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MESH-QI: MENTORSHIP AND ENHANCED SUPERVISION FOR HEALTH CARE AND QUALITY IMPROVEMENT IN RWANDA

ABOUT PARTNERS IN HEALTH

PIH® is a global health organization relentlessly committed to improving the health of the poor and marginalized. We build local capacity and work closely with impoverished communities to deliver high-quality health care, address the root causes of illness, train providers, advance research, and advocate for global policy change.

ABOUT PIH REPORTS

PIH Reports present issues related to public health program implementation in resource-limited settings. They are intended to complement traditional academic publishing by sharing evidence and knowledge from the field that may not fit the constraints of peer-reviewed literature. The intended audience for PIH Reports includes health providers, implementers, donors, and policymakers.

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Cover: Mental Health Nurse Robert Bienvenu (left) and mentee Jean Paul Hakorimana discuss a patient's case at Rusasa Health Center in Rwanda.

Right: View from the road to Kirehe, Rwanda.





RWANDA HAS LESS THAN ONE
NURSE PER 1,000 PEOPLE—
ONE OF THE MOST SEVERE
SHORTAGES IN THE WORLD.



ABSTRACT

Nurses are the linchpin of health care. They vastly outnumber physicians and often are the chief primary care providers for patients in hospitals, health centers, and clinics around the world. This is the case in Rwanda, though the country has experienced a decades-long shortage of clinicians. Rwanda's supply of nurses, at 0.7 per 1,000 residents, is more constrained even than those of other resource-limited countries. Additionally, training and skill levels are inconsistent among nurses who work in the country, which can result in diminished quality of care.

While Rwanda's Ministry of Health has embarked on a long-term plan to increase the quantity of health

care workers in the country, Partners In Health/Inshuti Mu Buzima (PIH/IMB) has collaborated with the Ministry of Health to improve the quality of care delivery and systems through the Mentorship and Enhanced Supervision for Health Care and Quality Improvement (MESH-QI) program. Since its launch in 2010, MESH-QI has connected nurse mentors with advanced training to nurses at rural health centers to improve quality of care. Mentors travel to the health centers to provide specialized training in areas such as HIV, noncommunicable diseases, and maternal and child health, as well as face-to-face support and feedback to



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mentees. The mentors also collect data that is used to inform program activities and further improve care.

Since MESH-QI's implementation, PIH/IMB has seen a higher quality of care delivery—from improved disease screening to better management of patients, to preliminary gains in clinical outcomes. MESH-QI also has been adapted for use in district hospitals, which has led to improvements in patient care and safety. Well-received by Rwanda's Ministry of Health, the program also has informed a national model of HIV mentorship, and it is being used in other PIH sites around the world to address the unique challenges facing their health systems. ♦

Left: Anatole Dusengimana, MESH-QI nurse mentee from Kinoni Health Center, left, speaks with patient Godeleva Mukamusoni, right, and her husband, Siliveri Hakuzumuremyi, in Burera District in Rwanda.

LETTER *from* SHEILA DAVIS



PIH Chief Nursing Officer Sheila Davis

This issue of PIH Reports highlights our commitment to providing quality care throughout the health systems in countries where we work.

The foundation of Rwanda's health system is a network of community health workers, health posts, health centers, and district hospitals. The health center is the focal point of primary care delivery, and nurses are the workforce that deliver this care. Despite the ongoing, long-term efforts to upgrade the level of training for Rwandan nurses, understaffing and limited training remain a challenge.

Being a nurse is a difficult job. Being a nurse with too many patients, few clinical colleagues, and inadequate or limited training is nearly impossible. Working with our partners, the Mentorship and Enhanced Supervision for Health Care and Quality Improvement (MESH-QI) program is part of our strategy to overcome these challenges.

Globally, we need to improve access to quality care. This is occurring in Rwanda, where great advances have been made. For example, HIV care was previously available only at district hospitals, which are often far from the rural areas where most Rwandans live. Now that care is provided in health centers closer to communities, in conjunction with maternal and child health care, primary care, and mental health services.

But to ensure the quality of this care, nurses need the right education and clinical supervision to develop confidence and competency. Unfortunately, Rwanda suffers from a shortage of nurses generally and an even greater shortage of nurses who have received adequate education to provide the level of care they are called on to give.

Historically, nurses in low- and middle-income countries have had limited opportunities to receive education beyond their initial training. Meanwhile, demands for a more skilled workforce have increased. Opportunities to gain knowledge and skills have been rare, and large conventional trainings in locations that pull nurses out of their clinical settings — often for several days or weeks — contribute to the chronic lack of staff at health centers. Nurses also must learn and keep current with Ministry of Health treatment guidelines; when they return to their clinical settings, the reality on the ground is so different that it is difficult to incorporate new information into their daily practice.

The conventional training paradigm needed to be changed into one focused on clinic-based, individualized skill-building that could foster an environment of hands-on learning. We realized we were in a position to provide this on-site training at health centers in Rwanda, and, drawing on PIH's long history of accompaniment, PIH/IMB worked with Rwanda's Ministry of Health to launch the MESH-QI program.

To continually improve services and patient outcomes, quality improvement must be integrated into care delivery. Mentorship provides individualized education for nurses as they deliver care, allowing them to make immediate changes to improve their nursing practice. The ongoing supervision in MESH-QI creates the opportunity for continual learning. Nurses receive real-time, concrete feedback in a supportive environment that also helps boost their confidence.

The MESH-QI program works: Nursing practice has improved, and patients are receiving a higher quality of care. We now know that a comprehensive mentorship and quality improvement program is possible in low-resource settings.

— SHEILA DAVIS
Partners In Health Chief Nursing Officer



INTRODUCTION

GLOBAL NURSING CHALLENGES

Nurses, the largest segment of the global health care workforce, deliver about 90 percent of all health care services worldwide.¹ In many low-income countries, nurses assume leadership roles at health centers and provide a multitude of services, from seeing patients to overseeing necessary administrative tasks. Yet there is a staggering shortage of nurses around the world: Sub-Saharan Africa alone needs an estimated 600,000 new nurses to scale up priority interventions.¹ Worldwide, a shortage of 4.3 million health care professionals poses enormous challenges and severely limits access to care for patients, especially those in low-income countries.² Limited education and training opportunities are significant contributors to this shortage.³

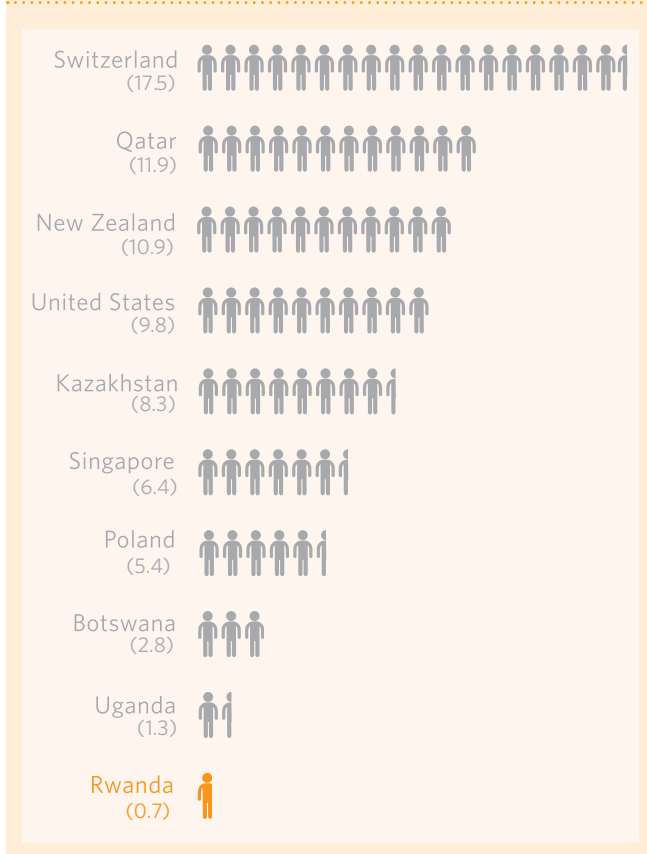
Along with increasing the number of nurses and other health professionals, it is imperative that the current workforce is able to provide high-quality care. Yet nurses on the front lines of care delivery often have inadequate training—only a secondary school education in many countries. Once health care workers in resource-limited settings have completed their formal education, they receive little in the way of continuing professional education.⁴ The training that is provided is often held in capital cities and consists of didactic workshops, incentivized by per diems.⁵ These trainings are often

driven by donor requirements for concrete deliverables, as holding a training is a time-limited task that can be counted in “numbers of people trained” but does not provide ongoing mentorship or support for implementing what was learned at the training.⁶ Didactic trainings also force health care workers away from their posts, compounding the existing challenge of understaffing.

