improved both the professional environment and provider motivation.

### MONITORING TO SUPPORT RESULTS-BASED FINANCING

With funding increasingly decentralized to the facility level under Plan Nacer / Programa SUMAR, Argentina needed to improve monitoring of funds allocation at the provincial level. A formal auditing system was developed, transforming what had previously been a paper-based process in many provinces to a digitized mechanism to track billing, reporting, and enrollment.

The monitoring system moved results-based payments from binary evaluations of whether services were delivered to a graduated scoring system that better captures the quality of service delivery and accounts for facility capacity. This has enhanced the ability of health system managers to evaluate improvements within each province and give providers and facility staff more flexibility to make decisions about health investments in line with local needs.

Regular financial and technical audits have also contributed to a culture of continuous, transparent measurement for improvement and have helped facilities respond to the evolving needs of the local population. All PHC facilities use standardized data entry forms to track beneficiaries and service utilization. This allows providers to identify recurrent areas of weakness and make necessary improvements, and it allows provinces to determine whether facilities are adhering to program guidelines.

Control over the use of funds played a significant role in perceived autonomy among facility staff. Although rules and guidelines for program fund allocation differ across provinces, in many instances joint decision-making processes involving providers and facility managers allowed providers to play a role in shaping the allocation and use of funds received. However, limitations on the use of program funds was frequently cited as a source of frustration. For example, hiring of additional staff was rarely permitted, since these decisions were typically made at the provincial level. Frustration due to delays in high-cost capital expenditures were also reported among facility staff, who cited the danger this inefficiency posed to local communities when essential equipment could not be purchased or replaced in a timely manner. Facility staff expressed interest in implementing a systematic purchasing process but recognized the limited role that the national government could play in implementing such a system, given the decentralized nature of provincial health management.

Provider motivation was found to be greater among professionals who felt that their role on the health team was clear. For example, provider motivation in comparable roles across provinces was found to be lower in places where outcomes were poor and resources were scarce.

Understanding the complex and interrelated elements that contribute to, or detract from, provider motivation has helped Argentina scale up Programa SUMAR into an effective, nationwide UHC scheme. By considering the pivotal role that providers play as the producers of high-quality health services, management and organizational structures can be adapted to better support the needs and interests of facility staff. As Argentina continues to build on the successes already realized under Plan Nacer and Programa SUMAR, continuing to establish decentralized processes and empower health workers to make decisions that reflect the needs of the populations they serve will be critical to ensuring that care is responsive, person-centered, and appropriate. Achieving health for all requires that patients, providers, and health managers alike feel that their voices are heard and their interests are valued.


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## CASE STUDY



# Using Evidence-Based Practices to Scale Up Community-Based Health Care

COUNTRY	 Ghana
INNOVATION	Implementation science
IMPACT	Community-based PHC that is responsive to population health needs

For nearly two decades, Ghana has been striving to improve the provision of PHC services through its Community-Based Health Planning and Services (CHPS) program, an innovative strategy to reorient care to the community level through proactive population outreach and community engagement. CHPS was launched in 2000 to scale up proven community-based PHC strategies, with the ultimate goal of achieving UHC. What began as a pilot project in three communities within a single district now reaches more than 4,576 communities across all of Ghana's 216 districts.

The remarkable success of CHPS in Ghana is a result of evidence-based planning throughout the past two decades. By conducting a pilot project and using evidence to inform the scale-up of successful practices, Ghana has been able to improve the quality of health care nationwide. The collection and use of data throughout every phase of CHPS design and implementation has been critical to pinpointing weaknesses and identifying practical solutions to overcome challenges to scaling up.



Ghana's CHPS program focuses on innovation and learning (A3) and providing capital to support providers (B5) in engaging communities to establish local priorities (C1) and organize facilities and provider outreach to address the unique needs of the local population (C2).

## The Challenge:

# Scaling Up a Successful Pilot Program

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CHPS grew out of a pilot project on culturally acceptable strategies for PHC delivery—the Navrongo Health Research Centre’s Community Health and Family Planning Project (CHFP)—which began in 1994 in Ghana’s Upper East Region and is now considered one of the most successful health development experiments conducted in Africa.<sup>1</sup> Studies of the Navrongo model documented rapid declines in child mortality when nurses were deployed to highly engaged communities. These results were validated in a 1998 replication trial in the Nkwanta District of the Volta Region.

The key strategy used by CHPS—which was based on findings that rural poor populations were not being reached by traditional health program—is to assign nurses, known as community health officers (CHO), to villages. There, they serve as people’s first point of contact with the health system and are supported by community volunteers. The community often builds a CHPS compound where the CHO and outreach services are based. A community health management

committee, comprising representatives from the local community, oversees both the management of the compound and the team of community health volunteers.

The Navrongo model was adopted as national policy in 1999, and the Ministry of Health and Ghana Health Service (GHS) launched CHPS the following year in all of the districts in Ghana. However, numerous obstacles resulted in stalled or incomplete implementation in nearly all districts. By 2008, CHPS had reached only 12% of households in the country. The Navrongo project had focused on strategies for delivering PHC services, not strategies for effective scale-up, which require improvements in district and regional leadership as well as improved capacity for resource mobilization and planning.

Ghana had aimed to expand CHPS to all communities by 2015, but GHS has since found that this level of service coverage would take five decades based on the rate of progress of the scale-up efforts.

## The Innovation:

# Designing and Testing Supporting Interventions and Systems

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To address these implementation challenges, GHS launched the Ghana Essential Health Intervention Program (GEHIP) in 2010. Following in the footsteps of the Navrongo project, GEHIP works to identify reforms that can facilitate expansion of CHPS across the country and generate evidence to build district-level political support for CHPS.

GEHIP selected intervention and comparison districts from among Ghana’s most rural and impoverished districts in the Upper East Region, to test problem-solving strategies in challenging contexts. The interventions it tested included expanding the role of CHOs, training nurses and their supervisors in leadership skills, providing supplemental funding for CHPS startup activities, improving district-level management and planning, building political engagement, implementing a community-engaged emergency referral system, and implementing interventions to address key challenges in areas such as budgeting and resource mobilization.

In early CHPS implementation efforts, the routine health information management system for CHPS was found to be cumbersome and underutilized by CHOs; the national CHPS monitoring system was shut down in 2008 with the discontinuation of external funding. GEHIP developed new tools to monitor and evaluate the CHPS scale-up, including tools to integrate with the national District Health Information Management System (DHIMS-2) and enable real-time access to data on implementation and progress. Other tools simplified and streamlined data collection, feedback, data visualizations, and use of data for decision-making. These solutions allowed CHOs to spend less time on data collection and more time on clinical care and to access information supporting routine service delivery. This simplification of data entry processes, combined with clear guidelines for data entry, improved the quality of administrative data in the routine health management information systems.

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1 Awoonor-Williams, J.K., et al. 2013. “The Ghana Essential Health Interventions Program: A Plausibility Trial of the Impact of Health Systems Strengthening on Maternal and Child Survival.” *BMC Health Services Research* 13, Suppl 2: S3.

The Ministry of Health conducted a five-year evaluation of GEHIP using cost and expenditure data and data from DHIMS2, facility-based surveys, household surveys, and focus groups that included community members, frontline providers, supervisors, and district managers. The results were promising: CHPS coverage expanded significantly faster in the intervention districts, with measurable impact on service delivery and health outcomes. The quality of services was enhanced due to improved retention of frontline health workers, and referral systems improved, including emergency transport to higher-level facilities. Contraceptive uptake increased, maternal and newborn survival improved, and under-5 mortality declined by an additional 49% in the treatment districts relative to the comparison districts. Further, the estimated time required for national expansion of CHPS coverage based on these reforms dropped from 50 years to five years.

A critical finding from both the GEHIP evaluation and the earlier experiences with CHPS implementation was the importance of peer learning exchanges for sharing lessons and building commitment for implementation. These learning exchanges allowed district leaders who had successfully implemented CHPS to guide others in doing the same. The impact was significant: in the first eight years of CHPS, 92% of national CHPS coverage was located in the 38 districts that had participated in cross-district exchanges.

