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Enhanced Supervision Approaches:

Phase 1 Landscape Analysis Findings Report

Cooperative Agreement No. AID-OAA-A-15-00046

Cover photo: A health worker administers a vaccine to a child at a clinic in Lilongwe, Malawi. Enhancing supervision will ensure health workers are equipped with the skills they need to provide optimal quality of care. Cover Photos: HRH2030.

May 20, 2019

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Contents

Acronyms

ANC	Antenatal care
ANMs	Auxiliary nurse midwives
CASP	Critical Appraisal Skills Program
CHW	Community health worker
DEC	Development Experience Clearinghouse
DHIS2	District health information software
FP	Family planning
GHWA	Global Health Workforce Alliance
GHSP	Global Health Science and Practice
HIS	Health information systems
HIV/AIDS	Human immunodeficiency virus / auto immune deficiency syndrome
HMIS	Health management information system
HNQIS	Health Network Quality Improvement System
HR	Human resources
HRH	Human resources for health
HSS	Health systems strengthening
IMCI	Integrated management of child illness
IPC	Infection prevention and control
LMIC	Low- and middle-income countries
MESH-QI	Mentoring and enhanced supervision – Quality improvement
MNCH	Maternal, neonatal, and child health
PHC	Primary health care
QI	Quality improvement
RCT	Randomized controlled trial
RMNCH	Reproductive, maternal, neonatal, and child health
USAID	United States Agency for International Development
WHO	World Health Organization

Executive Summary

The strength of a health system—and ultimately the health of a population—depends on health worker performance. However, insufficient support to build, manage, and optimize human resources for health (HRH) across broader workforce development functions results in insufficient quantity and quality of health workers in low- and middle-income countries (LMICs). This in turn perpetuates health inequities and results in low-quality health services.

Defined as "a broad set of supervisory interventions that improve provider performance through team-based, learning approaches, including supportive supervision, the use of checklists, and in-person visits" (USAID, 2018), **enhanced supervision is estimated to have the highest potential impact of all health systems interventions** (USAID, 2017).

Health worker supervision becomes an essential element to compensate for shortfalls in HRH training, management, and efforts to improve quality of health services. However, too often a supervision "status quo" persists, with limited quality and continuity of supervision to impact health worker performance. Where supervision enhancements and approaches are successful to improve HRH and health systems strengthening, they are often limited in terms of their integration within the health system, adaptation beyond a specific health worker cadre or service area focus, financial sustainability, and replicability to take to scale across a health system.

USAID's Human Resources for Health in 2030 (HRH2030) program conducted a landscape analysis of studies documenting supervision interventions, enhancements, and approaches aiming to improve health worker performance to document and highlight components associated with their effectiveness. Structured by a conceptual framework and taxonomy to classify the inputs, processes, and results for 45 documented supervision approaches, we elaborated findings from the analysis, as well as two case studies of most promising approaches.

This work is presented as both a summary report and as a taxonomy of approaches for use and reference by health sector managers, leaders, planners, and other stakeholders. The following key components of supervision approaches supported *integration, scalability,* and *sustainability*. As such, our recommendations to practitioners and policy makers alike to take forward most promising enhanced supervision approaches include:

- *Integrating evidence-based, quality-driven tools and processes* that streamline health workforce performance management with other health system performance data and information flows
    - Quality improvement (QI) methods (e.g., the "plan, do, study, act" cycle and others developed by the Institute for Healthcare Improvement) that promote problem solving and data use at the service delivery level.
    - Digital data integration and interoperability (i.e., linked to broader health management information systems) can facilitate timely multi-level feedback on performance and reduce supervisor workload.
    - Linkages to health system performance indicators such as district health information software 2 (DHIS2), and data use to inform supervision priorities can help target resource allocation and improve quality and equity.
- *Scaling and replicating successful models* across service delivery areas and geographically across health districts
    - Most promising supervision systems can be adapted to expand use for public sector, private sector, and community-based workers. However, scale-up requires

contextualizing approaches to the macro-, micro- and individual level contexts, and adapting them based on the maturity of the approach.

- *Sustaining efforts* with mechanisms to support transition from external human and financial resources to local ownership, including communities
  - Additional interventions such as clinical mentoring, which requires support to the supervisor, and support to the health workforce enabling environment, may also effectively complement approaches.
  - Community engagement and feedback on the quality of services can complement district- or manager-level supervisory efforts, especially for supervising community health workers (World Health Organization, 2018b).
  - In some cases, a "whole of system" approach was used to support health worker performance by capacitating supervisors, enhancing supervision for supervisees, and addressing the enabling environment, including through community engagement.

While many supervision enhancements and innovations may not be initially cost-effective, they could be when better integrated, scaled, and sustained within the existing system.

In next steps, HRH2030 proposes to more rigorously test a best practice supervision enhancement through a digital health platform that includes data use, data integration, interoperability with information systems, and ensures data quality to better determine how this supervision enhancement can be used across a variety of service delivery areas and standards of care to impact health outcomes.

Background and Context

The strength of a health system – and ultimately the health of a population – depends on health worker performance. The global community seeks to harness health systems to provide health for all (UHC 2030 International Health Partnership, 2017; World Health Organization, 2018a).

However, insufficient support to build, manage, and optimize HRH across broader workforce development functions results in insufficient quantity and quality of health workers in LMICs, which in turn perpetuates health inequities, as well as produces low-quality health services (Campbell *et al.*, 2013; Kruk *et al.*, 2018). Considering the underlying factors of low health worker performance: Outdated approaches within preservice education in LMICs too often fail to prepare health workforce, and require transformation in order to meet 21st century population needs, including to be competency-based and practically applied under clinical preceptor guidance (Frenk *et al.*, 2011). Opportunities for in-service training and continuing professional development are often infrequent or do not include post-training follow-up. Newly acquired skills need reinforcing in the context of the work environment. In the absence of this support, know-do gaps widen.

Health worker supervision becomes an essential element to compensate for these shortfalls. Defined as "a broad set of supervisory interventions that improve provider performance through team-based learning approaches, including supportive supervision, the use of checklists, and in-person visits" (USAID, 2018), enhanced supervision is estimated to have the highest potential impact of all health systems interventions (USAID, 2017). Effective supervision is a means to improve health worker performance and the quality and coverage of health services; the direct linkages of health worker performance to health systems performance should be recognized.

However, in many LMIC contexts, the "supervision status quo" persists (see text box).

The Supervision System Status Quo

Too often, especially in the absence of external support, the following scenario ensues:

- ***Limited accountability:*** For individual or team performance, this occurs when managers cannot assure an adequate working environment (including medicines and supplies).
- ***Limited supervisory capacity:*** While the concept of "supportive supervision" is well-known (Marquez and Kean, 2002), many facility managers and district health management team (DHMT) members may not have formal skills-building opportunities for supervision. As a result, authoritative and punitive methods may still be practiced instead of formative and facilitative methods.
- ***Limited, disparate resources*:** District health management teams have a budget and time allocation to visit all facilities in their catchment, but priorities may shift, and a lack of fuel or time to conduct a visit may prohibit supervision visits from taking place consistently. Community-based and outreach workers are rarely observed in the field.
- ***Private sector exclusion*:** Private sector supervision may not consider national standards of care; self-employed private providers may not have any supervision or be held accountable for quality services.
- ***Limited continuity, integration, and sustainability:*** Data and feedback from supervision visits are not always archived and available for follow-up and the next visit, there is high HRH turnover, and visits may be vertical, disease-focused initiatives, based on follow-up to a recent training. Externally funded supervision support or enhancements often focus on one disease or program, and then stop when external funding stops.
- ***Inequitable supervision support, especially for community-based workers:*** These challenges for health workforce supervision are further exacerbated when considering community health workers. Their lower training levels, autonomous scope, and distance from health facilities further challenge health systems that increasingly underline the importance of formally recognizing the role of communities in health (World Health Organization, 2018b).

What do we know works? Attempts have been made through various systematic reviews and studies to document effective supervision approaches, including strategies to improve healthcare provider performance and related health outcomes in LMICs (Källander *et al.*, 2015; Bailey *et al.*, 2016; Webb, Bostock and Carpenter, 2016; Rowe, 2018). However, evidence on the direct attribution of supervision to improve clinical and health outcomes is limited, and with most studies attributing lower-level outcomes including increased knowledge, motivation, and satisfaction.

While many different supervision interventions have been implemented in LMICs, perspectives on the most critical supervision components—or combination of components—can vary greatly. Supervision effectiveness may be dependent on the context, availability of other health systems inputs approaches, implementation factors, and the means of and level at which supervision is evaluated. The enhancement or approach to improve supervision may be difficult to implement consistently in changing environments, which makes evaluating with consistency more challenging.

Despite proven effectiveness, **supervision enhancements, approaches, or other innovations seeking to improve effectiveness of an existing supervision system are often one-off interventions** that are donor-funded and program-driven rather than country-led, integrated whole-system changes that can be scaled-up from a pilot and sustained over time.