Evidence shows that even with such training, health worker performance may remain poor.^{7,8} Determining whether participants actually apply what they learn in real-life clinical scenarios is rarely assessed.⁹ Thus, this routine approach to training leads to chronic understaffing and inconsistent skill levels among nurses, which directly affects the quality of care they can provide.

In developed countries, the drive for quality has resulted in robust clinical training that focuses on side-by-side mentorship in which the real-time provision of care is taught, evaluated, and improved. Close collaboration is useful for improving the provider’s knowledge and confidence, and it helps nurses adhere to new and changing clinical guidelines.¹⁰ In developing countries, per-diem supported, didactic training is driven by donor aversion to the recurrent costs of mentoring. Yet mentoring is needed where nurses have less formal education and often address a higher disease burden. In the absence of ongoing supervision, training

FIGURE 1. NURSES AND MIDWIVES PER 1,000 RESIDENTS



can be ineffective in improving clinical services.¹¹ Further, efforts to improve health worker knowledge on its own, without addressing environmental factors that affect the ability to deliver quality care—such as unavailable supplies and inadequate equipment—will fail to improve health outcomes.⁷

RWANDA'S SUCCESS AND CHALLENGES

The 1994 Rwandan genocide, which claimed more than 1 million lives, devastated the already weak and under-resourced health system, as many health workers died or fled.¹² Beyond the loss of human life, the country's infrastructure was left in shambles. In the two decades that followed, however, Rwanda achieved some of the largest gains in public health the world has ever seen.¹³

For example, deaths associated with HIV in Rwanda dropped 78 percent between 2002 and 2012. The likelihood of a child dying before the age of 5 fell by 65 percent between 2005 and 2010. The country focused its rebuilding efforts on strengthening the entire health system while capitalizing on the large influx of funding for specific diseases, particularly HIV/AIDS. With improved health

outcomes came economic growth: More than 1 million Rwandans lifted themselves out of poverty and more than 90 percent of Rwandan citizens are now covered under *mutuelles de santé*, the country's national community-based health insurance.¹³ These achievements are largely the result of Rwanda's Ministry of Health forging a comprehensive approach to health systems strengthening that prioritized equity, human development, and health care for the poorest and most vulnerable people.

Despite these gains, the Ministry of Health recognized the need for better trained health professionals to meet the demands of the population. With only 0.7 nurses per 1,000 residents,¹⁴ Rwanda has one of the most severe shortages of nurses in the world (Figure 1). The World Health Organization recommends that, at a minimum, a country should have 2.3 health care providers (physicians, nurses, and midwives) per 1,000 population. Rwanda has less than half that, at 0.84 health care providers per 1,000 population.¹⁵ In 2012, Rwanda launched the Human Resources for Health Program in partnership with a consortium of U.S. universities to improve the formal, post-graduate training of health care providers by developing a residency training program for physicians and advanced training for nurses. The program aims to drastically increase the number of physicians and nurses with advanced training by 2018 and is strengthening Rwandan institutions to sustain this specialized training after the program ends.¹⁵

Much of Rwanda's success rests on the decentralization of preventive and curative services provided by nurses at the health center level. However, in 2011, 90 percent of Rwanda's 8,273 nurses had the lowest level of nursing training available—an A2 degree, which is roughly equivalent to secondary school qualifications.¹⁶ Further, task-shifting—or reassigning specific tasks from health care workers with more advanced training to health care workers with less specialized training (i.e., from doctor to nurse or nurse to community health worker)¹⁷—has been a key component in Rwanda's approach to health system strengthening. As such, nurses are usually the primary care providers at health centers and often lack the skills they need to perform all the duties they are now assigned. The Human Resources for Health program aims to increase by nearly sevenfold the number of formally registered nurses with training at the A1 level, which consists of a three-year registered nursing certificate, from just 797 in 2011 to more than 5,000 in 2018.¹⁵ This will help build a better trained nursing workforce.

Still, formal training is only one component of a larger need for continuing education for nurses. The MESH-QI program builds on-site mentoring into the delivery of care and links this mentoring with quality improvement initiatives. In doing so, MESH-QI

supports nurses' ability to deliver care in their own clinics at the highest quality while simultaneously addressing systems barriers through continuous quality improvement.

In developed countries, ongoing clinical training and education for nurses is often required and usually includes a side-by-side mentorship component in which the real-time provision of care is evaluated.

THE SETTING

Rwanda is one of the most densely populated countries in the world, with nearly 12 million people living in an area roughly the size of New Hampshire. With an annual per capita GDP of just \$639.14, it is also one of the poorest. More than 1 million people live in Kigali, the capital city; the vast majority of the population is spread across rural areas.

Rwanda's decentralized health system provides several levels of care, with the backbone of the health system being the tens of thousands of community health workers across the country. Health posts—of which there is a growing number: 252 in 2013 compared to less than 20 in 2008¹⁸—provide basic preventative and curative services close to communities. The most common health facilities, however, are health centers. There are nearly 500 throughout Rwanda,¹⁸ each serving a catchment area of several thousand people. Health centers are staffed by nurses and provide outpatient primary care and some limited inpatient services. Many key services, including HIV care and uncomplicated newborn deliveries, have been decentralized to the health center level.¹⁹

For needs beyond the scope of the health center, patients are referred to district hospitals, provincial hospitals, and to referral facilities as needed. District hospitals are the lowest-level facility staffed with physicians and primarily provide inpatient services. They include some specialized services, such as minor surgery and chronic disease care, performed by specially trained general practitioners.¹⁹ There are 42 district hospitals and each serves an average catchment area of a few hundred thousand people.¹⁸

The Ministry of Health has made tremendous strides in improving access to health care with the goal of having everyone in the

country live within 5 kilometers of a health facility.²⁰ However, even relatively short distances in “the land of the hills” can be difficult to traverse, and many people still live far from the nearest health facility.

PIH IN RWANDA

Partners In Health and its Rwandan sister organization, Inshuti Mu Buzima (IMB), began working in partnership with Rwanda's government in 2005 to address the critical HIV/AIDS epidemic afflicting the population and to comprehensively strengthen its public health system in rural, underserved districts. Applying lessons learned from our work in Haiti, our efforts in Rwanda have achieved rapid success, gaining the attention of the highest levels of the government and international community. In partnership with the Ministry of Health, PIH/IMB helps strengthen the public health system in three of the country's 30 districts: Burera, Southern Kayanza, and Kirehe. PIH/IMB also supports the government in developing plans to replicate successful innovative programs throughout the country. As the primary care providers for the majority of services, nurses have been an integral part of these efforts.