## SCALING UP

The next step was to build on the success of GEHIP by replicating the reforms from the Upper East Region in other parts of the country. The National Program for Strengthening the Implementation of the Community-Based Health Planning and Services Initiative in Ghana, or CHPS+, was launched in 2016 as a five-year project to test the replication of GEHIP strategies in the Northern and Volta regions and produce evidence that these reforms could be used at an even larger scale. As a government program embedded in the Ghana Health Service system, the overall goal of CHPS+ is to build sustainable capacity to implement, monitor, and evaluate strategies to scale up community-based PHC. In many ways, CHPS+ is about “researching the use of research” by testing the transfer of GEHIP strategies to new regions. This requires ongoing collection, dissemination, and use of information to inform evidence-based decisions.

The three main components of CHPS+ are research, service delivery, and capacity building (as shown in Figure 4), with four primary objectives:

- Developing learning platforms to foster systems development and peer-to-peer learning
- Creating partnerships for systems development
- Improving data collection and use
- Generating knowledge for use at the national level

**FIGURE 4** Main Components of CHPS+



CHPS+ designates *systems learning districts*—districts in which implementation of CHPS is fully functioning in one or more subdistricts—to help train and support other participating districts through learning exchanges. Grants and funding for training are provided to participating districts.

The format of the learning activities is not mandated, but the activities are participatory and can include demonstrations and observation, helping participants better understand the process of adapting CHPS to local needs and circumstances. The activities help increase implementation capacity at all levels, from communities to subdistrict teams to district managers.

In keeping with its focus on implementation research, CHPS+ works with faculty from regional public health programs, including the University of Development Studies in the Northern Region and the University of Health and Allied Sciences in the Volta Region. These partnerships work on multiple levels to increase training capacity of systems learning districts while linking CHPS+ programming to the health professional training programs implemented by the universities. Columbia University's Mailman School of Public Health provides additional technical support for implementation, research, and capacity building.

## IMPROVING DATA COLLECTION AND USE

GEHIP reforms also included streamlining and developing community and district information systems under DHIMS-2. Under CHPS+, the systems learning districts have improved and simplified data systems and provide training to frontline providers, supervisors, and managers in the use of monitoring tools, evidence generation, and data use to support decision-making. The tools include a tablet-based electronic data capture system (the “e-Tracker”) that collects real-time data and feeds it into DHIMS2; this innovation significantly reduces staff data collection time. The objective of these reforms is to improve capacity for evidence-based decision-making, which is critical to implementing CHPS and adapting the program to the local context.

While CHPS+ is implemented at the district, subdistrict, and community levels, its implementers recognize the importance of ensuring that the program generates evidence and knowledge for use at all levels, including the national level. CHPS+ uses simple, cost-effective tools for impact monitoring from the GEHIP program to guide decision-making at all levels of the GHS system.

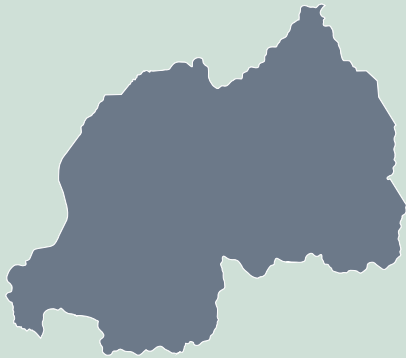
To measure the impact of CHPS+, Ghana launched a comprehensive evaluation of the study districts, led by the Regional Institute of Population Studies at the University of Ghana, in 2018. Evaluation methods include baseline and endline surveys, with quantitative data collected at the point of service delivery through DHIMS-2 and surveys on stakeholder perceptions of and experiences with CHPS+. CHPS+ is also conducting baseline and endline demographic surveys of women of reproductive age (15 to 49 years) to collect information on maternal and child health indicators, socioeconomic characteristics, and health care access. Results from the impact evaluation will guide future policy decisions to support the national scale-up of CHPS.

The collection and use of data to support health systems research, experimentation, and evidence generation has been critical to Ghana's success in identifying concrete actions that can be taken to improve the CHPS program and move closer to achieving UHC. Through its efforts, Ghana has proven the importance of not only generating evidence, but also ensuring that evidence is disseminated and used for nationwide scale-up of proven interventions.

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## CASE STUDY



# Improving Service Delivery and Data Collection Through Digital Health

COUNTRY	 Rwanda
INNOVATION	Using mobile devices to connect hard-to-reach populations with medical experts
IMPACT	Increased access for rural populations

In many countries, rural residents have less access to high-quality health services than urban residents. Even when they are able to physically access a clinic, these hard-to-reach populations may experience long wait times or receive low-quality services. The availability of medical staff—including physicians, nurses, and midwives—plays a fundamental role in the accessibility of high-quality care.

Medical and public health services provided using mobile devices—known as *digital health*—are changing the way patients receive care. With more than 5 billion wireless subscribers worldwide—70% of whom reside in low- and middle-income countries—the spread of mobile technologies is redefining what access looks like and has the potential to connect all individuals with timely, effective, and efficient PHC.



Electronic medical records allow providers to track patient health and share information with other facilities if a patient needs to be referred to a higher level of care (B3). This not only increases access to care (C3) and availability of effective PHC services (C4) but is revolutionizing the way Rwandans receive high-quality PHC by establishing an innovative way to deliver continuous, coordinated care (C5).



## The Challenge:

### Lack of Access to Health Services in Rural Areas

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In the past two decades, Rwanda has made remarkable progress in strengthening its health system, including improving maternal and child health and nutrition and reducing infectious disease prevalence. But the distribution of the health workforce across the country remains inequitable. More than 80% of the population resides in rural areas, but rural residents are served by fewer than half of the nurses in the country

and only 12% of physicians. This translates to only 0.84 physicians, nurses, or midwives per 1,000 rural residents.<sup>3</sup>

To address this inequity, the government has implemented an initiative that uses digital health to deliver timely, appropriate, and high-quality care to rural Rwandans.

## The Innovation:

### Connecting Patients to Care Providers Using Mobile Phones

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In 2017, the Rwandan government partnered with Babylon, a London-based health care company specializing in linking technology with medical expertise, to bring high-quality health care to underserved populations. The system, known locally as Babyl, allows individuals to use a mobile phone—which about 75% of Rwandan's own—to receive care when they need it from a network of nurses and physicians.

Patients register with Babyl using their national identification number (which all Rwandan citizens receive at age 16) and their mobile phone SIM card. Within minutes, they receive a message confirming that their ID matches the SIM card information in the National Identification Agency and approving their enrollment. Use of the national ID number allows Babyl providers to access and update patients' medical records no matter where they seek care. The national ID number also allows Babyl to link to the patient's insurance provider, such as Mutuelles de Santé or La Rwandaise d'Assurance Maladie (RAMA).

Once they are enrolled, patients can call to request an appointment. An SMS text message is sent to their mobile phone proposing an appointment time. At the appointed time, a nurse in the Kigali-based call center calls the patient and conducts an initial screening. This triage appointment is free of charge and allows the nurse to understand the patient's history and symptoms and identify appropriate next steps. In some instances, the nurse may give medical advice; in others, the nurse may refer the patient to a Babyl doctor, who will call back within 15 minutes for a longer follow-on consultation. If the patient

requires a prescription, Babyl will send a unique ID code via text message that the patient can bring to the nearest pharmacy, where a pharmacist will confirm the code and prescription on a Babyl web portal. If the condition is beyond the scope of services Babyl offers or is not conducive to treatment via a virtual consultation, the patient is referred to the nearest health facility (based on the patient's insurance), with a referral note from the consulting nurse or doctor. For example, RAMA patients may be offered the option to visit a private clinic, while Mutuelle patients can access services only from Health Centers. Babyl receives a follow-up message once the patient has received care. When medications or lab tests are recommended, the integration with patient insurance schemes allows for these services to be covered.

Since its implementation, Babyl has registered 2.2 million users and has booked over 200,000 consultations. Nearly 80% of patients who use the service are from rural areas, in part because the service was initially offered to Mutuelle patients, who are primarily based in rural areas. As Babyl scales up, services are being offered to RAMA patients, who are primarily based in cities.