Further challenges include: ensuring that the enhancement or approach can be sustained financially and technically; scaling approaches across the health system and adapting and responding to health workforce performance areas as the health system changes over time; and, integration into other health system functions for greater efficiency and effectiveness, including ensuring appropriate data use to inform supervision.

Key Terminologies

In the context of this landscape analysis, HRH2030 defines the following key concepts:

- *Enhanced supervision*: "a broad set of supervisory interventions that improve provider performance through team-based learning approaches, including supportive supervision, the use of checklists, and in-person visits" (USAID, 2018).
- *Performance*: "the quality of the health workers' work, the technical skills they use, the care they deliver, and the impact of their work on health outcomes" (GHWA, 2014). When health worker performance is optimal, they are providing client services reflective of their training and ability.
- *Health workers*: people engaged in activities with the main aim of protecting and improving health; this widely includes health service providers, health managers, and support workers both from the public and private sector and includes unpaid and paid workers, lay and professional cadres.
- *Health services:* "all services dealing with the diagnosis and treatment of disease, or the promotion, maintenance, and restoration of health" (WHO, nd).
- *Health outcomes:* "The changes made at the population level in a program's target evaluation, some or all of which might be the result of a program intervention. They refer to specific knowledge, behaviors, or practices on the part of the intended audience that are clearly related to the program" (MEASURE Evaluation, nd).

Landscape Analysis Approach

In this context, HRH2030 adapted the Dieleman et al. 2009 health worker performance conceptual framework to review documented supervision approaches and to analyze the characteristics and factors associated with improving health worker performance, health service quality, or system effectiveness. Our team then classified the supervision inputs and implementation processes of these best practices to help practitioners and decision-makers consider how best to adapt and scale these supervision approaches.

Objective

Through the Phase I landscape analysis, HRH2030 sought to identify current or recently implemented enhancements to health worker supervision in LMICs that improved health workforce performance according to the following questions:

1) Does the supervision implementation approach demonstrate **positive results** for health worker performance, as well as on health services and health outcomes (*i.e., approach must demonstrate results in terms of outputs, outcomes, effects, and/or impact)?*
2) What are the **enhancements** to the supervision approach (*i.e., understanding the inputs, and processes of the approach, given the context)?*
3) How can/has this enhanced supervision approach be **scaled and sustained** (*i.e., assessing implementation maturity, implementation costs over time, and any evidence of continuity or further uptake)?*

To achieve the landscape analysis objective, HRH2030 undertook a database search to gather evidence of supervision approaches, and reviewed findings according to defined criteria and analyzed according to the conceptual framework. The resulting inventory of approaches was classified according to a more detailed taxonomy and analyzed to produce our findings. Finally, virtual deep dives of two of the most promising supervision approaches were conducted to further detail implementation.

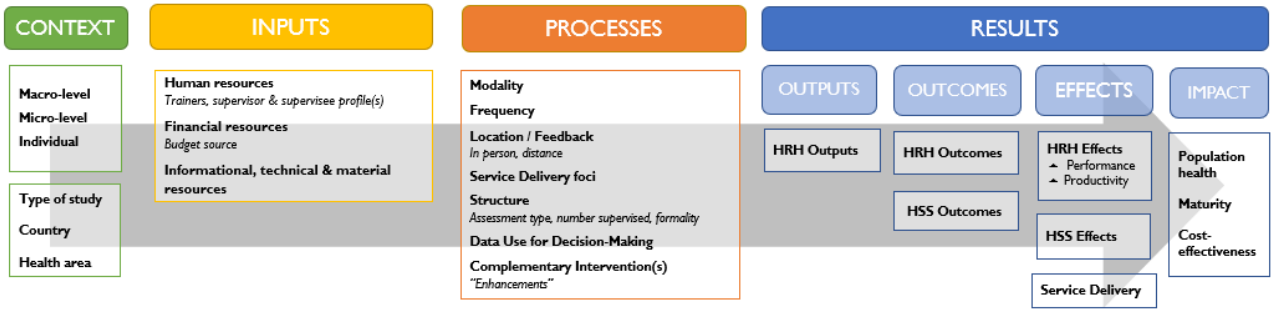
Database search

We first conducted a **search of white and grey literature**[1] to identify the documented enhanced health workforce supervision approaches that were: relevant to the health sector; documented in English; implemented in 2010 or later; and demonstrated positive results in terms of health worker or health system performance within an LMIC health system, service, or program. The database search methodology is summarized in Figure 2 of the Findings section, and further detailed in Annex A.

Framework for analysis

Approaches identified through the database search were then analyzed through the lens of a **conceptual framework.** We adapted the framework developed by Dieleman, Gerretsen, and van der Wilt, 2009, which integrates mechanisms for improved "availability, productivity, responsiveness, and competency of health workers," as well as indicators for health workers' performance that has also been adapted for use by the World Health Organization's Global Health Workforce Alliance (GHWA, 2014). HRH2030 adapted the conceptual framework's structure to establish key components, by which to further analyze the supervision approaches: *context* (macro-, micro-, and individual levels); *inputs* (human, financial, informational, technical, and material resources); *processes* (the modality, frequency, location, feedback type, structure, use of data within the approach, as well as what specific enhancements were implemented); and *results* (HRH outputs; HRH or health systems strengthening [HSS] outcomes; HRH, HSS, or service delivery effects; population health outcomes; as well as the maturity and cost effectiveness of the approach). See Figure 1.

Figure 1. HRH2030 conceptual framework for analyzing enhanced supervision approaches



Source: HRH2030 2019. Adapted from Dieleman et al 2009, GHWA 2014, and informed by Campbell et al 2013.

[1]Databases include: Cochrane Database of systematic reviews; Global Health Science & Practice; GlobalHealth & PubMed; Health Systems Evidence; Healthcare Management Information Consortium; the HRH Global Resource Center; The Lancet; mHealth compendium databases; Popline, ResearchGate; USAID Development Experience Clearinghouse (DEC); and the WHO Global Health Library. In addition, references from Bailey et al. 2015 were reviewed.

Inventory and taxonomy of promising supervision approaches

Using the conceptual framework structure, HRH2030 analyzed the database search results to elaborate an **inventory** of enhanced supervision approaches. HRH2030 reviewed and categorized each approach according to a common classification, or **taxonomy**. Emerging themes and patterns were noted across different settings, health worker types, program goals, modalities, pedagogies, and other types of enhancements and complementary interventions. Fixed list drop-down menus were used in the inventory to classify approaches according to the taxonomy, which underwent multiple iterations as new themes emerged during analysis. We undertook further review and analysis to extrapolate and group themes and classifications for most critical and/or promising supervision enhancements from the literature to develop our main report findings.

Case studies

Reviewing the inventory, HRH2030 identified two supervision implementation approaches that emulated most or all the most promising enhancements. In addition, these approaches were still being implemented at the time of the landscape analysis. We then conducted **deep-dives** to elaborate more in-depth **case studies** for two supervision approaches. We contacted the implementers of the approach, held several key informant interviews, and reviewed additional documents provided to further detail the approach. Additional snowballing and triangulation were done to identify additional resources, such as program reports, training manuals, or guides that described additional aspects of these approaches.

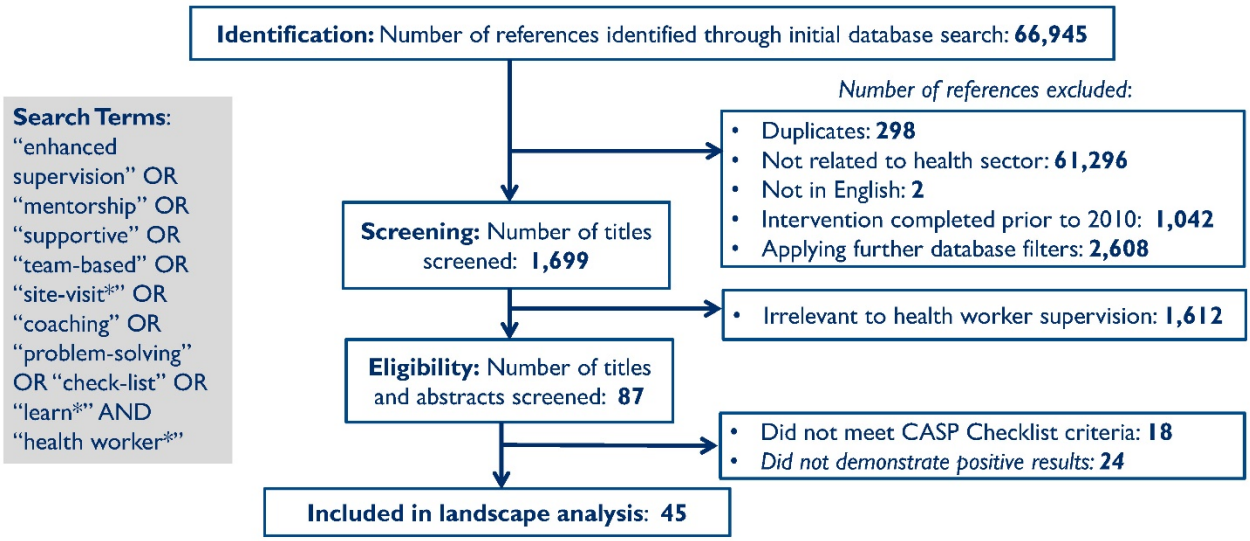
Findings

This section summarizes the landscape analysis approach and main findings of the inventory according to the conceptual framework structure.