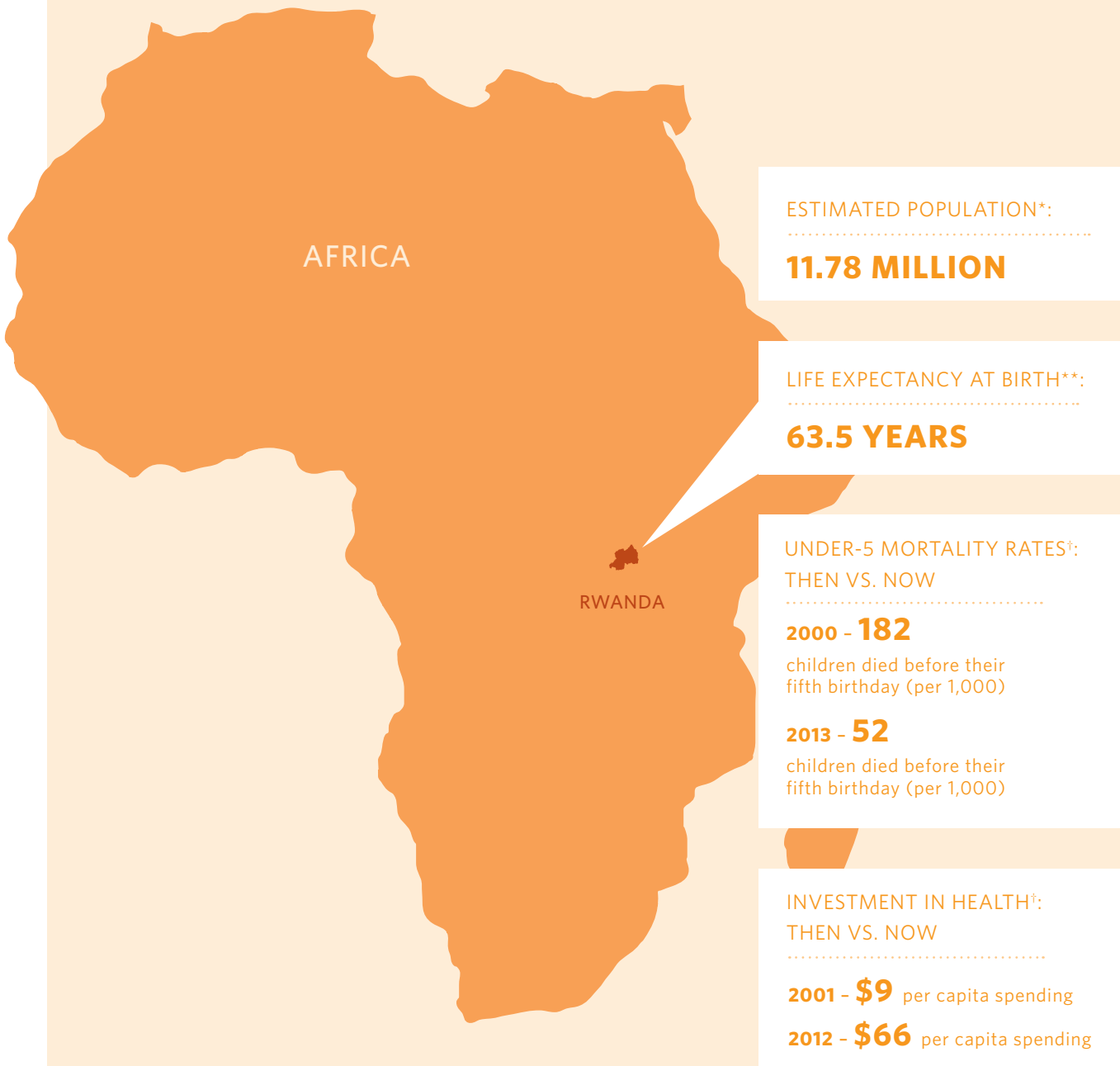
Rwanda has made tremendous health and development gains over the past decade, and PIH/IMB has responded to ever-changing demands on the country's health system (Figure 2). Building on our expertise treating HIV and AIDS, PIH/IMB's work has expanded over the years to include designing and enabling the first health center clinics to treat noncommunicable diseases and provide mental health and palliative care. In addition, when the Ministry of Health requested further training in health care management for its leaders, PIH/IMB brought Harvard Medical School's world-class Global Health Delivery training course to Rwanda in 2012.

At every step of the way, PIH/IMB has worked in close partnership with the Ministry of Health to develop innovative programs that strengthen Rwanda's health system—from the highest levels of technical support for the Ministry of Health all the way to the community level through a continued focus on strengthening the community health worker system.

A NEW APPROACH

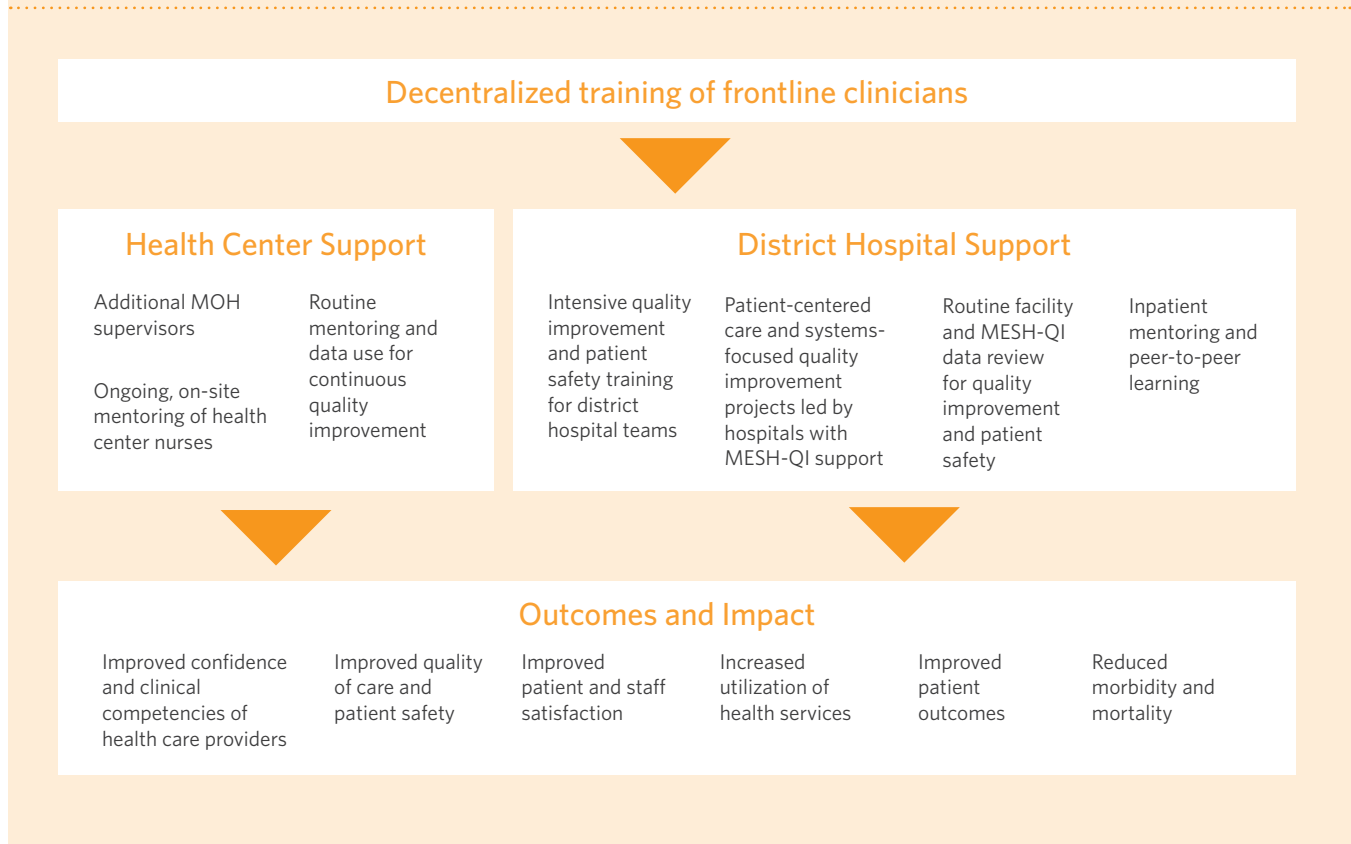
The MESH-QI program is designed to support the ministry's efforts at task-shifting and decentralizing key primary care services to the health center level, such as HIV treatment and basic maternal and child health services. As nurses gain responsibility, MESH-QI provides a model for ensuring their proper training in key Ministry

FIGURE 2. RWANDA IN BRIEF



*2013 World Bank figures
**2012 World Bank figures
†World Development Indicators

FIGURE 3. MESH-QI CONCEPTUAL MODEL



of Health protocols as well as ongoing supervision and coaching to improve the quality of primary care services.

To boost health centers' clinical capacity, PIH/IMB collaborated with the Ministry of Health to provide intensive, on-site supervision and mentorship, utilizing nurses with more advanced training in key clinical areas (Figure 3). These expert nurses are called "mentors" and spend the majority of their time working alongside nurse mentees at health centers to improve their clinical skills and confidence.

A key component of the program is to make data-driven decisions at every step. Mentors help collect routine data about the health facilities and use structured checklists to gather quality of care information during their visits to health centers. These data, as well as feedback from nurses and health center administrators, help inform quality improvement projects to address health system

gaps. Ongoing data collection measures the progress of nurse mentees and quality improvement projects.

The MESH-QI program has grown rapidly during its first four years of implementation. First supporting just one district in the areas of maternal and child health, outpatient care for adults and adolescents, and HIV care, the program now supports all three districts in which PIH/IMB works and has grown to include mentorship for treatment of noncommunicable diseases, neonatology, and mental health. MESH-QI exemplifies an approach that can be used across clinical domains to build capacity and improve quality of care.