A formal independent evaluation is still underway, but patient feedback indicates that Babyl patients are pleased with the accessibility and expertise of Babyl doctors. Babyl plans to work with the Rwandan government to determine how the service can be integrated into the national UHC scheme, thereby ensuring that digital and remote consultations are available to all Rwandans.

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3 Binagwaho, Agnes, et al. 2013. "The Human Resources for Health Program in Rwanda—a New Partnership." *New England Journal of Medicine* 369, no. 21, 2054–59.

## INTEGRATING BABYL WITH THE NATIONAL HEALTH INFORMATION SYSTEM

The ability to easily refer patients to nearby clinics and access a patient's entire medical record is crucial to Babyl's ability to deliver high-quality care. To achieve that functionality, Babyl's data platform has been aligned with the country's national health management information system (HMIS) to exchange data—an extensive process that has involved ensuring secure data storage and encryption.

Babyl sends a monthly report to the Rwandan Social Security Board on the number and demographics of the patients treated and a high-level summary of health trends. Babyl hopes to eventually automate this data sharing in real time to provide metrics to health system managers more quickly and comprehensively.

The Babyl call center currently operates 72 hours a week over six days, with a staff of 35 doctors and 50 nurses. When Babyl first launched, the promotional free period spurred thousands of people to try the service. Since the implementation of modest copayments and linking of the service to national insurance schemes, Babyl is now completing more than 1,400 appointments each day. Copayments are made by patients using mobile money on their SIM cards; all fees mirror those that would be collected from insured patients seeking care at a brick-and-mortar clinic. As Babyl continues to scale up, the Ministry of Health is looking at ways to more fully integrate the scheme into Rwanda's UHC policies.

Most Babyl providers spend only a portion of their time at the Babyl call center and are also employed by government-run clinics. This helps keep training protocols aligned and ensures that services provided by Babyl are of the same high quality as those provided in traditional clinics. Symmetrical payment structures prevent salary inflation and avoid depleting human resources from the public sector. Although Babyl does not currently engage with community health workers (CHWs), the program hopes to develop smartphone modules that CHWs can use to more efficiently triage and refer patients.

## ENSURING HIGH-QUALITY CARE

The medical staff employed by Babyl often require training in how to adapt their skills to remote care. A week-long training and onboarding period is followed by a supervision period in which medical directors and head nurses listen to recordings of new staff consultations and provide feedback. Nurses and physicians also review recordings of their own consultations to identify areas for growth, which are then compared with notes from their supervisors. This format has been found to strengthen staff skills at the Babyl call center and has system-wide benefits as employees bring these skills back to traditional clinics.

As providers and health systems work to meet patient demand and improve access for all populations, a “digital-first” model of service delivery is proving to be a promising approach to expanding coverage. Babyl nurses are beginning to implement a computer-based algorithm to support symptom triage. This may allow Babyl engineers to refine diagnosis modules and enable nonmedical experts to perform similar triage functions in the future. As Babyl continues to scale up across Rwanda, continuing to integrate digital health care into the existing architecture of the health system will be a priority.


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## CASE STUDY

# Using Mobile Phones to Track Maternal and Child Health

COUNTRY	 Rwanda
INNOVATION	Using mobile phones to track maternal and child health
IMPACT	Improved service delivery, stronger data management



Every day, nearly 830 women around the globe die from causes related to pregnancy and childbirth. The majority of these deaths are preventable, and they constitute perhaps the greatest example of health inequality worldwide. Most of these women live in rural areas in low- and middle-income countries and are of lower socioeconomic status. Increasing access to care for pregnant and postpartum women can help prevent many of these deaths. In Rwanda, using mobile phones to track pregnant women and newborns and help connect them with needed services has played a key role in increasing and improving care for these populations.



*In Rwanda, the use of mobile phones to collect and transmit data (B3) strengthens the ability of community health workers to engage in proactive population health outreach (C1), thereby increasing access to care for women and children (C3) and ensuring that these patients receive continuous, high-quality services (C5).*

## The Challenge: Reducing Maternal Mortality

Since the 1980s, Rwanda has adopted a health strategy based on decentralized management and district-level care and has focused on PHC as the key to improving population health. The country has made remarkable progress in improving maternal and child health outcomes and achieved its Millennium Development Goals in this area by the target date of 2015. The under-5 mortality rate declined by 67% between 2005 and 2015, and the maternal mortality ratio decreased by 72% during the same period.

In 2005, Rwanda, like many countries, continued to have unacceptably high rates of maternal mortality. Nearly 740 women died for every

100,000 live births. Although this reflected a significant decline compared to five years earlier, the Rwandan government knew that it had to take action to further reduce maternal mortality. It enacted policies that focused on increasing access to care, ensuring that more women could give birth in a health care facility with a skilled birth attendant and increasing access to prenatal care services so providers could better track pregnancies. To address challenges related to insufficient health infrastructure and shortages in human resources, Rwanda implemented a program to use mobile phones and community health workers (CHWs) to increase access and quality.

## The Innovation: A Digital Tracking Tool for Community Health Workers

Rwanda introduced an innovative tracking tool that uses RapidSMS, an open-source technology platform developed with support from the United Nations Children's Fund (UNICEF). The Ministry of Health worked with UNICEF and other partners to customize the tool for tracking maternal and child health; the resulting RapidSMS-MCH system enables rapid communication and alerts between CHWs and health facilities and helps improve community reporting on key maternal and child health indicators, including nutritional status and treatment for malaria, pneumonia, and diarrhea.

When the program began, CHWs used RapidSMS-MCH via their mobile phones to track pregnant women and newborns during the “first 1,000 days of life”—from the start of pregnancy until a child reaches age 2, which is when most maternal and child deaths occur. Piloted in the Musanze District in 2009 and scaled up nationwide by 2013, the system now links 45,000 CHWs serving 15,000 villages across Rwanda with the broader health system—including the ambulance system, health facilities, district hospitals, and the central government. The system enables real-time two-way communication, quality review, and data use for decision-making, including a rapid response system for emergency obstetric care. In recent years, the success of the program has resulted in the expansion of the target population to include children up to the age of five.

### THE ROLE OF COMMUNITY HEALTH WORKERS

CHWs are a formal part of Rwanda's national health strategy and play a crucial role in extending health services to the village level. They are full-time volunteers who serve as the first point of contact with the health system, providing preventive and basic curative services at the village level and serving as a liaison between communities and health facilities. CHWs are elected by the community during the monthly *umuganda*, or community service day, and are supervised by community health directors from the catchment-area health center.

Each village—roughly 100 to 150 households—elects three CHWs: An *assistante maternelle de santé* (ASM) provides maternal and newborn care, and a male and female community health worker pair (*binomes*) provides basic care. The ASM registers pregnant women, conducts regular visits during and after pregnancy, and encourages deliveries in health facilities where skilled birth attendants are available. The ASM also educates community members about the importance of prenatal and postnatal care and provide referrals to health centers as needed, particularly when they observe danger signs. *Binomes* are trained and equipped to provide integrated community case management (assessment, classification, and treatment or referral of diarrhea, pneumonia, malaria, and malnutrition in children under age 5), contraceptives, directly observed therapy for tuberculosis, preventive care for noncommunicable diseases, preventive and behavior change activities, and household visits.

As part of the RapidSMS-MCH program, CHWs are given a mobile handset and a code card, allowing them to collect and submit patient-level data on key maternal, newborn, and child health indicators in real time. Basic mobile phones are used rather than smartphones because they have longer battery life and can work for several days even during power outages in isolated regions. The code card lists codes for different child and maternal health events, in the form of acronyms. For example, the code *RED* is used when the patient's condition is life threatening, and the code *NP* is used to signal "no problem" when a pregnancy is proceeding normally.

CHWs register new pregnancies in the system and use SMS text messages to report all pregnancy warning signs among women of childbearing age. The message has a specific structure: it consists of a command followed by data values in a fixed order, with each value separated by a space. Similarly, to report a new pregnancy, they use the code *PRE* and enter the mother's national ID number followed by the input parameters in the order specified on the code card. CHWs receive a response message confirming that their message has been received by the system.