Database search

From May 1 to June 24, 2018, the database searches according to the search criteria above yielded a total of 66,945 initial results, of which 5,351 were relevant to the health sector, of which 4,309 were published in 2010 or later, and 4,307 in English. In the case of USAID's Development Experience Clearinghouse (DEC), additional filters were applied, yielding a total of 1,699 articles. The titles and abstracts of these results were then reviewed to ensure their relevance, yielding 87 articles. Of these, 69 met the Critical Appraisal Skills Program (CASP) criteria. After further review based on their relevance, the strength of results, and the rigor of their documentation of the supervision inputs and processes, a total of 45 resources documenting enhanced supervision approaches were retained for the inventory. See Figure 2.

Figure 2. Enhanced supervision landscape analysis: Database search results



Annex A describes in greater detail the database search methodology and results.

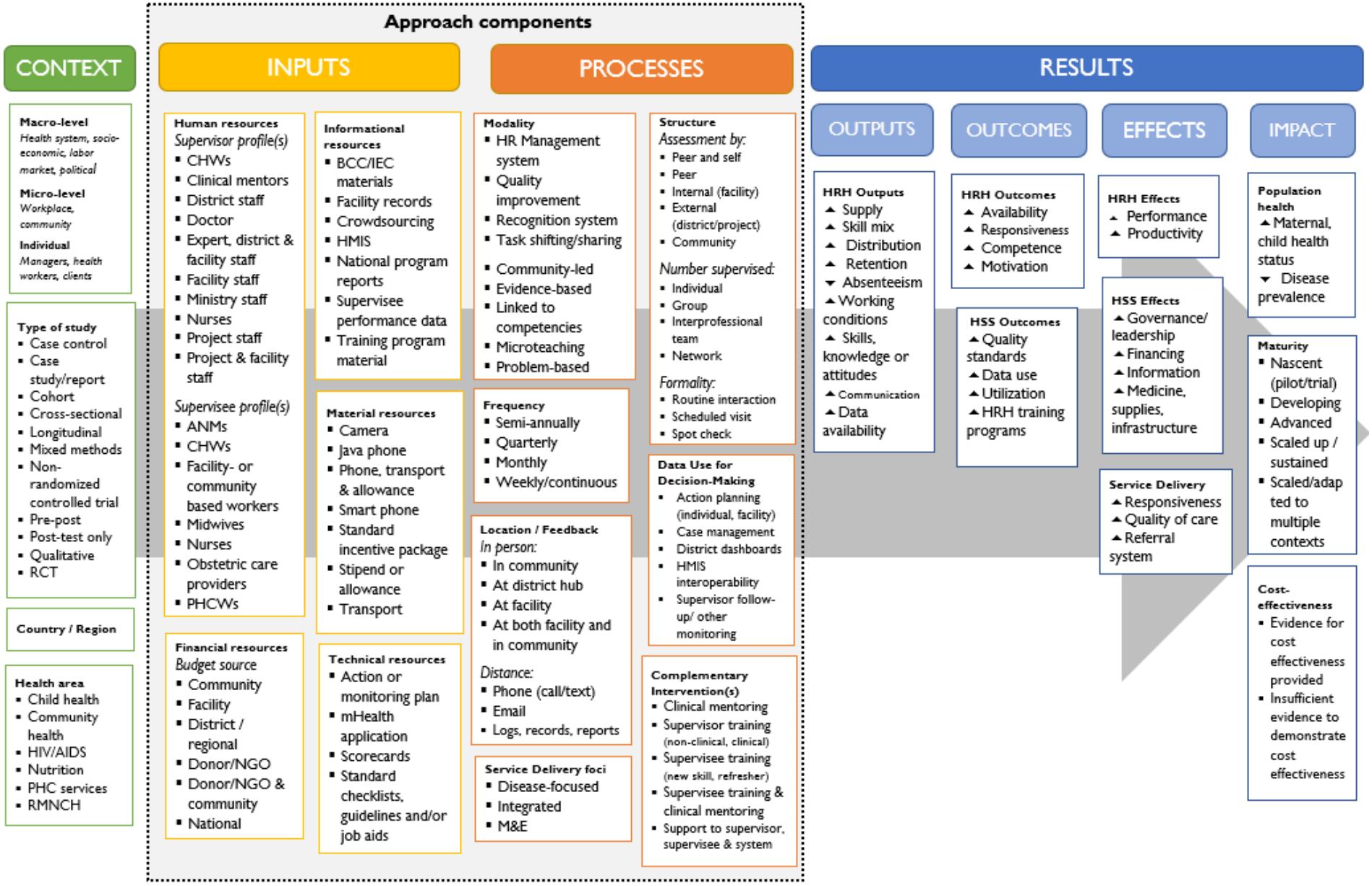
Inventory and taxonomy of promising practices

Adapting the conceptual framework (Figure 1), HRH2030 developed a detailed taxonomy for classifying enhanced supervision approaches by their components[2], as shown in Figure 3. Annex B is the complete Excel-based inventory of documented enhanced supervision approaches included within the landscape analysis.

Figure 4 shows the frequency of approaches by context, inputs, processes, and results as classified according to the taxonomy. For example, the first box under Context shows that 24% of all approaches within the taxonomy were case studies, while 22% were randomized controlled trials (RCTs). The report narrative details additional descriptive and cross-variable analyses.

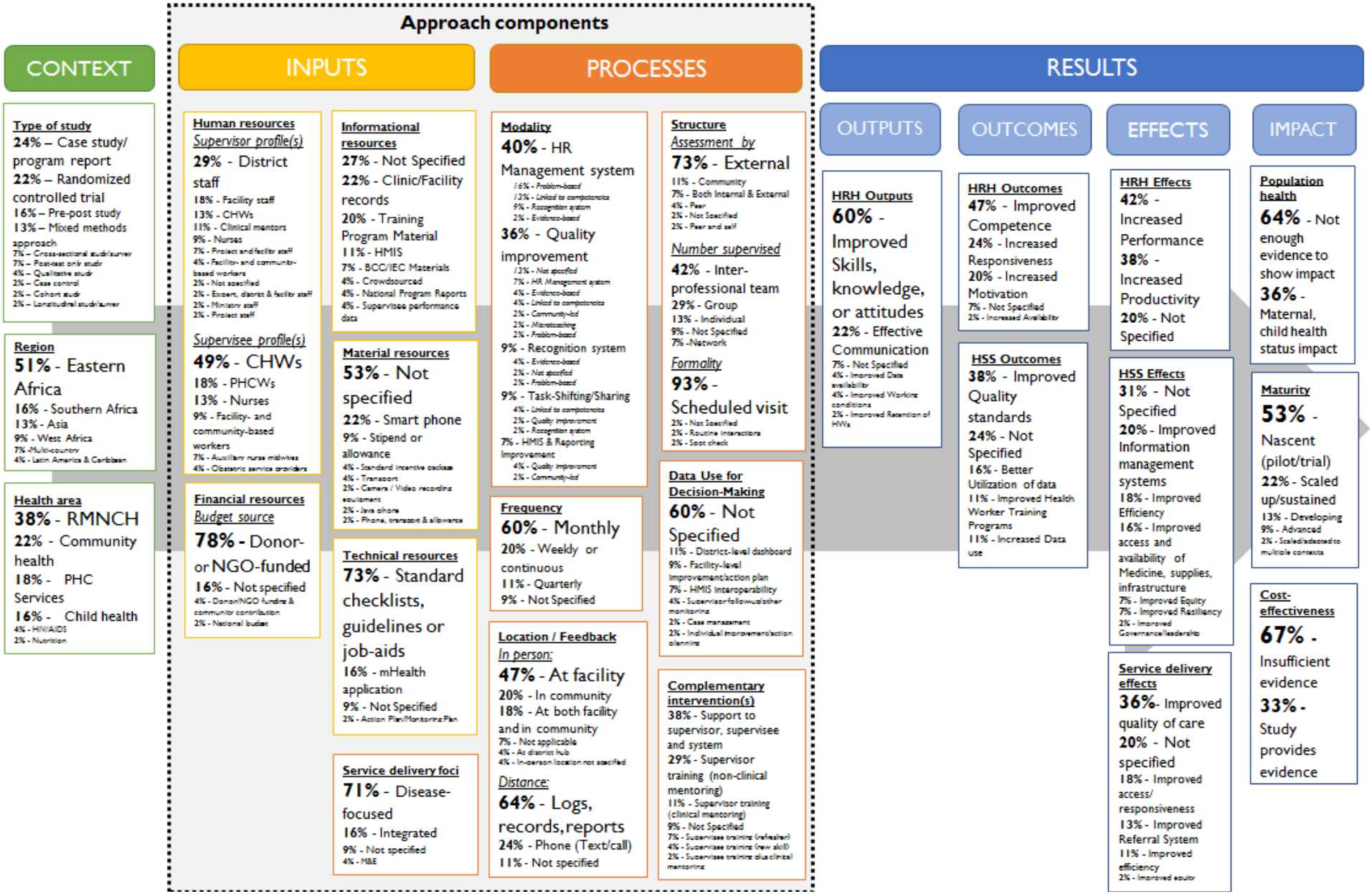
[2] While some additional classifications were included in earlier iterations, only those components documented within the inventory resources were maintained.