Additionally, as the capacity of nurses at health centers improves, MESH-QI has been adapted to focus on improving quality of care at the district hospitals. ♦



PROGRAM DESIGN

LAYING THE FOUNDATION FOR STRENGTHENING HUMAN RESOURCES IN THE HEALTH SECTOR

MESH-QI began as part of the Population Health Implementation and Training (PHIT) Partnership, funded by the Africa Health Initiative at the Doris Duke Charitable Foundation. PHIT, a collaborative effort among Rwanda's Ministry of Health, PIH, Harvard Medical School, and Brigham and Women's Hospital, began in 2009 to test innovative approaches to health system strengthening. PHIT's initial focus was to equip the health system with essential materials needed to deliver care—including the building of new health centers, improving existing facilities, ensuring facilities had necessary equipment, and providing funding to hire additional staff to meet government staffing norms.²¹ With the essential infrastructure and people in place, MESH-QI launched in 2010 to strengthen the capacity of frontline health care workers.

MESH-QI: PROGRAM OVERVIEW

MESH-QI's key pillars are training, ongoing mentorship and supervision, and quality improvement initiatives focused on supporting national priorities for task-shifting to nurses (Figure 4).¹⁰

MESH-QI enhances standard Ministry of Health supervision structures by adding an important element of coaching and

mentorship. The program also creates a system for supporting facilities to engage in continuous quality improvement, which is mandated by the ministry.²² Operating across a number of clinical areas—from the integrated management of childhood illness (IMCI) to supporting decentralized mental health care—MESH-QI strengthens the capacity of the health system to address areas of care identified as priorities by the Ministry of Health (Table 1). A key emphasis of MESH-QI is the utilization of data to improve the quality of care. In order to effect change, data utilization and data sharing are key components for engaging and informing the decisions of providers, health facility administrators, and program staff.

The MESH-QI leadership team consists of three primary program implementers—a director, a manager for mentorship, and a technical advisor of inpatient quality improvement—and 14 permanent mentors. Four of those mentors are in Kirehe, four are in Southern Kayonza, and six are in Burera. They provide mentorship in IMCI, women's health, HIV, NCDs, and—in Butaro—mental health.

IMPROVING NURSE TRAINING EFFICIENCY AND FOLLOW-UP

In the conventional training system, nurses resume their posts in rural facilities after attending a specialized training workshop. There is little, if any, follow-up at the facility to determine whether a nurse

FIGURE 4. CORE ACTIVITIES OF MENTORS AT THE HEALTH CENTER



Assess Quality of Care

Visit each health center every 4–6 weeks and observe patient consultations in the mentor’s clinical sphere. Use observation checklists to assess quality of patient consultation.



Improve HC Staff Knowledge

Conduct on-site learning sessions to address knowledge and training gaps of health center nurses.



Build Mentees’ Skills

Offer in-the-moment mentorship, particularly for urgent issues.

Post-consultation discussions of strengths, weaknesses, and plans for skill building.



Improve Systems

Complete Mentor Activity Log, including facility assessment, to identify system gaps that could be addressed through quality improvement projects.

TABLE 1. DESCRIPTION OF MESH-QI CLINICAL AREAS OF INTERVENTION

MESH-QI Clinical Sphere	Services Supported
All Babies Count (ABC)	Neonatology/newborn care, with links to women’s health sphere
Infectious Diseases	HIV/AIDS care and treatment
Integrated Management of Adolescent and Adult Illness (IMAI)	Outpatient consultation for acute illness in adolescents and adults, focusing on identification of tuberculosis and sexually transmitted infections, along with identification and referral of chronic illness
Integrated Management of Childhood Illness (IMCI)	Consultations on sick child visits with special focus on malaria, respiratory infections, and diarrhea
Mental Health	Outpatient mental health consultations and treatment, focused on pharmacological management of severe mental illness including psychotic disorders, bipolar disorder, post-traumatic stress disorder, mania, epilepsy, and depression
Noncommunicable Diseases	Asthma, diabetes, hypertension, and detection of heart failure
Women’s Health	Family planning, antenatal care, labor and delivery, and postnatal care

is correctly applying new skills. Further, the constant challenge of staff attrition makes it difficult to maintain an adequate number of trained nurses in various clinical domains. As a result, nurses are often assigned to domains beyond their training. To address this, MESH-QI proposed decentralizing trainings to the health facilities, selecting a few Ministry of Health-approved trainers to do the training. Rather than transporting participants to a single location at high cost, this approach requires transporting only the ministry-approved trainers and allows trainings to be organized more frequently as needed. To strengthen the impact, trainings are complemented with mentorship visits to ensure nurses are correctly applying new protocols and techniques.

ENHANCING MENTORSHIP AND SUPERVISION SYSTEMS AT HEALTH CENTERS

The Ministry of Health has an established supervision structure, where health centers are supervised by staff at district hospitals. However, the emphasis is on monitoring and evaluating select facility indicators as part of the government's performance-based financing system, which provides financial incentives for meeting pre-identified indicators, with limited time to provide technical support to improve staff performance and competence. Further, the supervisors provide direct care at district hospitals, which also struggle with understaffing, thus limiting time for supervision. To complement these existing structures, MESH-QI mentors are district hospital employees who are integrated within the standard supervision system with an emphasis on building capacity for improved patient care through mentorship and coaching.

MESH-QI mentors are recruited following established World Health Organization guidelines for HIV mentorship.²³ They are hired as Ministry of Health staff, but funded by PIH/IMB. PIH/IMB expert physicians and nurses serve as their technical advisors, who provide MESH-QI mentors with intensive clinical orientation and validate their capacity in specific clinical domains, such as IMCI or HIV care. Mentors are also trained in critical mentorship skills including communication, teaching, and relationship building.

Once trained, mentors travel to each health center every four to six weeks to provide individual mentorship and support health center staff to address health system gaps. Throughout implementation, mentors are accompanied by PIH/IMB advisors who support the mentors' capacity and expertise in their clinical sphere. "Mentoring the mentors" is an essential part of MESH-QI and helps ensure they are adequately supported and providing high-quality guidance.

As time progresses, the MESH-QI team use data on the quality of care processes and outcomes to determine which health centers

are improving and which are lagging behind in order to focus activities where the need is greatest. MESH-QI mentors determine the schedule of their visits based on the health center's specific needs. For instance, if a new nurse is hired at one health center, the mentor will increase the frequency of visits to observe the nurse's care and provide intensive support to reduce any skills gaps that impede the quality of care. After consistent mentorship, the feedback from mentors and the data typically demonstrate that improved quality of services can now be sustained so less intensive mentorship is needed. Mentors continue to visit all health centers for regular visits, but these visits become less frequent as nurse mentees can independently provide high-quality care.

STRENGTHENING SYSTEMS WITH QUALITY IMPROVEMENT PROJECTS

Beyond individual mentorship, a key component of MESH-QI is focused on addressing systems issues that impede the delivery of quality care. The mentors, along with teams at the health facilities, help identify gaps that can be addressed via targeted, collaborative interventions (Table 2). During their visits, mentors gather data about health facilities and work with nurses and health center administrators to identify issues that require interventions. Mentors also serve as change agents supporting health center teams to complete quality improvement projects. These projects vary in duration—some are quick, such as introducing better tracking systems or replacing missing equipment. Others take longer, such as addressing challenges in the supply chain.

INFORMATION FEEDBACK LOOPS: DATA COLLECTION, SHARING, AND UTILIZATION

A number of teams are involved in gathering and utilizing quality of care data from MESH-QI-supported clinical services. The mentors record information in "case management observation checklists" about patient consultations and document their own activities in activity logs. They also record systemic issues in an observation section that asks about facility staffing and supplies. These data are shared with the PIH/IMB monitoring and evaluation team, which supports MESH-QI with data entry, management, and analysis.