The data that CHWs collect through RapidSMS-MCH span a wide range of areas, including prenatal care, delivery, postnatal care, growth monitoring, and maternal, newborn, and child mortality. CHWs submit data on these key indicators for all children under age 5 to a central RapidSMS-MCH database, which can be accessed by facilities and is stored on a central server. Real-time data feedback loops allow the system to send automated text message reminders to CHWs about clinical appointments, prenatal care visits, delivery, postnatal care, and follow up visits so CHWs can follow up with patients and increase patient attendance at prenatal and postnatal care visits.

When danger signs are present and emergency obstetric care is needed, the CHW can send an emergency RED code to the system, which alerts the nearest ambulance driver and the manager of a nearby health facility. The CHW's text message contains information on the danger signs, the name of the village, and the CHW's contact number. The automated system responds by sending the CHW instructions for immediate steps to take while waiting for the ambulance to arrive.

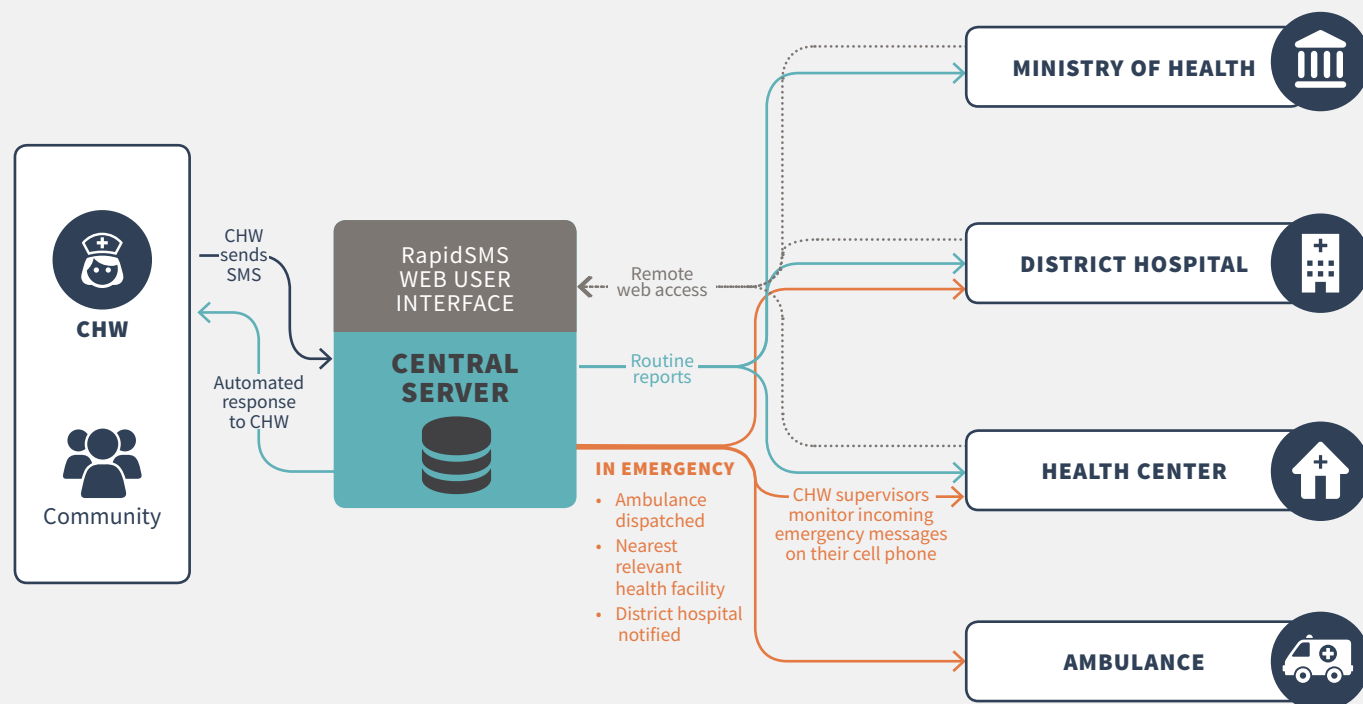
## DATA FLOW IN THE RAPIDSMS-MCH SYSTEM

The RapidSMS-MCH system includes a password-protected web interface that gives health managers access to aggregated and disaggregated data and reports and enables individual patient tracking. Data gathered through the system are used to inform key decisions regarding service delivery, including forecasting the number of expected deliveries at each facility over the next two-week period. This allows the facility to ensure that an adequate number of staff are available and to identify high-risk patients among the expected deliveries.

In the Ngoma district, for example, facilities use the data to ensure that they have enough birth kits available for the expected number of deliveries. The Kibungo Hospital collects information on newborns born with cleft lip or cleft palate for later use when programs such as Operation Smile are performing surgeries in Rwanda. At the Rubaya Health Center in the Ngororero district, RapidSMS-MCH data are shared at weekly staff meetings in the respective departments, leading to more informed decision-making.

The RapidSMS-MCH system has a built-in error log that facilitates continuous technical monitoring. The error log records any inaccuracies in SMS formatting or logic errors when a CHW reports to the system. In response, the system generates a message for the CHW with instructions on correct formatting. Community health officers also review the error log and provide feedback to the CHWs. (See Figure 5.) As Rwanda continues to build on the success of this program, new alerts aligned with updated maternal and child health protocols, malaria treatment guidelines, data quality controls, and user-friendly dashboards have been added.

FIGURE 5 RapidSMS-MCH System Information Flow



Source: Ngabo F., et al. 2012.

## PROMISING RESULTS

The RapidSMS-MCH system has some ongoing challenges, such as electricity issues in rural areas and high rates of turnover among CHWs, but the impact has been impressive so far. Since the first pilot in 2009, it has helped more than 730,000 pregnant women and 1 million newborns access essential and often lifesaving health services.


A 2016 evaluation commissioned by UNICEF and the Ministry of Health used longitudinal quantitative data and comprehensive interviews to assess the impact of the RapidSMS-MCH program based on a number of key indicators and outcomes. The study found an 18% increase in facility delivery rates over a single year as a result of RapidSMS-MCH. It also found increases in postnatal care registration, the number of care visits, malnutrition screening, and immunizations. Interview participants noted that the objectives of the program are well aligned with district, national, and international targets and care has reached the intended beneficiaries. As a leader in the use of digital health to improve service delivery and address the scarcity of human resources in health, Rwanda is continuing to find innovative ways to use emerging technologies to improve its health system.

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## CASE STUDY

# Improving Monitoring of Health Commodities to Overcome Supply Chain Fragmentation

COUNTRY	 Senegal
INNOVATION	Integrated supply chain information management
IMPACT	Streamlined supply delivery and improved service delivery through increased accessibility and availability of health products



Many countries struggle with vertical health systems in which priority health needs have separate delivery models, leading to fragmented information and service delivery systems. This fragmentation can be particularly pronounced at the primary care level, where services for many common conditions have separate points of care. In Senegal, as in many countries, separate health programs—such as those for malaria, tuberculosis, and family planning—had separate supply chains and did not share delivery mechanisms for products and medicines, leading to inefficiencies in tracking and distribution due to duplicative efforts and lack of coordinated action.

By addressing major inefficiencies in the way family planning commodities were monitored and supplied, Senegal was able to streamline the delivery of essential commodities and develop a framework for overcoming fragmentation for all PHC supplies. Aligning facility and national supply data through improvements in product monitoring and data feedback loops allowed Senegal to monitor real-time data on key indicators, such as product availability, and ensure that women had reliable access to family planning services and that providers were able to address the needs of their patients. More than 90 essential PHC products have been integrated into a coordinated supply distribution chain across Senegal, allowing clinic, district, and national-level health staff to more effectively track and forecast product consumption and health trends.



By improving the way drugs and supplies (B1) move through the health system and strengthening monitoring capacity (B3), Senegal has been able to increase access to (C3) and availability of effective PHC services (C4) and strengthen facility organization and management (C2).