Figure 3. Conceptual framework and taxonomy for analyzing enhanced supervision approaches



Source: HRH2030 2019. Adapted from Dieleman et al 2009, GHWA 2014, and informed by Campbell et al 2013.

Figure 4. Findings from inventory of enhanced supervision approaches



Source: HRH2030 2019. Adapted from Dieleman et al 2009, GHWA 2014, and informed by Campbell et al 2013.

Context

Determinants of health workers' performance and productivity are greatly influenced by factors related to: the *macro-level* components such as the overall health system, socioeconomic/labor market, and political components; the *micro-level*, which includes workplace dynamics or factors affecting communities where health workers live and the individual attributes of these health workers (GHWA, 2014). Within the inventory resources in Annex B, macro-, micro- and individual level contextual factors and determinants for health worker performance were detailed, though they were not classified according to taxonomy to capture their diversity. They are summarized below.

At the **macro-level,** many of the approaches documented were undertaken at the impetus of **new or renewed national health sector policies**, guidelines, or training programs, some influenced by political will. For example, in the Senegal and South African contexts, political will to implement task shifting/sharing lent a focus to supportive supervision (Daniels, Nor, Jackson, E. C. Ekström, *et al.*, 2010; Gueye *et al.*, 2016a). In many countries, the professionalization or **increased responsibilities assigned to community health workers (CHWs) and renewed importance of primary health care (PHC)** also placed importance on supervision to ensure performance and program effectiveness. Many resources cited national health goals, including a **desire to increase equity and coverage to rural, remote and underserved populations**. In LMICs, resources for supervision are constrained, with fiscal space decentralized to regions or districts.

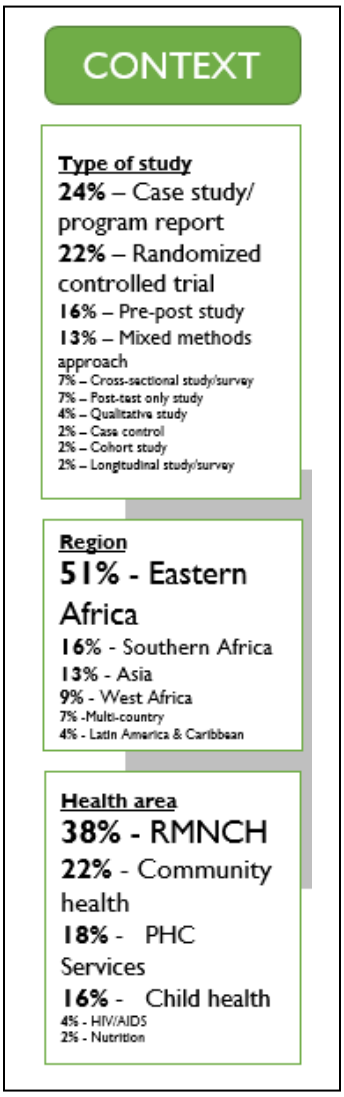
At the **micro-level**, the contexts in which many approaches were implemented—and especially community-based health workers—affected productivity and performance due to **high workloads, inefficient processes, vast geographic distances to cover, limited access to equipment and supplies, and limited community trust and health service utilization** (Jaskiewicz and Tulenko, 2012). The **inadequate pre-service education** in most contexts does not always prepare health workers well for their work. For this reason, clinical mentoring (discussed under complementary interventions) becomes an important component. In addition, the **limited management and leadership skills of supervisors** can be noted. One study noted that the supervisor training conducted as part of the intervention was reported to be the first one they had ever completed (Kok, Dieleman, *et al.*, 2018).

At the **individual level,** of the health workers that were involved in the implementation of the various supervision approaches, we considered possible factors such as: skill-related factors; motivation-related factors; performance-related factors; productivity-related factors, and job-satisfaction factors. **High HRH turnover and absenteeism** remain an issue for continuity of services and the health facility performance. For example, in a multi-country study documenting the effect of supervision on primary eye care providers, only 20% of the workers interviewed at baseline were at their post at the end of two years, and about one-third of all workers were absent for supervision visits (Kalua *et al.*, 2014a).

The types of studies meeting inclusion criteria were a **range of methodologies**. Of the 45 documented resources: one-quarter (24%) were case studies or published program reports; one-fifth (22%) were gold-standard RCTs; one-third (38%) were another rigorous quantitative method[3]; 13% (6) were mixed methods; and 4% (2) were qualitative. The preponderance of case study reports may be due to the inclusion of the USAID DEC and Global Health Science and

[3] Quantitative methods include: Pre-post study (7/45, or 16%); cross-sectional study (3, or 7%); post-test only study (3, or 7%); and 1 (2%) longitudinal, case control, and cohort study, respectively.

Practice journal within the databases to search, as the team sought to identify practical approaches. The health areas of focus were represented across all types of study design.



The inventory includes promising practices for supervision in LMICs, of which the **vast majority (76%) were documented in Sub-Saharan Africa**, with a minority of approaches from LMICs in Latin America and Asia. Of the multi-country studies, two resources documented the same approach in Eastern and Southern African countries (4%), and one approach (2%) is being implemented across 19 countries in Africa and Asia. Rwanda (6), Ethiopia and Uganda (5 each, respectively), India and Tanzania (4 each, respectively) were the countries with the most resources included in the analysis. See Annex B for the complete list of countries represented within the analysis.

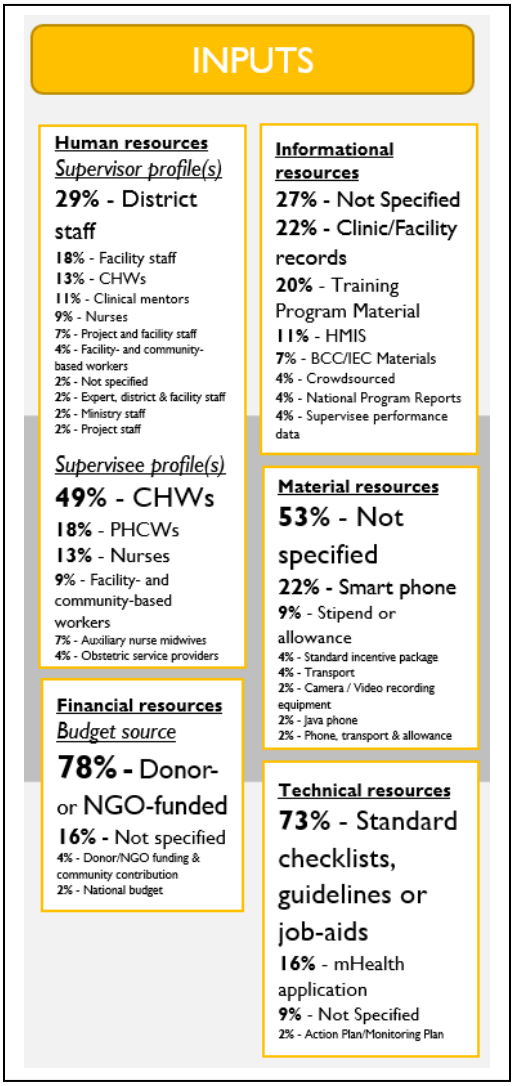
HRH2030 classified the approaches by general and specific health areas, **all of which focused on improving services delivered by frontline health workers at either the community or primary health care levels**. Almost two-fifths (38%) focused on supervision of facility-based reproductive, maternal, neonatal, and child health (RMNCH) services, specifically: antenatal care (ANC); family planning (FP); maternal, neonatal and child health (MNCH); obstetric services, and postnatal care. Almost one-quarter (22%) focused on community-based services, specifically: integrated management of child illness (IMCI) and child health; nutrition; infection prevention and control (IPC) and water, sanitation and hygiene; and monitoring and evaluation and health information systems (HIS). About one-fifth (18%) focused on supervision for facility-based health workers in PHC services in general, and specifically for IMCI, malaria, eye care, IPC, and drug distribution. Sixteen percent focused on facility-based child health services: IMCI and routine immunization. Two approaches were HIV-focused (4%), and one approach (2%) focused exclusively on supervising health workers for infant feeding.