These data are supplemented with routine, aggregated data reporting from the health facilities through electronic medical records, the Health Management Information System, and the Community Health Information System. These data are shared via quarterly meetings among an interdisciplinary team of MESH-QI program staff, mentors, and technical advisors for each clinical sphere. The team discusses programmatic issues and strategizes solutions. Data are also shared

TABLE 2. EXAMPLES OF QUALITY IMPROVEMENT PROJECTS IMPLEMENTED TO ADDRESS HEALTH SYSTEM GAPS

HEALTH SYSTEM GAP	MESH-QI IMPROVEMENT
Administration	
<ul style="list-style-type: none"> – Women delayed antenatal care-seeking and often failed to complete all recommended visits – IMCI services often considered a “subspecialty” and only offered sporadically at health centers – Patients turned away if their health insurance was from a different health center than the one that provided noncommunicable disease care 	<ul style="list-style-type: none"> – Changed schedule at health center so that antenatal care is offered daily and immediately after a positive pregnancy test – Fostered collaboration among health center directors to ensure IMCI services offered daily by IMCI-trained or mentored nurse – Created agreements among health centers to ensure patients can use their insurance for noncommunicable disease services there
Procedures	
<ul style="list-style-type: none"> – Physical exams to diagnose a patient were used infrequently and were often incomplete when performed – Insufficient monitoring of women during key phases of pregnancy, including early labor and postpartum period – Gaps in referral process delayed access to care – Patients transferred to national referral hospital due to clinicians’ discomfort addressing mental health – High loss to follow-up of mental health patients at Butaro District Hospital – Health centers were unable to process necessary lab tests, and blood transport system was inadequate 	<ul style="list-style-type: none"> – Introduced IMAI patient recording forms to reinforce use of IMAI protocols – Introduced labor and postpartum care patient recording forms to aid clinical monitoring – Strengthened referral system through team meetings and enhancing communications among clinical services – Provided training to increase capacity and willingness of district hospital teams to manage mental health patients – Created a system of setting follow-up appointments during patient visits – Began using a portable lab testing machine so lab results could be processed at the health center
Supply Chain	
<ul style="list-style-type: none"> – Medical equipment needed for labor and delivery was often outdated and insufficient – Core medications often out of stock – Shortcomings resulted in delayed CD4 count tests for HIV-positive patients – Lack of or broken maternity tables at health centers 	<ul style="list-style-type: none"> – Conducted systematic inventory of equipment and procured necessary items – Strengthened stock management and communication between health center and central pharmacy – Improved supply chain to ensure steady supply of reagents needed for CD4 tests – Approached district hospitals and PIH/IMB leadership to advocate for immediate replacement of essential equipment

through quarterly meetings with leaders from health centers and hospitals, Ministry of Health providers, PIH/IMB staff, and other stakeholders. These feedback loops ensure the data are interpreted and used to improve health services. To ensure the data are well understood, trainings on data utilization have been conducted with the support of PIH/IMB's monitoring and evaluation team.

APPLYING MESH-QI TO NEW PROGRAMS

One of PIH/IMB's strategic goals is to develop and scale up innovative delivery platforms; MESH-QI is an important part of supporting these initiatives. Along with supporting core Ministry of Health services, such as IMCI, maternal health, and HIV care, the MESH-QI model has been used to launch several new and innovative programs. In 2010, MESH-QI was used to pilot the Integrated Management of Adolescent and Adult Illness (IMAI) program to improve primary care delivery for adolescents and adults through the use of a standardized protocol similar to IMCI for children under 5. In 2013, PIH/IMB partnered with the Ministry of Health and the Rwanda Biomedical Center (the ministry's implementation agency) to pilot novel programs in mental health and neonatal health using the MESH-QI approach.

MESH-QI's model was used to support the ministry's plan to decentralize mental health services to district hospitals, health centers, and the community level. Very few health providers with specific training in mental health work in Rwanda, even at district hospitals, and these gaps weren't being addressed. The MESH-QI program allows a nurse trained in mental health, supervised by a PIH/IMB psychiatrist, to train new nurses in mental health and provide ongoing mentorship.

The MESH-QI model also has been used to address neonatal mortality. Despite tremendous reductions the past decade in the deaths of children under 5, we've seen little improvement in reducing deaths among children during their first 28 days of life. In

response, the Ministry of Health and the PIH/IMB pediatrics team launched the Impinja Ntizigapfe/All Babies Count (ABC) initiative in Kayanza and Kirehe Districts in October 2013. ABC aims to improve neonatal care processes and outcomes at all levels of the health system. MESH-QI is a key component of ABC, but the program also includes a number of other interventions.

ABC staff worked with the Ministry of Health to develop national neonatal protocols, trained nurses and clinicians in the new protocols, supplied medical equipment such as infant warmers to health centers to ensure all met ministry norms and standards, and intensified quality improvement efforts over the course of an 18-month program. Five district-wide learning sessions were held to provide data-sharing opportunities that dove deep into quality gaps related to newborn care to accelerate and sustain improvements in newborn health, encourage peer learning and exchange across levels of the health system, discuss quality improvement projects, and improve data quality. This intensive period of intervention will be followed by ongoing MESH-QI for the health facilities in order to sustain improvements in quality of care and continue to make strides in ensuring all babies survive and thrive.

MESH-QI PROGRAM COSTS

Programmatic financial data have been collected to help understand the costs associated with implementing MESH-QI. Estimates consider its key programmatic areas, mentor salaries, training expenses, the resources mentors need to conduct supervision visits to health centers, and costs associated with collecting and analyzing data for quality improvement projects. Estimates of MESH-QI's cost-effectiveness for the IMCI program will be reported in a forthcoming manuscript by triangulating the cost estimates mentioned above with program outcomes. This will provide key information for policy makers and other organizations who may consider implementing and scaling up MESH-QI in Rwanda or other settings. ♦



OUTCOMES

Since its inception, MESH-QI mentors have supported nurses at 41 health centers across all three PIH/IMB-supported districts in Rwanda. There are four to six mentors based at each district hospital, depending on the clinical areas supported. Thousands of mentorship visits and hundreds of on-site learning sessions have been conducted in a catchment area of more than 800,000 people (Table 3).

IMPROVED QUALITY OF CARE AND STRENGTHENED SYSTEMS

Nurses have significantly improved the quality of care they deliver across clinical spheres (Figure 5). When cross-sphere comparisons began in 2014, nurses made correct diagnoses for roughly two-thirds of observed visits. However, one year later the number of nurses making correct diagnoses across all clinical spheres improved to 93 percent (Figure 6). We've also seen success within clinical spheres—nurses more often assess for potential danger signs during pregnancy (such as headaches, blurry vision, facial swelling, convulsions, bleeding, loss of fluid, or painful contractions), as well as correctly manage diabetes, hypertension, and asthma within integrated NCD clinics (Figure 7).

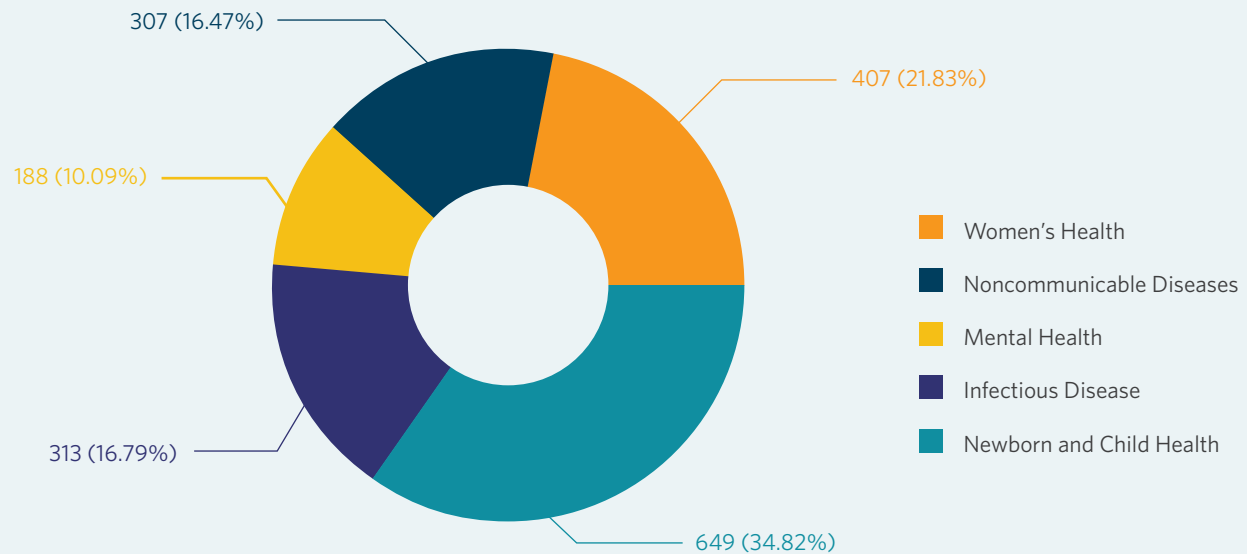
MESH-QI helps improve access to care for services such as NCDs, HIV, and mental health by bringing these services to

TABLE 3. MENTORSHIP VISITS AND ON-SITE TRAINING SESSIONS*

District	Mentoring visits	Training sessions
Butaro Hospital, Burera District	576	56
Kirehe Hospital, Kirehe District	1139	445
Rwinkwavu Hospital, Southern Kayanza District	1001	215
TOTAL	2716	716

*January 2013 – December 2014

FIGURE 5. SUMMARY OF MENTORING VISITS BY CLINICAL SPHERE FOR 2014 (N=1864)



facilities that are closer to patients' homes. MESH-QI for mental health care has seen increased consultations for mental health issues at the health center level (Figure 8). We have received positive feedback from community members about these newly available services, which is likely contributing to increased demand for them. After 15 months of the intensive phase of the ABC intervention, we have also seen a significant improvement in neonatal care processes and preliminary evidence of a 41 percent decline in neonatal mortality (Figure 9). The final ABC evaluation will take place in mid-2015.