## *The Challenge:*

### **Misaligned Supply Forecasting and Frequent Stockouts**

In 2012, the unmet need for modern contraceptives among married women in Senegal was nearly 88%. Public-sector facilities, where most reproductive-age women go to seek family planning services, reported stockouts more than a quarter of the time. The National Supply Pharmacy, the government agency responsible for providing all health commodities to public-sector facilities, delivered commodities to the regional level but no further. From regional warehouses, districts had to arrange transportation to district warehouses; local health facility staff were responsible for procuring and transporting commodities from there, often without the information they needed to forecast the commodity needs of their facility.

This “pull-based” distribution model, in which facilities bore most of the burden of ensuring availability of health products, was inefficient. It was not uncommon for products to be in stock at the national level but absent from the shelves of facilities. A 2014 study found that 84% of women using a modern contraceptive method were affected by stockouts in a single year, and that in at least 60% of these cases,

commodities that were unavailable in facilities were recorded as “in stock” in national tracking systems.

Under the pull-based system, paper-based reporting resulted in a lack of harmonization between clinics and district warehouses. Clinic staff who had little formal training in supply chain management and many competing demands on their time were assigned to track and forecast family planning needs. This led to incomplete reporting of family planning data at the national level and lack of accurate and timely commodity forecasting throughout the health system. In addition, the requirement that clinics pay for commodities up front using their own “working capital” created incentives that were misaligned with the overall goals of the health system. Out of necessity, providers would frequently favor stocking commodities that earned them higher margins; this meant that family planning products—which typically do not earn high revenues—were a low priority for them. Since the efficacy of most contraceptives depends on consistent access, Senegal knew that action had to be taken to address this need.

## *The Innovation:*

### **A New Approach to Monitoring Supplies**

To overcome supply challenges, Senegal’s Ministry of Health and Social Action and the National Supply Pharmacy worked with IntraHealth International, Merck for Mothers, and the Bill & Melinda Gates Foundation to develop the nationwide Informed Push Model—called Yeksi Naa (“I have arrived”)—a supply distribution scheme that uses real-time data to manage supplies and direct health commodities through routine stock management. Third-party distributors make monthly deliveries of health products directly to facilities, where they evaluate current stock and enter data into an online platform called CommCare, allowing their logistics managers to track consumption trends and forecast future needs. Facilities are charged only for the

commodities consumed during the preceding month. This strategy lifts the burden of logistics and operational tasks from overburdened health facility staff and shifts the financial risk away from facilities to ensure that monetary constraints do not impede a clinic’s ability to provide essential commodities.

Yeksi Naa uses a tablet-based logistics management information system that transfers data in real time to the district, regional, and national levels. This ensures that information at facilities aligns with that recorded at the national level. As in the old model, a national warehouse in Dakar serves as a central storage site and regional warehouses use

#### **HARMONIZING CONSUMPTION DATA AND HEALTH STATISTICS**

The integration of logistics and health management information systems represents a key aspect of better data use for better decision-making. Logistics management information systems allow health system managers to evaluate how commodities are moving across all levels of the system, including available stock, dispensing of products, and needed adjustments. Similarly, health management information systems compile important system performance information, including disease incidence rates, services sought, and outcomes, which can be used to aggregate and track population health trends. These two types of systems are often separate, so decision-makers cannot easily compare population health and supply chain trends to see whether inputs are available when and where they are needed.

Senegal developed an automated, integrated dashboard to support the Informed Push Model in partnership with the UN Commission on Life Saving Commodities for Women and Children. Implemented in 1,400 health facilities across four districts, this shared dashboard displays information on health commodities alongside facility health reports, allowing health system managers to evaluate the relationship between incidence and product availability over time. It also displays service delivery indicators side by side to allow health system managers to more comprehensively understand the mechanisms of patient care. In the coming years, Senegal intends to scale up this model to integrate health information and logistics systems across the country by linking the CommCare system with the national Data Health Information System (DHIS2).



consumption data from districts to order products for delivery. Under the new digitized system, however, accurate and timely reporting enables stronger forecasting and tracking. Logisticians can use historical data to determine the amount of product each clinic will need and can adjust this amount based on anticipated climatic conditions or fluctuations in national-level health trends. At the facility level, paper and Microsoft Excel-based tracking are used to corroborate the tablet-based inputs.

Shifting forecasting responsibilities from facility staff to logistics experts enables better trend analysis that accounts for activity at individual facilities and across the region. Once a month, reports are compiled by each facility and shared with district health experts, head nurses, and midwives. Regional and national reports are also compiled regularly to report on trends and track progress toward global and national targets. In the pilot phase of the Informed Push Model, one district was able to identify a shortage of the local anesthetic used to deliver contraceptive implants after observing inexplicable declines in implant use across facilities.

## SCALING UP THE MODEL

After the pilot phases of the Informed Push Model increased the use of modern contraceptives by more than 90% in some regions, scaling up was the clear choice. As ownership of the project transitioned fully to the Division de la Santé de la Mère et l'Enfant and the National Supply Pharmacy, the scope of commodities delivered through the Informed Push Model was expanded. Currently, Yeksi Naa delivers 90 essential health products to facilities around the country. (See Figure 6.)

Integrating disparate health products into a single supply chain is challenging, and developing a process to select the products to combine into single deliveries requires significant trial and error. As the Yeksi Naa project scaled up, much consideration was given to how family planning products could be delivered along with other health commodities, including essential medicines.

By 2016, after implementing supply chain integration efforts, Senegal had nearly quadrupled the percentage of women whose demand for modern family planning was met by modern methods, lowering the unmet need from 88%, recorded just four years earlier, to 53%. By

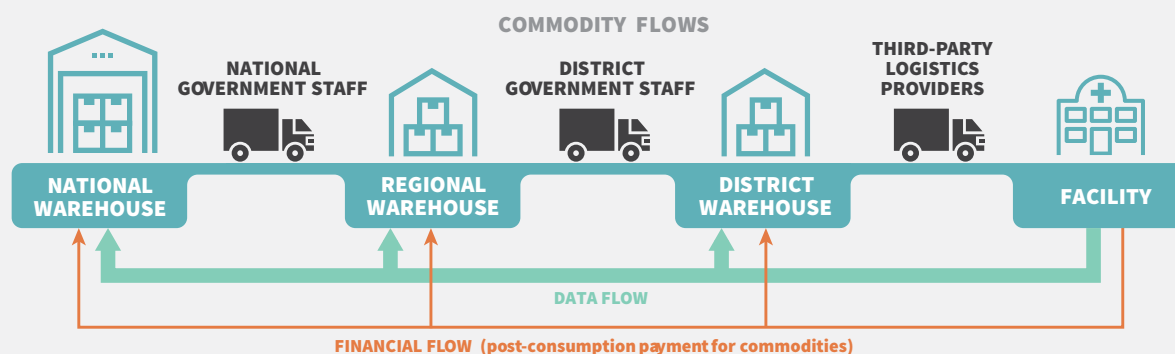
2017, when the new model had been fully scaled up, access to modern contraceptives had increased for an estimated 3.2 million women across Senegal, and average rates of stockouts for modern contraceptives had fallen below 2%.

The push-based supply chain model has revolutionized the delivery of essential health products in Senegal. Providers can remain at their facilities rather than having to travel to procure supplies. This, in turn, means that clinics can be open longer and that when patients arrive, the commodities they need are in stock. Transferring supply chain management to trained logisticians has reduced inefficiency and improved data quality, availability, and visibility by ensuring that those responsible for recording stock information and forecasting have the requisite expertise to complete these tasks. As the Yeksi Naa program continues to expand, Senegal provides an important example of how data can be used to identify and address challenges and refine solutions to improve service delivery.