Inputs

Of the supervision inputs—human resources, financial, informational, material, and technical—among the most notable findings include: **the large and diverse number of approaches for supervising CHWs (49% of all resources);** the paucity of approaches financed by national budgets (2%); the diversity of informational resources to prepare for supervision visits, and the limited documentation of the material resource packages (53% did not specify). As all resources reviewed had some level of positive results, it can be noted that using client records and referring to training materials could both be considered best practices, as well as using smartphones and standard checklists or job aids.

Human resources

Across the resources reviewed, **district staff were the most frequently cited supervisor profile** (29%), followed by facility staff (18%) and CHWs (13%). In all cases where a CHW was the supervisor, they supervised CHWs, except in the case of microteaching for postnatal care



home visits in India, where a lady home visitor (a type of CHW) and a social worker provided supervisory support to auxiliary nurse midwives (ANMs), as well as to other CHWs (accredited social health activists, or "ASHAs") (Gupta *et al.*, 2016). In all three instances where project staff supervised alongside facility staff, the approaches were documented as having been scaled-up (MCHIP, 2013; Deussom, Mitchell, and Ruben, 2014; Lussiana *et al.*, 2016).

For CHW programming focusing primarily on RMNCH in India, Ethiopia, Kenya, Pakistan, and Tanzania, **delegating supervisory roles to CHW supervisors or peers** was shown to be effective, with results including: improved CHW supervisee motivation (Henry *et al.*, 2016; Kok, Dieleman, *et al.*, 2018); safety (Daniels, Nor, Jackson, E. C. Ekström, *et al.*, 2010); communication (Rabbani *et al.*, 2016), and improved skills and standards of care (Gupta *et al.*, 2016).

Delegating supervisory roles to both facility- and community-based workers can increase the number of supervisory contacts and improve accountability (Mkumbo *et al.*, 2014; Okuga *et al.*, 2015a). This could be particularly valuable when introducing or scaling a new CHW task, and when facility-based supervisors face high workloads; community-based supervisors could benefit from seeing effective supervisory skills demonstrated.

Financial

Of all approaches reviewed, **the majority (78%) were NGO or donor-funded,** with the rest either unspecified (16%), donor/NGO funded with cost-sharing through community contributions, or solely funded through a national budget. A limitation of the landscape analysis is that search criteria were more likely to yield results of interventions with substantial enough funding to adequately document it. Details on specific funders can be found in the "Description of Inputs" column in Annex B, when available.

Informational resources

Resources documented informational resources—considered to be any source of data or context used to plan, prepare, or inform the application of the specific supervision approach for an individual visit or specific to the supervisee, such as report from the last supervision visit—whereas a technical resource would be a standard tool to assess performance during the supervision. While **one-quarter (27%) did not specify what information would be used by supervisors to prepare a visit**, about one-fifth would use facility-level records (22%), or training material (20%), respectively. Two approaches (4%) noted using individual supervisee performance data (Battle *et al.*, 2015; MEASURE, 2017). Two others used smartphones to

"crowdsource" information from supervisees (Campbell *et al.*, 2014; Henry *et al.*, 2016). Both innovative approaches used mHealth applications to support community health and CHW-focused supervision.

Promising practice: *Use Health Management Information System to Inform and Prioritize Sites and/or Service Areas*

In the context of resource-constrained LMIC settings, the team noted the value and potential to more consistently use the national health management information system (HMIS) to review facility and service area performance and prioritize supervisory support to the lowest-performing areas. Further, **using an HMIS, such as the DHIS2[4], enhances the extent to which the supervision system can be integrated across performance and health system management processes, which could promote efficiencies and cost-effectiveness**. If supervision system information is aggregated and used through the same architecture as other health systems data, there may be greater and more cost-effective opportunities to use and provide timely, real-time information and/or feedback to the supervisor and supervisee to promote evidence-based/informed problem solving.

It was observed that HMIS could inform the supervision approach for a range of different health system goals, including: task shifting of mid-level providers for improved health system responsiveness in Uganda (Naikoba *et al.*, 2017); improved CHW performance and therefore system efficiencies for nutrition services in India (Kaphle, Matheke-Fischer, and Lesh, 2016); improved quality of care for private sector and/or community-based health providers in malaria and family planning services across Africa and Asia (Lussiana *et al.*, 2016); and improved referral systems for CHWs for HIV in Ethiopia, and IMCI in Zambia (Marshall and Fehringer, 2014; Biemba *et al.*, 2017). More research is needed to connect the impact of HMIS-informed supervision approaches on service delivery effects. Two of the three HMIS-focused supervision approaches (per primary modality) reviewed suggested that they were cost-effective (Campbell *et al.*, 2014; Biemba *et al.*, 2017).

Material & technical resources

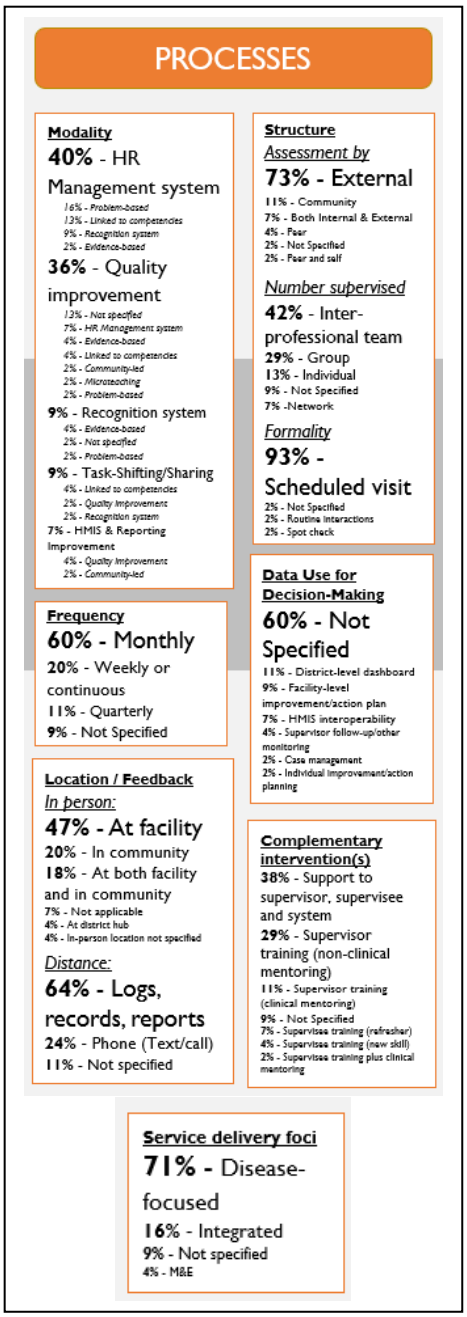
Most studies (53%) did not indicate the type of material resource provided for purposes of supervision approaches, and these were distributed across health area, geographic region, and supervisee profile. In 22% of studies reviewed, smartphones were a key input for the supervision approach. **The most frequently cited technical inputs were standards of care checklists, guidelines, or health worker job aids** (73%). Checklists have been recommended as tools that support both supervisors and supervisees (Loevinsohn, Guerrero, and Gregorio, 1995). The primary modality for supervision approaches using these included 100% of task shifting approaches (4/4); 81% QI approaches (13/16); and 77% of HR management approaches (14/18). Sixteen percent of approaches included using an mHealth application.

Processes

HRH2030 analyzed the processes that were involved in the various supervision approaches in terms of modality, type of intervention, frequency of supervision, how feedback was provided by

[4] DHIS2 is the world's largest HMIS platform, in use by 67 LMICs; with inclusion of NGO-based programs, it is in use in more than 100 countries. There are 2.28 billion people living in the countries where DHIS2 is used. https://www.dhis2.org/about

the supervisor, service delivery focus, structure, formality and type of data platform used during the supervision process. Interventions complementary to supportive supervision—including enhancements for the supervisor, supervisee, and/or the health system—were also analyzed. Findings of these specific components are described below.



Modality

Through our taxonomy, we considered both **the primary and secondary modalities** (i.e., methods or procedures) of the supervision approach to discern the specific qualities of the supervision process ascribed in the approach. Our taxonomy used five primary modality categories: HMIS and reporting improvement; HR management system; QI; recognition system; and task shifting/sharing. For the secondary modality, we added to these five categories: community-led; evidence-based; linked to competencies; microteaching, and problem-based modalities. Our cross-analysis noted that the **most commonly documented modality for supervision was the standard HR management (40%),** of which the majority employed a problem-based or competency-based approach. **More than one-third of approaches used QI (36%),** enhanced with a variety of secondary modalities.

Supervision interventions supported **task shifting/task sharing, and frequently used the QI modality (see text box on following page) and complemented the approach with clinical mentoring**. This was deemed to be most appropriate and cost-effective to use where health system planners and managers seek to upgrade the skills of lower-skilled health workers. For example, the Mentorship and Enhanced Supervision for Healthcare and Quality Improvement (MESH-QI) effectively applied monthly QI visits with clinical mentoring to support an enhanced scope for nurses—most of whom are A2 high-school diploma nurses—to upgrade skills for integrated management of adult illness, IMCI, and ANC services (Anatole, Magge, and Redditt, 2012; Manzi *et al.*, 2014; Manzi *et al.*, 2018).