An evaluation of MESH-QI for IMCI also revealed significant improvements in the quality of care being delivered. After one year of mentorship in Southern Kayonza and Kirehe Districts, nurses correctly diagnosed and treated children significantly more often, and there was less variability in the quality of care across providers (Figure 10).²⁴ MESH-QI has also shown improvements in the quality of nurses' use of correct diagnostic tests and treatment prescriptions for malaria, fever, and dehydration in rural health centers.²⁵ By strengthening adherence to protocols, MESH-QI supports reducing unnecessary drug prescription and improving patient outcomes. MESH-QI for IMCI was expanded to Burera District at the end of 2013 and similar improvements have been seen in the quality of care there.

FIGURE 6. PERCENT CORRECT DIAGNOSES ACROSS CLINICAL SPHERES

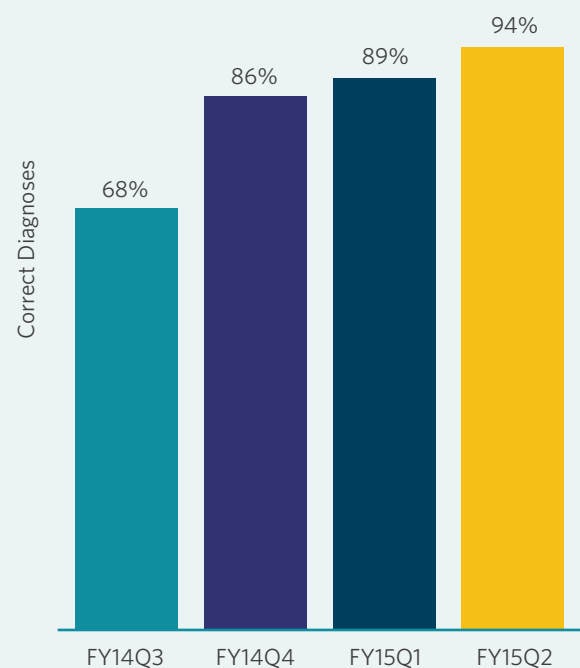


FIGURE 7. NONCOMMUNICABLE DISEASES (NCDs): APPROPRIATE MANAGEMENT OF ASTHMA, DIABETES, AND HYPERTENSION

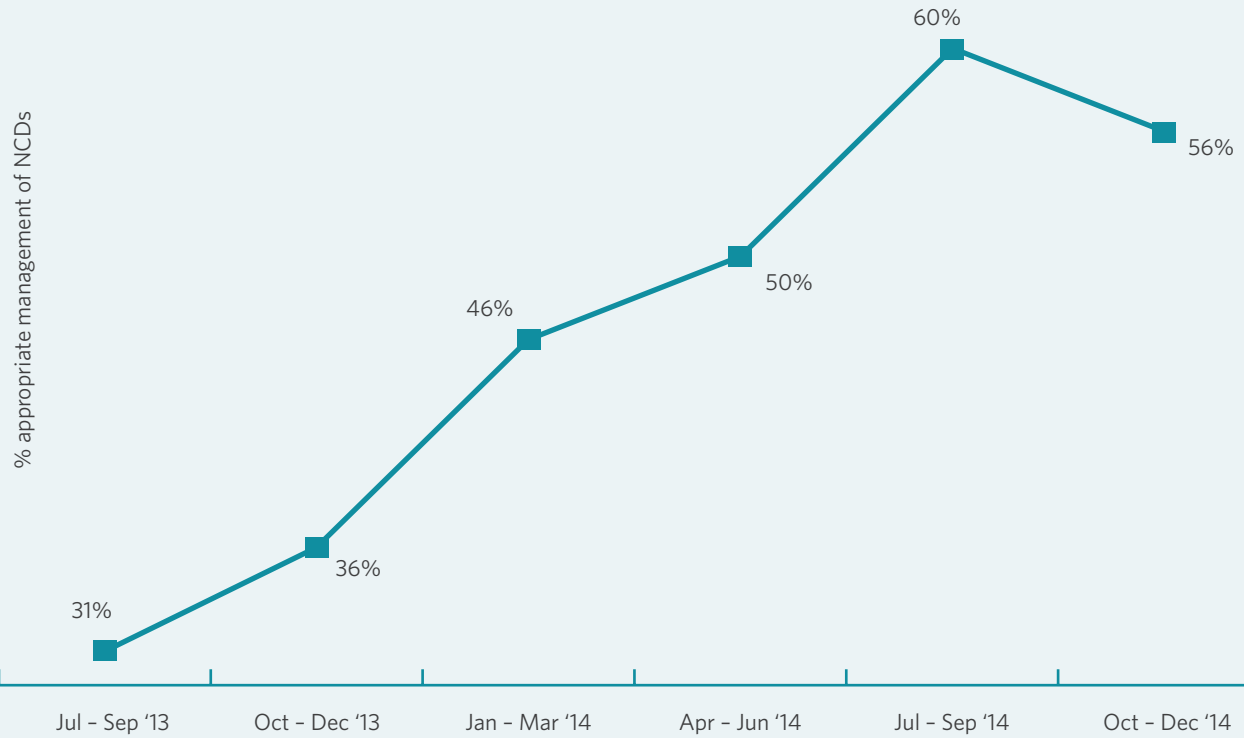


FIGURE 8. MENTAL HEALTH VISITS AT SIX PILOT HEALTH CENTERS PER QUARTER

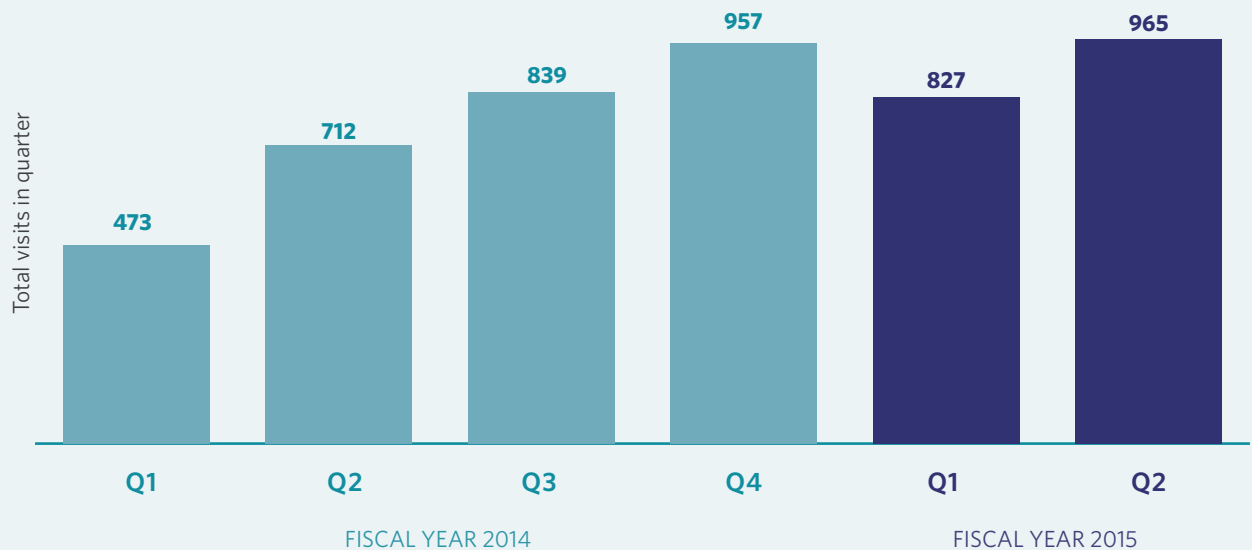


FIGURE 9. DANGER SIGNS ASSESSED DURING MESH-QI ANTENATAL CARE CONSULTATION (SOUTHERN KAYONZA AND KIREHE DISTRICTS)