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FIGURE 6 The Informed Push Model for Health Commodities



Source: [merckformothers.com/docs/senegal-informed-push-model.pdf](http://merckformothers.com/docs/senegal-informed-push-model.pdf)

## CASE STUDY



# Increasing Transparency and Accountability Through Facility Quality Assessments

COUNTRY	 Tanzania
INNOVATION	Nationwide quality assessments for “star ratings” and facility accreditation
IMPACT	Increased transparency, informed decisions, and social accountability

Effective data use means that health care information is not merely transmitted up through the system—collected at facilities and transferred to the district, regional, and national levels, where it can be analyzed and evaluated—but that compiled information is shared back to the levels from which it was collected. This process, known as a “data feedback loop,” is a key component of a responsive culture of data use to inform decision-making. Quality monitoring frameworks that compile understandable, transparent indicators can help health system managers and providers identify areas for improvement. In Tanzania, transparent accreditation of PHC facilities is conducted using a five-star rating system that establishes strong data feedback loops and helps hold PHC facilities and providers accountable for improvements.



Tanzania’s standardized PHC facility accreditation policy (A1) improves the way facilities are monitored and assessed and strengthens the use of information management systems (B3). This has improved facility organization and management (C2) and increased the availability of effective PHC services (C4).



## *The Challenge:*

### **Poor PHC Performance and Accountability**

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In the past two decades, Tanzania has seen marked improvements in population health. In line with its UN Millennium Development Goal targets, the country reduced under-5 mortality by more than 50% between 1990 and 2015 while increasing facility deliveries and births attended by skilled health personnel and limiting mother-to-child HIV transmission. To continue building on these successes, the Tanzanian government has recognized the need for stronger quality assurance procedures to continuously assess system performance and identify areas for improvement.

A key challenge in improving population health has been limited access to high-quality PHC from functional facilities. High rates of provider absenteeism, poor adherence to clinical guidelines, and frequent stockouts of medical products have resulted in gaps in service delivery

that have hindered provision of adequate care, even when patients have had physical access to PHC facilities.

To improve PHC performance, governance, and accountability, the Tanzanian government launched a series of measures under the Big Results Now in Health program, which was developed in 2015 as part of the country's Development Vision 2025. Big Results Now aims to improve the collection, sharing, and use of data for decision-making. Its Star Rating quality assurance program provides a stepwise accreditation process for PHC facilities that standardizes facility evaluation, guides improvements for performance management, and creates a transparent and reliable way for communities to hold providers accountable for delivering high-quality care.

## *The Innovation:*

### **A Five-Star Rating System for PHC Accreditation**

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Tanzania's primary health facility accreditation program is aimed at identifying facilities—both public and private—that need additional support in targeting areas for improvement. The program evaluates both service delivery and facility support systems and helps inform national evaluations of facility performance while identifying common bottlenecks and weaknesses. Priority areas for facility strengthening include organization and management, service delivery, and referral mechanisms.

The program's five-star rating system uses objective criteria to assess how a facility is functioning. Accreditation is awarded to facilities that receive three or more stars. Once evaluated, facilities are eligible for targeted interventions—including mentoring and supportive supervision—to help them achieve accreditation or make improvements more broadly. Setting a minimum standard for accreditation is meant to bolster quality of care, strengthen service delivery, and improve performance on key health objectives while maintaining the national commitment to community-based care, in which local governments work with communities to monitor health system performance and improve service delivery. In addition to enhanced social accountability, the ratings are used to establish performance targets and contracts as well as facilitate future decentralization of fiscal management to health facilities.

Assessments are conducted under the Ministry of Health's Quality Assurance Division and carried out by local assessors at both public and private facilities. Assessors track quality and performance across four key domains: management; service charters and accountability; safe and conducive facilities; and quality of care and services. After assessing a particular facility, assessors sit with the facility staff to develop quality improvement plans (QIPs) based on the assessment findings, with an emphasis on areas of low performance or gaps. Results are immediately shared with the health facility and a report is provided to local health management teams at the facility, council, and regional levels as well as both the President's Office for Regional Administration and Local Government (PO-RALG) and the Ministry of Health. PO-RALG supports health management teams at the regional and district levels for follow-up activities, including supportive supervision and mentoring. This process brings together a diverse group of stakeholders to support the implementation of QIPs through Regional and Council Health Management Teams.

A facility's star rating is based on the lowest score it receives in any one of four domains. This means, for example, that a zero-star rating is assigned to a facility that scores below 20% in any domain and that a facility must earn a 60% in all four domains in order to be awarded three stars.

## ROLLING OUT THE FACILITY ASSESSMENTS

Between July 2015 and December 2016, facility assessments were rolled out across the country, establishing a baseline among nearly 7,000 facilities across 26 regions. The assessment found that only six facilities qualified as “high performers,” with ratings of four or more stars. Only 2% of facilities received the three stars required for accreditation, while an additional 12% of facilities received two stars. Most facilities received one star (51%) or zero stars (34%), indicating a need for immediate attention and improvement. Disaggregating results by region has helped national and regional-level policymakers appropriately direct investments and has allowed implementers to identify positive outliers, investigate factors underlying success, and share findings to support improvement in other facilities.

The comprehensive QIPs developed following the baseline assessments specify gap areas and outline steps to improve facility ratings. Elements of these plans are specific to the individual facility and can range from identifying the need for additional staff or trainings to increasing client-centered services or engaging with local communities. The plans specify who will lead improvement efforts and set a timeline for rolling out activities. Since facility scores are based on a facility’s lowest domain score, many districts had a number of “quick win” facilities that were eligible for elevation to the next level by improving scores in a single domain.

Performance improvement strategies are complemented by social accountability mechanisms, performance targets, and fiscal decentralization. Together, mechanisms such as community scorecards and patient charters are intended to foster a dialogue with local populations on their right to high-quality health care. As Tanzania works toward a single national health insurance program, the Tanzania Social Action Fund—a World Bank-supported project—is using star ratings to evaluate equity by stratifying facilities according to the demographics of the populations they serve; in this way, policymakers and managers can closely monitor the quality of care delivered by facilities that serve a higher proportion of impoverished people.

Recognizing the need to prioritize improvements, Tanzania targeted facilities with zero-star ratings first, offering additional funding and establishing facility complaint management guidelines to improve basic performance. A second round of nationwide star rating assessments showed one-fifth of PHC facilities achieving three or more stars. Raising ratings for all facilities remains a top priority, as indicated by ongoing policy support, funding, and technical support.

Star rating assessments and quality improvement tracking have been integrated into Tanzania’s health data platform, supporting the use of data by enhancing access. The country aims to establish a fully automated, real-time data tool with an effective feedback loop and interactive scorecards to facilitate interpretation and use.

## DATA-DRIVEN INVESTMENTS

Additional performance improvement programs in Tanzania include a results-based financing scheme that requires at least a one-star overall rating and a minimum score in the human resources subdomain for eligibility to receive funds for facility infrastructure improvements and supply availability. Facilities without these prerequisites can work with regional and council health management teams to address gaps and work toward earning one star.

In the future, the Tanzania government plans to link insurance payments to star ratings as a strategy to motivate health facilities to perform beyond the three-star minimum and improve on performance targets identified for each dimension. Under this system, facilities achieving a minimum three-star overall rating will be eligible for focused investments, with the end goal of meeting international accreditation standards. Funding based on star ratings will be additive to ensure that facilities with fewer than three stars are not financially penalized in a way that exacerbates weaknesses.

As Tanzania decentralizes management of its health facilities to improve governance and management at the facility level, it will implement social accountability mechanisms to monitor and strengthen service delivery and facility organization and management. As a result of the star rating system, health system managers are better equipped to understand facility performance and make decisions accordingly. Establishing transparent facility accreditation has allowed Tanzania to more effectively direct national and regional priorities and has given local governing authorities important tools to hold health facilities accountable for improvements.


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## CASE STUDY



# Using Digital Health Records to Improve Care for Transient Populations

COUNTRY	 Tanzania
INNOVATION	A patient health record used by roadside wellness centers to track mobile populations through their travels
IMPACT	Ability to track disease across borders

Mobile, or transient, populations can be defined as individuals who move frequently—either across international borders or within their own country—while maintaining the same primary residence. Beyond the reach of traditional health systems and away from home for extended periods, these populations often carry an increased vulnerability to illness. In the East African Community—made up of Burundi, Kenya, Rwanda, South Sudan, Tanzania, and Uganda—70% of goods are transported by road, and long-distance truckers make up a significant portion of transient populations.