For task shifting, in two cases, a **"whole of system approach"** was used: In South Africa, the combination of supervisor training on clinical mentorship, plus supervisee clinical mentoring and supervision, plus a standardized job aid to support clinical decision-making. The approach supported increased access to ART services, helping to achieve the goal of 85% of ART patients being nurse-initiated by 2016 in South Africa. While population effects were not noted, the Ministry of Health has scaled this HIV-specific mentoring approach to produce about 20 additional supervisory mentors annually (Green *et al.*, 2014). In Senegal, the combination of performance support to family planning providers, mentoring, ensuring providers' enabling environments, and community support increased provider

competence for long-acting reversible contraceptive (LARCs) methods, which expanded access to these methods and increased informed choice by 86% over six months (Gueye *et al.*, 2016b). As part of the "whole of system" approach, professionalizing districts, supervisors, and communities to take a **"client-centered" approach to HRH management** is a means to meet systemic goals by ensuring the staff have an effective and enabling environment (Aikins et al 2013).

Promising practice: *QI Approaches*

Results of the 16 supervision approaches having QI as the primary modality[5] were impressive in terms of their:

- Outputs: 63% (10) improved HRH skills, knowledge and attitudes;
- Outcomes: 69% (11) improved HRH competence; half (8) documented improved quality standards;
- Effects: 81% (13) improved HRH performance and/or productivity; and 56% (9) improved the quality of care;
- Impact: 56% (9) improved population health (compared to only 17% [3/18] HR management systems approaches)

Evidence on the benefits of using QI modalities to improve health services is widely documented (Tawfik *et al.*, 2010; Ovretveit and Broughton, 2011). Our findings agree with other prior research that "the quality of supervision is more beneficial than increasing the frequency of supervision" and that "**quality improvement and problem-based** approaches show the most promise" (Strachan et al., 2014).

Frequency

Supervisory assessment **frequency, location, structure, and feedback approach tended to correspond to the context and goals** of the intervention. However, almost all visits were scheduled (93%). The majority of approaches reviewed documented supervisory interventions of monthly frequency (60%), though some were more intensively weekly or continuously to respond to supervisory needs, often immediately after a new skill or task was imparted, such as for an updated job description for ANMs in India (Som *et al.*, 2014; Panda *et al.*, 2015).

Location and Feedback

For in-person supervision visits

In line with the earlier description of "enhanced-supervision," supportive supervision benefits from quality and timely feedback among supervisors and supervisees. In this study, we considered the type of feedback provided in the various supervision approaches and it was noted that feedback was either provided in-person or at a distance either by phone/text message or through existing records/reports.

Feedback on almost all supervisory visits occurred at the health workers' place of work, presumably at the end of the supervisory visit or assessment. However, in several

[5] QI modalities include using a fishbone diagram for root cause problem analysis; run charts, and the plan-do-study-act cycle. These modalities were honed and applied more broadly, including in low- and middle-income country settings, in response the landmark paper authored by the Institute of Medicine (IOM): "To err is human: building a safer health system." (Washington, DC: National Academy Press; 1999). The Institute of Healthcare Improvement (IHI), the International Society for Quality in Health Care (ISQua), and the Agency for Healthcare Research and Quality (AHRQ) are all sources for relevant QI tools and resources.

instances, **some CHWs were supervised at a facility hub**: in Uganda, quarterly community-based supervision was combined with monthly CHW meetings at their facility hub, contributing to their motivation and productivity (Brunie *et al.*, 2014). In Ethiopia, Kenya, and Tanzania, group CHW supervision at the facility combined with supervisor training served to improve CHW motivation and the efficiency of supervisory processes (Kok, Vallières, *et al.*, 2018; Mkumbo *et al.*, 2018).

For distance supervision

Distance feedback appears effective to complement in-person visits, where supervisors share data or feedback to the supervisee. The majority of QI and HR management supervision modalities (88% and 56%, respectively) included feedback loops through sharing of reports, logs, and records, though in most it was not clear if or when they were provided to the supervisee or archived at the facility or within the health system. Use of the phone, whether texting or calling, was most frequently used when the primary supervision modality was a recognition system, in three of the four documented cases (Smisha Agarwal *et al.*, 2016; Henry *et al.*, 2016; Kaphle, Matheke-Fischer, and Lesh, 2016). Across approaches that included phones for continuous or routine supervision support, several documented more effective communication, increased health worker responsiveness, and increased use of data (Campbell *et al.*, 2014; Deussom, Mitchell, and Ruben, 2014; Battle *et al.*, 2015; Henry *et al.*, 2016; Biemba *et al.*, 2017). Notably, the communication networks created by using WhatsApp groups to support CHWs in Kenya included peer-to-peer, or supervisor-supervisee, as well as one-on-one or group discussions. **Network-wide communication was considered favorable to reinforce standards of care and clinical guidance, provide activity updates,** reinforce accountability through photo sharing, and recognize and motivate CHWs (Henry *et al.*, 2016).

Service delivery foci

Most supervision approaches (71%) documented goals and effects that were disease- or program-focused. This may be due to research study parameters, and many approaches could potentially be adapted or integrated within primary or community health settings when taken to greater scale. However, most promising supervision approaches would not create a vertical system that would compete with other national or district level activities, but rather demonstrate adaptability to multiple programs, and facilitate targeted supervision within a context in response to an assessment of facility-wide performance.

Promising practice: *Integrated Supervision*

From a service delivery perspective, *integrated supportive supervision* is defined as "a harmonized supervisory system which uses a common tool and reporting format based on a collection of indicators from as many initiatives/programs as possible" (USAID, CDC, and HHS, 2015). The approach compiles and uses national standards of care checklists to ensure quality and promotes on-site capacity building. It seeks to empower the district health management team to channel the multiple disease program-specific initiatives at the facility and/or community level and engages more diverse stakeholders in health to take a systemic approach to supervision. While this approach taken by the Malaria Action Program for States in Nigeria was not included within the landscape analysis inventory, it provides a useful example (USAID, CDC, and HHS, 2015).

Structure

Assessment type, number supervised, and formality

About three-fourths **(73%) of approaches used external evaluations** to assess performance. Fewer relied on community assessments (11%), peer assessments (4%) or a combination of peer and self-assessments (2%). All three approaches using a combination of internal and external assessments served to support interprofessional teams (Okuga *et al.*, 2015b; Broughton *et al.*, 2016; Mkumbo *et al.*, 2018).

A majority of approaches demonstrated either interprofessional or group assessments (71%), which was common for CHW supervisees. When implemented successfully, this can promote efficiencies where site or field visits consume time and resources and can also improve supervision coverage. However, individual skills may still need to be assessed using observation or records review, or with other communication, feedback, and/or information sharing by phone. Overall, only 13% focused on individual supervisory approaches. While it did not meet all criteria for inclusion in the inventory, the community-based monitoring approach in Uganda demonstrated increased the quality and quantity of primary health care provision, leading to an increase in infants' weight and a significant decrease in child mortality by 33% (Björkman and Svensson, 2009).

An overwhelming **93% of supervisory approaches were scheduled visits**, suggesting that previous efforts for spot checks to ensure health workers are present is not an effective approach for improving performance alone; in Zanzibar, spot checks on traditional birth attendants were used to ensure quality data and were complemented by regular data review and routine phone calls between the facility and community (Battle *et al.*, 2015).

Data use for decision-making

A majority (60%) of approaches documented did not specify *how* supervisory visit data, reports, and other information were used *after* the visit to inform subsequent actions and intervention. One limitation is the research article format; information about the supervision implementation approach may have been truncated within those documenting a QI modality, as the Plan-Study-Do-Act method that includes continual data review may have been considered implicit by their authors, and thus was not specified (Daniels, Nor, Jackson, E. Ekström, *et al.*, 2010; Frimpong *et al.*, 2011; Bello *et al.*, 2013; Marshall and Fehringer, 2013; Magge *et al.*, 2014; Panda *et al.*, 2015; Broughton *et al.*, 2016; Gupta *et al.*, 2016; Manzi, Nyirazinyoye, *et al.*, 2018).