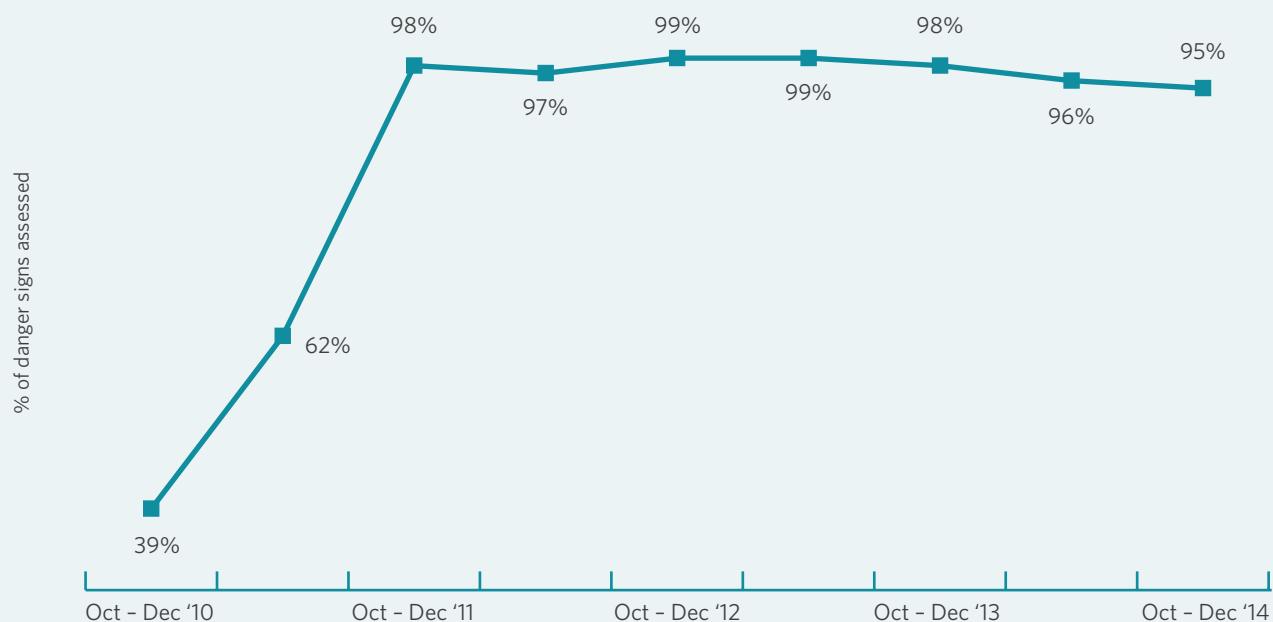
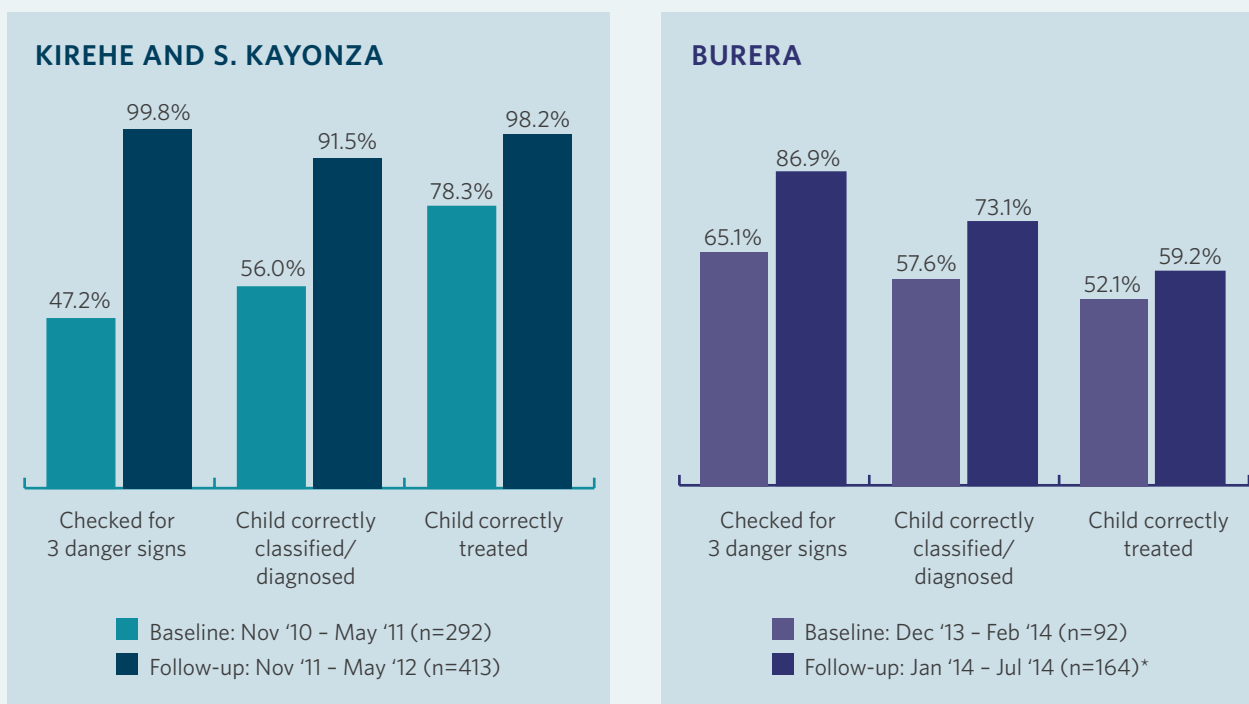


FIGURE 10. INTEGRATED MANAGEMENT OF CHILDHOOD ILLNESS: BASELINE EVALUATION AND FOLLOW-UP



*Some health centers baseline data were collected in December, allowing follow up data to be collected in January.

FIGURE 11. GEOGRAPHIC COVERAGE OF CLINICAL MENTORSHIP



MOVING BEYOND HEALTH CENTERS: MESH-QI AT DISTRICT HOSPITALS

As MESH-QI demonstrated measurable improvements in the quality of health care provided at health centers, it was adapted to respond to the changing needs of Rwanda's health system, including at district hospitals. District hospitals provide both outpatient and inpatient services, including some specialized care such as minor surgery, and have greater lab diagnostic capacity

than health centers.¹⁹ Teams are led by medical doctors though nurses still make up the majority of clinical staff.

The Ministry of Health launched a plan for accreditation to ensure facilities met minimum standards. Quality improvement is key to achieving and exceeding these standards. As part of the government's Health Sector Strategic Plan, district hospitals were required to establish quality improvement teams. However, there was no support to make this requirement a reality.²²

STAFF IMPRESSIONS



ROBERT BIENVENU,
Mental Health Nurse Mentor,
Burera District

"I like [working with the mentees] because it helps to build a relationship. Normally we were supposed to be supervising health centers so [MESH-QI] is one of the ways to make those clinical supervision [visits] but with a focus on quality improvement, which is different from the other clinical supervision which we had been conducting."

BEATRICE MUREBURAYIRE,
Women's Health Nurse Mentee,
Rusumo Health Center, Kirehe District

"Léoncie helps us to deepen our knowledge of different techniques. Sometimes when we work together, I execute the technique and then she shows me whether this is correct or not correct. She explains [how to do it correctly], and then she tells us advice that we must give to women about their nutrition and behavior of a pregnant woman at home."



JUSTIN I. BIZIMANA,
QI Mentor and Psychologist at
Rwinkwavu District Hospital

"I am supporting the team of NCD and HIV services, and mental health. We are working on one project to [reduce loss to follow-up] and we have to meet every Tuesday and we see the updates where we are reaching with the three groups on these services. [...] We are still reminding them that QI is not an event. It's a process we have to do every day."



MESH-QI for district hospitals was launched in 2013 with a focus on quality improvement projects to address gaps in inpatient care. The program was adapted to support the national priority for hospital accreditation. Key activities of this phase include training a cadre of clinicians and administrators in quality improvement, and engaging in quality improvement projects based on gaps observed in monitoring data. Quality improvement teams have tackled issues such as patients being turned away without a consultation in the outpatient department, the length of time patients wait for lab results, and re-engaging patients in care who have been lost to follow-up in chronic care services. Mentorship remains a key component of hospital-based MESH-QI, with select hospital staff receiving advanced training to serve as quality improvement mentors.