Establishing roadside clinics (B2) along major transit corridors and using electronic medical records to track patient health regardless of where they seek care (B3) has allowed Tanzania to improve continuity of care for transient populations (C5), increase access to care for hard-to-reach communities (C3), and improve the organization and management of health facilities (C2).

## *The Challenge:*

### **Providing Continuous Care to Transient Workers**

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Transient populations frequently lack access to health services, passing between cities and across borders without seeking care or addressing infections they may be carrying. Border towns, truck stops, mining zones, and construction sites—often referred to as epidemiological hot spots—create conditions for disease transmission that place local communities at increased risk as transient populations pass through. Many towns bordering rest stops along major transit corridors lack

sufficient health services, including reproductive health, family planning, nutrition, malaria, and maternal and child health services, which places both local communities and the individuals passing through at increased risk of contracting or spreading illnesses. Tanzania is addressing this problem through a unique patient tracking system that allows patient health to be monitored between clinics and across borders.

## *The Innovation:*

### **Using Data to Track Patients Across Borders**

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To ensure that hard-to-reach populations have access to reliable, continuous care, a nongovernmental organization called the North Star Alliance has established a network of clinics along high-volume transit corridors and has implemented a robust system for tracking patients. These clinics can operate effectively and efficiently even when patients access care in different countries as they travel. Founded in 2006, North Star Alliance provides health services in Sub-Saharan Africa to populations that are often isolated from and neglected by public health facilities, including long-distance truck drivers, sex workers, and the communities they interact with. The organization began with an explicit focus on HIV and sexually transmitted infections, but it has systematically expanded its scope to provide a range of PHC services.

Nearly 50 North Star clinics across 13 countries offer a basic package of PHC services, including reproductive health services and screening for noncommunicable diseases. These “Blue Box clinics”—also known as Roadside Wellness Centres—are semi-mobile structures made from converted shipping containers that can be rapidly produced and deployed while still meeting WHO facility standards. A standardized model with a lean staffing structure has been crucial to North Star’s ability to replicate its model in a variety of contexts while maintaining the same quality standards. Over the past 10 years, North Star has responded to patient demand by expanding into new geographic areas and offering new services, including screening tests for vision and hearing as well as counseling for conditions such as hypertension.

North Star’s expansion has been enabled by an innovative electronic health care data system that captures and stores information on patient demographics and service utilization. The system allows patients to receive treatment at any Blue Box clinic, thereby ensuring continuity of care and making care delivery more efficient. North Star uses electronic medical records, also known as “health passports,” that patients can access at all North Star clinics. This allows North Star health workers to provide coordinated and continuous care and allows North Star providers and government partners to analyze epidemiological data to identify health trends throughout eastern and southern Africa. Aggregated and anonymized data are shared with ministries of health

and are a valuable resource for understanding disease trends and profiles of mobile populations along major transit corridors.

The health passports are managed in North Star’s electronic medical record (EMR) system. The system uses a distributed network of laptops connected to a central server. Providers download North Star’s EMR software onto their laptops and record patient information. They synchronize encrypted EMR data with the central server, which in turn synchronizes data with the other laptops in the closed network, operating as a single EMR system across countries.

To protect against disruptions caused by local electrical outages, each Blue Box clinic is equipped with a battery-powered laptop. During power outages, clinics can temporarily switch to manual paper records and then enter the data when systems are operational again. In many rural areas where North Star operates, internet connections depend on telecom networks, which often have limited bandwidth. As the number of North Star clinics expands, overcoming connectivity challenges will remain a top priority.

#### **WORKING WITH GOVERNMENTS**

North Star works with governments, including ministries and departments of health and district health management committees, in the countries where it operates. Its strong partnerships with governments are based on the principle of mutuality. Ministries of health offer capacity-building trainings to Blue Box clinical officers, nurses, and HIV lay counselors, and they supply facilities with essential medical commodities. North Star, in turn, provides valuable epidemiological data to the ministries, including data on health care access and utilization by mobile populations.

In Tanzania, North Star works closely with representatives of the Ministry of Health, Community Development, Gender, Elderly and Children (MoHCDGEC) to ensure that the organization’s work complements national efforts. The ministry provides Blue Box clinics with HIV test kits and condoms and trains North Star staff on a range of relevant health priorities. For example, North Star providers at



the Iringa Blue Box clinic receive MoHCDGEC training on domestic violence and on coding causes of death in health facilities using WHO's international-standard ICD-10 codes. The MoHCDGEC also assigns a government nurse to the North Star clinic in Iringa. The Ministry of Works and Transport provides land for the Blue Box clinics in Iringa and Dar es Salaam. Partnerships with other community-based and private organizations (such as the Tanzania Commission for AIDS) help expand North Star's impact. North Star's Blue Box clinics in Dar es Salaam and Tunduma also strengthen the MoHCDGEC's efforts to increase antiretroviral therapy coverage across Tanzania. North Star's frontline staff in the Dar es Salaam and Tunduma Blue Boxes play a critical role in initiating and managing antiretroviral therapy for HIV-positive patients. As a result, North Star's operations align with global health commitments and help advance the UNAIDS Fast-Track 90-90-90 strategy, which seeks to end the AIDS epidemic by 2020.

MoHCDE also provides Blue Box clinics with supportive supervision to ensure adherence to government policies and procedures. Regional and district health management teams support Blue Box clinics along the Dar Corridor, while public health facilities serve as referral sites for the Blue Box clinics, which increases demand and access to services. Local North Star clinic teams are familiar with the communities, politics, existing resources, and services available in their catchment areas. Patients who require higher levels of care or services that are not provided by North Star clinics are referred to government-run health centers or private facilities. Referrals are still paper-based, and the diagnoses, results, and treatments received by patients in government clinics are recorded in a North Star EMR only when the patients revisit a Blue Box clinic. In the coming years, North Star plans to develop a solution to enable data sharing between its clinics and government health information systems.

## TARGETING LOCAL HEALTH NEEDS

North Star collects and stores vast quantities of data on patient admissions, diagnoses, and treatments as well as on outreach activities. The rich information captured by the system has allowed for targeted adjustments to population health needs and allows clinics to be responsive to emerging health trends. For example, analysis of North Star's data revealed that truck drivers are at greater risk for cardiovascular disease due to poor dietary options when traveling and sedentary behavior. This finding led the North Star clinics to increase their focus on noncommunicable diseases.

To reach more long-distance truck drivers—North Star's second-largest patient group, according to 2017 data—North Star developed the Star Driver loyalty program, which combines professional certification with health literacy promotion among truck drivers. Star Driver integrates traditional clinical and public health services, such as HIV testing and family planning, with nonmedical services such as professional development, health promotion, and road safety workshops. The program uses mobile phone technology to enlist and retain truck drivers in the program. It sends regular SMS text messages to truck drivers to encourage testing and care-seeking for a range of communicable and noncommunicable diseases. Initially piloted and rolled out in Kenya, the program has been implemented in six clinics across Tanzania, including locations in Dar es Salaam, Iringa, and Tunduma. It sets a target for long-distance drivers to visit North Star clinics four times a year to be tested for sexually transmitted infections and receive primary care checkups. Drivers who complete the Star Driver process receive a Star Driver certificate, a recognition that can be shared with new and prospective employers.



## ENHANCING CARE BY INCREASING CONNECTIVITY

North Star is currently developing a new digital health system with a different network architecture that can operate in areas with low to no network connectivity. Under the new model, each clinic will have its own uninterruptable power supply and manage data synchronization using an in-clinic WiFi network. The browser-based EMR, accessible through the clinic laptop, will connect to this local server. Synchronization to a central database and with other clinics will be scheduled for low-bandwidth-usage periods, such as late evenings and nights.