Promising practice: *Digital Data Feedback / HMIS Integration*

In conducive health system contexts with access to basic hardware and software, electricity and connectivity, collecting and disseminating supervision data digitally can support or integrate with the broader HMIS. Potential advantages include:

- Efficiencies for the supervisor, reducing paper-based data management tasks and automated analysis to demonstrate performance trends or target supervisee support needs
- Digital data generated by CHWs, including patient-level data, helps supervisors follow supervisee activities and monitor quality (S. Agarwal *et al.*, 2016)
- A more immediate feedback loop to the health worker or health team and DHMT is created, as data feedback mechanisms can be automated or in real-time
- Ability to link health worker performance data to health systems outputs, including the quantity and quality of specific services in comparison with data on the population

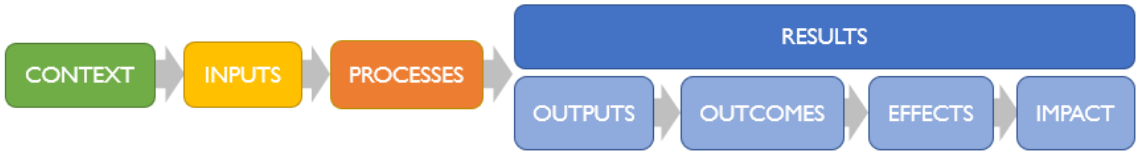
of district-level dashboards (Anatole, Magge, and Redditt, 2012). Integrated supervision systems can be especially useful when assuring the effectiveness of community-to-facility referral systems, such as the approach taken to improve MNCH outcomes in Zanzibar (Battle *et al.*, 2015).

Complementary intervention(s)

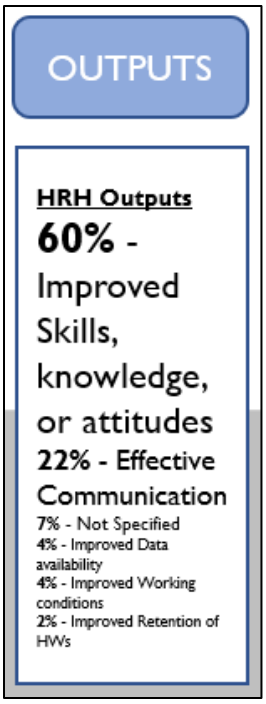
The complementary interventions, or enhancements, to add value to the supervisory approach were distinguished between enhancements to the supervisor, to the supervisee, or to the enabling environment. In many resource-constrained LMIC settings, the "whole of system" approaches that provided support in all these areas were effective. Thirty-eight percent of resources noted additional support beyond the supervisory assessment to improve the skills of the supervisor, supervisee, and reinforce health system effectiveness. This is consistent with the observation that health system challenges are not related to HRH performance alone. Another 29% of resources focused more on the quality of supervision itself, by seeking to improve supervisors' HR management skills. To sustain supervisory skills building, the cascade model of clinical mentoring could help take the best practice approach to scale (Green *et al.*, 2014; Ajeani *et al.*, 2017). In fewer instances, the approach linked supervisee training, whether a new skill or a refresher training, to post training supervision visits. As noted elsewhere, task shifting-focused supervisory interventions were generally complemented—and superseded—by new skills trainings for health workers (Naikoba *et al.*, 2017).

Results

Inherent to our taxonomy is a logical framework, flowing from initial inputs and the contextual factors that inform them all the way to impact-level results. This allows us to explore the implementation approaches of the resources included in the inventory and to unpack the various pathways that supervision approaches may achieve a range of results. The following section explores the results at four separate-but-related levels: outputs, outcomes, effects, and impact.



Outputs



93% of the reviewed approaches documented improvements in HRH outputs. The most common documented result was improved skills, knowledge, or attitudes (60%). In fact, some resources demonstrated results at several levels of Bloom's taxonomy of learning outcomes (Bloom, 1965) from knowledge, to comprehension, to application. For example, as discussed in the previous section, Gueye *et al.* (2016b) demonstrated that the TutoratPlus approach improved knowledge after five anatomic model demonstrations, improved competence after two mentoring visits, and increased application of LARC skills over time, leading to increased uptake of LARCs. Examples of improved attitudes documented by the resources include: improved job satisfaction, commitment, and conscientiousness (Kok, Vallières, *et al.*, 2018); increased awareness of the importance of posting important materials (Tadesse *et al.*, 2012); increased recognition and support (Brunie *et al.*, 2014), and attitudes to patients (Frimpong *et al.*, 2011).

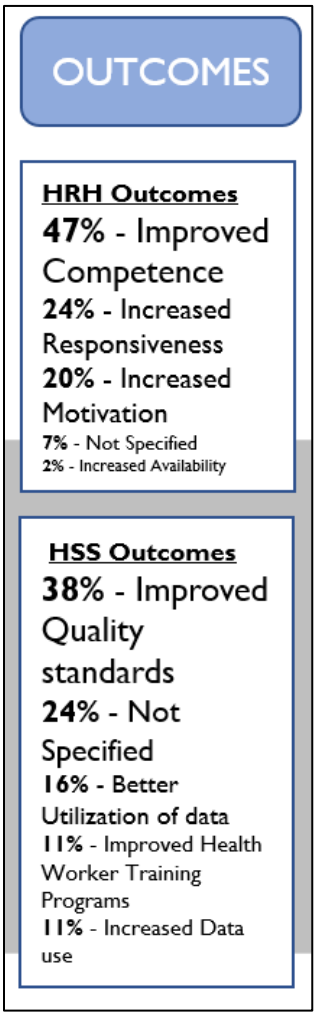
The second most frequent HRH output was effective communication (22%). Communication improvements were reported not only between health workers and their supervisors, but also between health workers and clients and among facility teams. Of the 10 resources that documented more effective communication as an HRH output, eight documented HSS outcomes related to increased or better utilization of data.

Other outputs were reported far less frequently, but included improved data availability, improved working conditions, and improved retention of health workers. In an RCT across Kenya, Malawi and Tanzania, 80% of health workers rotated (Kalua *et al.*, 2014b). To account for high turnover, supervision systems should be integrated, linking performance records with the provider as well as the facility and service. That said, supervision—compared to the absence of any supervision—has shown to improve health worker retention in Malawi, Tanzania, and Mozambique (Mcauliffe *et al.*, 2013).

Outcomes

At the outcome level, we considered both HRH outcomes (competence, responsiveness, motivation, and availability) as well as HSS results (quality standards, data use, and improved training programs). HRH outcomes were more frequently documented (93% of resources) than HSS outcomes (76%).

The most common outcomes reported were improved competence in the HRH category (47%) and improved quality standards in the HSS category (38%). The high number of resources that documented improved competence could be interpreted as a continuance of the frequency of outputs related to improved skills, knowledge, and attitudes. Further, competence and quality often seemed to go hand-in-hand; the majority (57%) of resources that reported improved competence also reported improved quality, and vice versa (71%). Though some of this may be due to the high frequency of both outcomes in general, it is reasonable that the same modalities that would improve health worker competencies could also improve the quality of services provided by those health workers.



While QI was the most frequent modality related to improved health worker competence (52%), HR management system modalities accounted for 78% of resources that reported improved health worker motivation. Many of these resources discussed the importance of both constructive and positive feedback toward improving HR management; for example, Kambarami *et al.* (2016) reported that positive feedback from both supervisors and the community motivated CHWs to make more pregnancy referrals. Constructive feedback should not be used alone, but in combination with timely positive feedback and recognition to motivate health workers. HR management system modalities have an excellent platform to promote such feedback among supervisors to build the confidence of their supervisees.

Two different HSS outcomes were reported related to data use: *better* utilization of data (16%), and *increased* utilization of data (11%). These outcomes were not only limited to those that assessed HMIS and reporting system modalities; HR management system improvements, QI, recognition systems, and task-shifting/sharing modalities contributed to these outcomes as well.

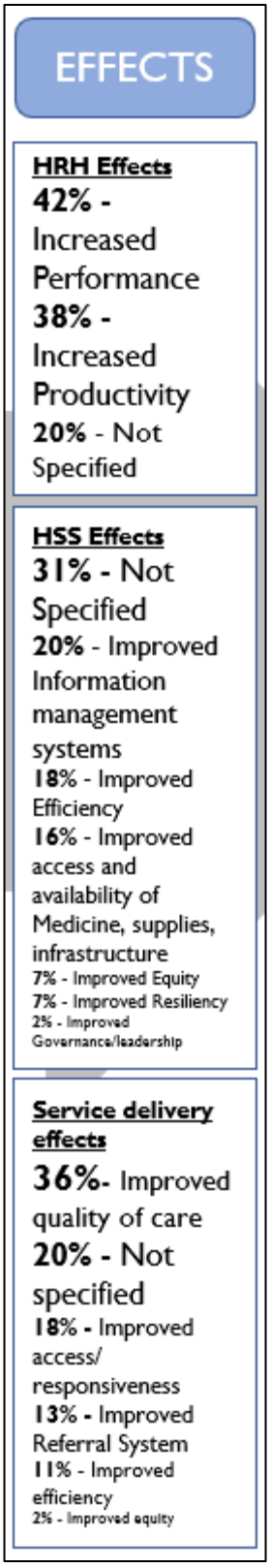
Effects

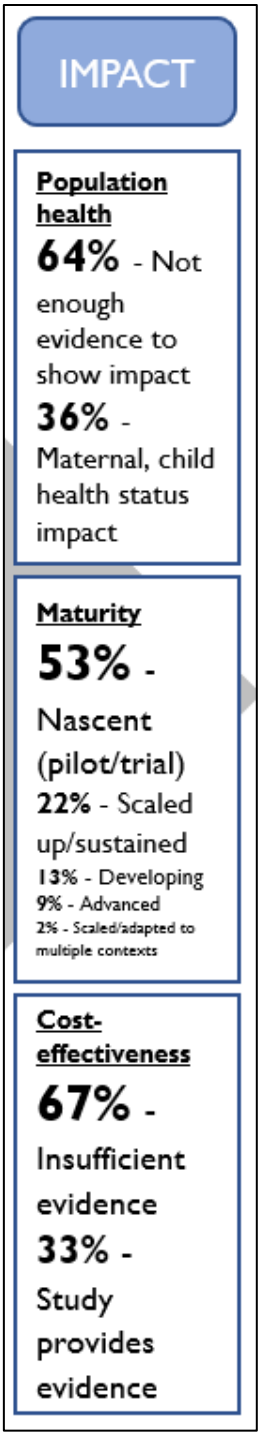
Effects of the supervision approaches were analyzed by level—HRH, HSS, and service delivery—within the taxonomy. All but three resources identified an effect in at least one of these levels, though those three resources did report outputs and/or outcomes. Slightly more resources documented HRH effects (80%) and/or service delivery effects (80%) than HSS effects (69%).