NATIONAL IMPLEMENTATION OF CLINICAL MENTORSHIP IN RWANDA

The MESH-QI model was adapted by the Division of HIV/AIDS in the Rwanda Biomedical Center in 2013 to provide national mentorship to improve the quality of HIV care across the country and support task-shifting for HIV care to nurses. For the National HIV Mentorship Program, PIH/IMB supported the Rwanda Biomedical Center in training mentors and evaluating the rollout in 10 district hospitals and their supported health centers across Rwanda (Figure 11). PIH/IMB continues to support these efforts as part of the National Mentorship Technical Working Group. The mentorship program has met some challenges, as HIV funding is declining globally. However, it is clear mentorship is an important strategy for improving the quality of HIV care delivered at health facilities across the country and the government remains committed to sustaining the mentorship program.

POSITIVE RECEPTION OF MESH-QI BY MENTORS AND HEALTH FACILITY TEAMS

One of MESH-QI's strengths is its focus on consistent, supportive mentor supervision. Mentors are trained on the "soft skills"

essential to successful mentoring relationships and effective communication, such as techniques for giving feedback and building rapport. MESH-QI relies on the strong relationships mentors build with nurses and facility staff. Feedback from nurse mentees has been positive overall, with specific recognition of how ongoing mentorship helps them feel more confident in applying new skills and improving their work.²⁶

CHALLENGES

While MESH-QI has achieved a number of successes, the team encountered challenges throughout its implementation. For instance, despite a critical need to improve systems for outpatient services for adults and adolescents and poor quality of care,²⁷ the difficult decision was made to end the Integrated Management of Adolescent and Adult Illness (IMAI) program, as it was not a government priority at the time. An ongoing evaluation of IMAI through MESH-QI will assess the effectiveness of this approach and, if successful, may lead to proposing IMAI as a standard of care in Rwanda.

Logistical issues, such as the transportation of mentors, remain a challenge, particularly for some of the most remote health centers. But the MESH-QI team is devising and testing solutions. Funding limitations prohibit the purchase of a vehicle or motorcycles for mentors, but current solutions are focused on better coordination of schedules with other staff travelling to health facilities, and objectively evaluating transportation needs.

Another challenge is nurse turnover at health facilities, whereby months of mentorship gains can be lost instantly in staffing shuffles. Turnover requires re-intensified mentorship and often repeating didactic trainings. Turnover of mentors can also be a challenge; MESH-QI mentors become very skilled in their clinical domain, mentorship, and quality improvement—which make them desirable for higher-level positions. A mentor's departure causes interruption in health center support, but the Ministry of Health's commitment has helped facilitate efforts to find new, skilled nurses to fill the roles. ♦



LESSONS LEARNED

MENTORSHIP AND QUALITY IMPROVEMENT IS FEASIBLE, AND SUCCESSFUL, IN LOW-RESOURCE SETTINGS

In just four years of implementation, the MESH-QI program has demonstrated measurable successes, experienced tremendous growth, and overcome key implementation challenges (Figure 12). MESH-QI has proven to be an effective model in improving quality of care in various clinical areas, and can feasibly be implemented as part of an integrated public health supervision system. Further, MESH-QI has been able to successfully support the government of Rwanda's policies of decentralizing health services and task-shifting.

ACCOMPANIMENT, RATHER THAN CREATING PARALLEL SYSTEMS, IS KEY

MESH-QI mentors and quality improvement teams at district hospitals are Ministry of Health employees and report directly to ministry supervisors. For the program's effectiveness and sustainability, it was important for MESH-QI mentors and quality improvement teams to be part of the Ministry of Health system, rather than being employed by PIH/IMB. PIH/IMB then provides ongoing technical support through MESH-QI mentor debriefings and participating in quality improvement team meetings. Additionally, the MESH-QI team is part of a national technical working group led by the ministry to facilitate the sharing of lessons learned and to inform policy.

MESH-QI'S CORE COMPONENTS ARE APPLICABLE ACROSS CLINICAL DOMAINS

MESH-QI has successfully expanded to cover a number of core services—both routine and novel—at health centers. The latter include services for noncommunicable diseases and mental health, and the All Babies Count initiative. The same approach is used in all clinical areas: ongoing supervision and mentorship by a skilled nurse, an emphasis on quality improvement, and data utilization. Across all applications, the program has seen improvements in the quality of care, and both nurse mentors and mentees express satisfaction.

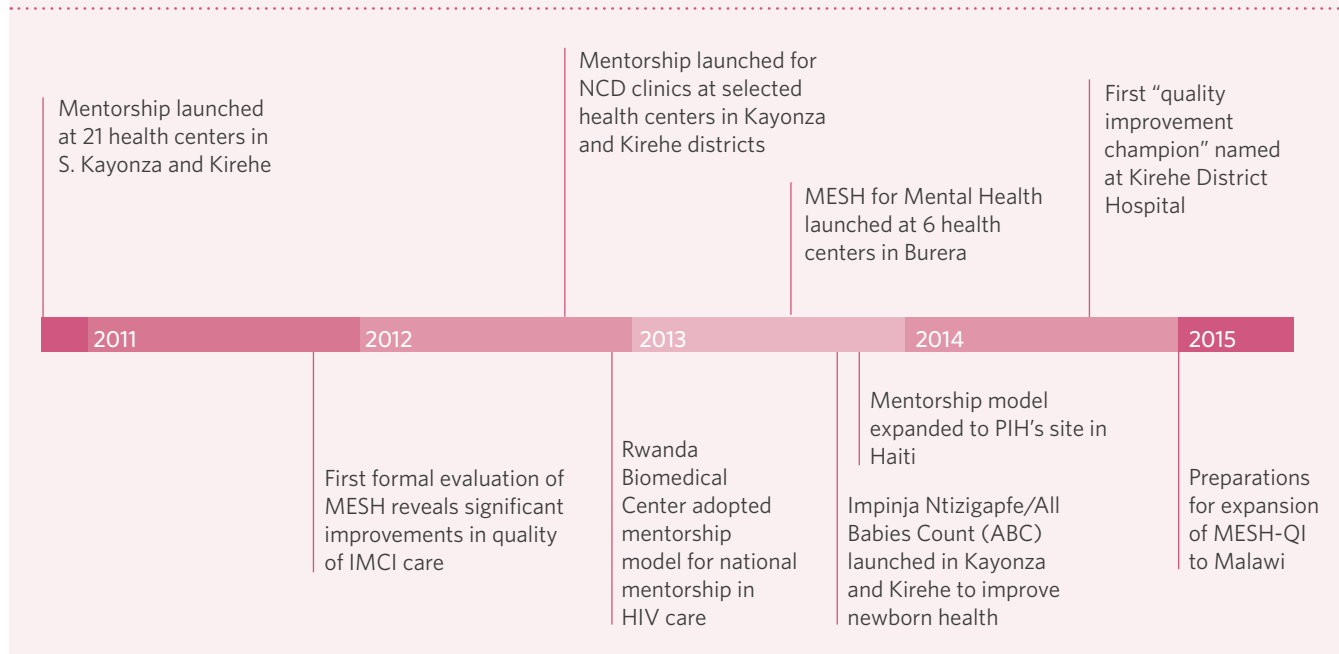
MESH-QI CAN BE SCALED UP AND EXPANDED TO NEW CONTEXTS

The MESH-QI model is scalable, as demonstrated through Rwanda's national HIV mentorship program. The positive experience in scaling for HIV care has motivated efforts to use the MESH-QI model to develop national maternal and child health mentorship in Rwanda.

MESH-QI also could be useful in supporting nonclinical areas such as finance or management. These administrative departments are essential to the success of health systems, but do not often receive the same attention in terms of capacity-building needs.

Much remains to be learned as MESH-QI is scaled up in Rwanda and expanded to nonclinical domains in the near future. PIH is also

FIGURE 12. TIMELINE OF MAJOR MESH-QI EVENTS



beginning to establish MESH-QI programs at other sites, including Haiti and Malawi. The lessons we've learned over four years can inform these new applications, and efforts are increasing to

document exactly how MESH-QI is implemented to provide tools for others interested in using mentorship and quality improvement to strengthen health systems. ♦

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Above: Rwinkwavu District Hospital staff members Akimana Marcelline (left) and Jeanette Abimana participate in a quality improvement training in Rwinkwavu, Rwanda.

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