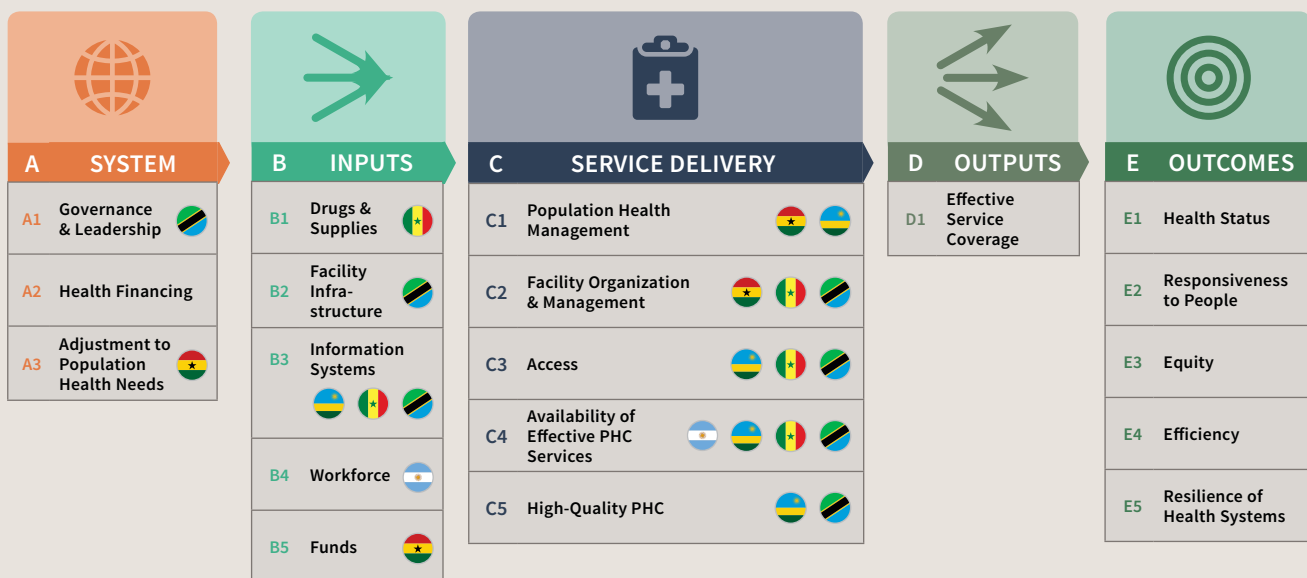
The new system will integrate stock management, allow in-clinic drug storage and dispensing, generate low-stock warnings, and facilitate automatic ordering. North Star also hopes to implement the use of tablets for data collection, with apps guiding providers through the requisite EMR steps. The use of tablets will allow Blue Box providers to operate offline and synchronize data when they are in proximity of the clinic WiFi network, as well as to manage referrals electronically.

The recent 61<sup>st</sup> World Health Assembly called on nations to improve the health of migrant and mobile populations by increasing the use of data to inform evidence-based policies. North Star Alliance is working to make this a reality.

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## LOOKING AHEAD: MEASURING WHAT MATTERS





Strong PHC depends on effectively deploying physical and human resources to deliver accessible, comprehensive, coordinated, continuous, person-centered, and high-quality care that equitably responds to all people's health needs. The ways in which PHC data—across all the dimensions of the PHCPI Conceptual Framework—are collected, analyzed, and used can have significant implications for the effectiveness and efficiency of PHC. The state of PHC data is still poor in many contexts, but the seven studies in this report demonstrate that a wide variety of innovations in PHC data use are possible and can translate into PHC improvements even in resource-poor contexts.

### **KEY THEMES: WHAT THE CASE STUDIES REVEAL ABOUT THE ROLE OF DATA IN PHC STRENGTHENING**

Four key themes related to data-driven PHC improvement emerged from these case studies:

**Incorporating local, regional, and national-level data into priority setting can help ensure that practices are sustainable and scalable while remaining relevant and appropriate at the community level.** Ghana's use of implementation science to diagnose challenges and accelerate scale-up of its flagship CHPS program shows the importance of developing and disseminating an evidence base to inform strategic policy decisions. By evaluating the successes of individual projects and working with local and national leaders and global experts to identify how these successes could be replicated, Ghana demonstrated a commitment to ongoing PHC improvement that depends on the collection, dissemination, and use of high-quality data. Tanzania's facility accreditation program similarly demonstrates the importance of using and communicating data to local populations, practitioners, and health system managers. At the local level, this information can be used to inform care-seeking behaviors and develop facility improvement plans, and at the national level it can be used to develop a comprehensive understanding of PHC performance across the country. Argentina's experience shows that using existing data to inform decisions and policy direction is not always the solution: in some instances, new efforts must be made to collect data on previously unmeasured phenomena. Developing strategies to better evaluate the experience of patients and providers—and effectively using this information once it is collected—is critical to building a culture of evidence-based decision-making.

**Integrated data systems provide a comprehensive view of system performance and can help ensure that care is available when and where patients need it.** Innovations in information systems can often spur improvements in the health system more broadly. Working to improve supply chain data was a critical step for Senegal in streamlining the health commodity supply chain and ensuring that essential health products and medicines were getting to the people who needed them, when they needed them. Tanzania's development of an integrated system to track patient medical records between clinics and across borders is a promising step toward improving the health of increasingly mobile populations. In both cases, the ability to share data has enabled evidence-based decision-making, providing better care to patients through improved service delivery and increased coordination of care.

**Coordinated and continuous care depends not only on technology solutions to connect patients across providers and levels of care but also on effectively collecting and disseminating data.** The use of telehealth technology and digital health solutions represents an exciting new approach to connecting patients with care as well as collecting and sharing data. In Rwanda, mobile devices are fueling increased accessibility and coordination of care by enabling patients to receive medical guidance at a time and place that works for them. As countries work to scale up these programs, ensuring that patient data are secure and accessible to those who need it will be an important priority.

**Strengthening PHC as the foundation for achieving UHC depends not only on the generation of new data but on the better analysis and use of existing data to identify areas of weakness and develop innovative solutions.** The amount of available data is increasing exponentially, but even the best evidence can easily become lost in the flood of excess information. Tools that use indicators to highlight areas of strength and weakness—such as the PHCPI's Vital Signs Profile—can help leaders better understand system performance and develop appropriate reforms.

## FUTURE DIRECTIONS: USING THE VITAL SIGNS PROFILE TO IDENTIFY PRIORITIES FOR PHC IMPROVEMENT

To build on the progress already achieved in strengthening PHC, the five countries in this report collaborated with PHCPI to develop Vital Signs Profiles—visual snapshots of PHC system strengths and weaknesses. (See Figure 7.) Given the quantity and varying quality of health-related data available, such tools help distinguish the “signal” from the “noise” by highlighting the best-quality information and focusing attention on the most critical components of system performance. This helps leaders focus their reform efforts more effectively and can inform deeper analysis.

The Vital Signs Profile helps answer several key questions about a country’s PHC system:

- » **Financing:** How much does the country spend on PHC? Is this adequate to address the needs of the whole population?
- » **Capacity:** Does the country have policies that prioritize PHC? Does the system have enough drugs, supplies, and health care providers, and are they organized and managed effectively?

» **Performance:** Are people able to get the care they need, without facing financial or geographic barriers? Is the care that people receive of high quality?

» **Equity:** Does the system reach the most marginalized people in society? Are disparities based on wealth, education, and geography decreasing over time?

The Vital Signs Profile promotes coordination among different data sources and makes data more accessible by compiling and presenting information in a way that is easy for policymakers, donors, and advocates to understand. Where possible, the data displayed are globally or regionally comparable, making it easier for decision-makers to learn from the experiences of other countries and apply relevant insights. For more information, visit the PHCPI website at [www.improvingphc.org](http://www.improvingphc.org).

As all countries work to strengthen their use of data to achieve UHC, the lessons of these five countries point the way toward sustainable and equitable health for all. Just as PHC differs by country and context, so too does the use of data for improvement. The case studies in this report show that many paths are available to strengthening PHC. Better use of data can help ensure that countries not only reach their goals but can sustain and expand improvements.

FIGURE 7 A Sample Vital Signs Profile