Increased health worker performance (42%), increased productivity (38%), and improved quality of care (36%) were the most frequently identified effects documented in this analysis. All these effects were heavily influenced by improved skills, knowledge, or attitudes at the HRH output level; such outputs were reported among 79% of resources that documented performance effects, 53% of resources that documented productivity effects, and 81% of resources that documented quality effects. As mentioned previously, this may signal that these approaches have reached the "application" stage of Bloom's taxonomy of learning objectives (1956), indicating that supervision approaches that can achieve HRH learning outputs have the potential to impact application of skills.

To further analyze the implementation logic of these approaches, we also explored the outcomes associated with the three most common effects. Of the approaches that reported increased performance, 68% had also reported improved quality standards as an HSS outcome, and 79% had reported improved health worker competence as an HRH outcome. Similarly, improved quality standards and HRH competence outcomes contributed heavily to resources that documented improved quality of care effects (69% and 75%, respectively). On the other hand, there was no single HRH outcome or HSS outcome that stood out in the analysis as key to increased productivity, as these resources documented a wide variety of outcomes.

Under the HSS category, improved information management systems (20%), improved efficiency (18%), and improved access and availability of supplies, medicine, and infrastructure (16%) were the most commonly reported effects. Like the data use findings in the outcomes section, there was no single modality that accounted for improvements to information management systems; while about one-third of these resources implemented HMIS and reporting improvement modalities, the remaining approaches implemented a variety of modalities, including HR management systems, QI, recognition systems, and task-shifting/sharing. As such, it was found that HMIS modalities are not the only road to improved information managements systems; rather, this effect may also stem from improvements made to information systems to sustain other modalities. For example, the Plan-Do-Study-Act cycle of QI modalities requires iterative and adaptive data analysis to test new changes, and task-shifting/sharing requires accurate data to properly estimate human resource requirements and to make informed





workforce decisions[6]. For example, Green *et al.* (2014) documented improved information management systems as a result of task-shifting of ART administration for HIV positive treatment clients from doctors to nurses, as quality data was necessary to track the nurses authorized to prescribe ART and the proportion of ART initiations performed by the mentored nurses.

Impact

Population health, maturity, and cost-effectiveness

The ultimate category of the results section of the taxonomy explored the impact of the approaches in terms of population health, maturity, and cost-effectiveness. Maturity[7] may set the context for other impact findings, as the extent to which an approach has been implemented from nascent pilot projects to fully scaled-up, sustained programs could affect whether the approach has had an opportunity to collect impact-level data. More than half (53%) of approaches documented in this inventory were at the nascent stage, the lowest stage of maturity that included pilots, trials, and other approaches that have not yet been implemented at scale. Thirteen percent of resources were assessed to be at the developing stage, 9% at the advanced stage, and 22% at the scaled-up/ sustained stage. Only a few approaches, such as MESH-QI and Health Network Quality Improvement System (HNQIS), had been scaled-up and adapted to multiple contexts; the former in three countries, and the latter across 19 countries.

Despite these challenges, 36% of resources attributed MNCH impact to supervision approaches; two-thirds of these resources had reached a maturity level of "advanced" or higher. The taxonomy also included a population health impact category for "disease prevalence reduced at intervention site," but no resources demonstrated adequate evidence for this impact category. The prevalence of MNCH impact versus disease reduction impact may be in large part due to the balance of resources included in the inventory, as 56% of the inventory resources fell under RMNCH, child health, or nutrition in the "health area" section of the taxonomy. Impact-level results were not always possible to assess, especially given that most of the approaches were nascent levels.

The remaining approximately two-thirds of all resources did not document impact-level evidence. Sixty-five percent of the approaches that *did not* demonstrate impact were at the nascent stage, while only 31% of approaches that *did* demonstrate impact were at the nascent

[6] HRH2030 developed an HRH Optimization Tool for ART: https://hrh2030program.org/tool_hrh-planning-for-hiv/

[7] The team defined maturity according to four stages of implementation:
1) *Nascent:* supervision enhancements were documented within a study pilot or trial, covering an initial period, geographic and technical scope (i.e., service area). The literature did not confirm that the supervision enhancements were implemented beyond the study period. Country ownership of the approach is limited.
2) *Developing:* supervision enhancements may have been limited to a geographic and technical scope, but literature gave some indication that the capacity built during implementation supported continued implementation of the

stage, indicating that the scale, maturity, and length of implementation may have influenced the ability of the inventory resources to demonstrate impact. Similarly, approximately two-thirds of the resources included insufficient evidence to determine cost-effectiveness of the assessed approach.

QI was the most frequent modality among resources that demonstrated population health impact. Despite comprising only 38% of resources in the inventory, QI resources accounted for 56% of approaches that demonstrated population health impact, followed by HR management system modalities and task-shifting/sharing modalities, both at 19%. Though the number of impact-level resources is too low to draw firm conclusions, it is interesting to note that QI and task-shifting/sharing were the only two modalities where the majority of resources provided sufficient evidence of impact; 56% of QI resources and 75% of task-shifting resources were able to demonstrate impact.

Case studies

HRH2030 elaborated two case studies demonstrating how enhanced supervision has been implemented in selected contexts, and with which inputs, processes, and results. As noted within the Annex B inventory, these enhanced supervision approaches have been scaled-up and adapted to multiple contexts. The full case studies are available in Annexes C and D and summarized below.

- **Mentorship and Enhanced Supervision for Healthcare and Quality Improvement (MESH-QI):** In one instance, a supervision approach was documented multiple times with various research methodologies, including a cost-effectiveness analysis (Manzi, Mugunga, Nyirazinyoye, *et al.*, 2018), allowing the team to consider how the approach was developed, reviewed, adapted, evaluated, and further scaled and sustained over time. See Annex C case study on MESH-QI.
- **Health Network Quality Improvement System (HNQIS):** In another instance, the approach inputs and processes had limited documentation; however, they exemplified many of the promising practices described in the landscape analysis main finding, and the results and scalability of the approach demonstrated great potential. See Annex D case study on HNQIS.

Discussion & Recommendations

Based on HRH2030's landscape analysis, supervision approaches implemented across health systems—including with community health workers—have demonstrated health workforce performance and service delivery improvement in a range of health areas. Broadly, supervision enhancements are most effective when they:

- In terms of *context*, **consider macro-, micro- and individual-level contributors to performance** and are designed to **adapt to variations** at each of these levels. Due to the

supervision enhancements beyond the study period. The specific inputs and processes may not be clearly defined, and/or country-led ownership of the approach may be limited.
3) *advanced:* supervision enhancements were implemented beyond initial geographic and technical scope, with skills building approaches built into the implementation. The specific inputs and processes are clearly defined, and some level of country-led ownership of the approach is documented. Whether implementation continues is unknown.
4) *scaled-up/ sustained*: supervision enhancements were implemented beyond initial geographic and technical scope, with skills building approaches built into the implementation. The specific inputs and processes are clearly defined, and country-led ownership and continued implementation is documented.

generally limited quality of health worker pre-service training, and the limited skills development for supervision for many supervisors, support to strengthen these respective skills through **clinical mentoring** and **supervisor training** are recommended.

- At the *inputs level*, **engage a range of stakeholders** across health and local systems, including district managers, peers, and communities, and include **performance data to inform visit priorities**, as well as make use of **standard technical resources** and job aids to assure quality across all visits.

- In terms of *processes*, provide **timely, effective performance feedback**—against clearly defined standards of care to promote self-efficacy. Digital technologies facilitate adherence to standards by using checklists or job aids with algorithms to provide the most appropriate and immediate feedback. In addition, they should seek to **improve the quality of services**, especially with a QI approach that seeks to understand quality gap, address underlying factors, and continuously monitor and adapt through collaborative problem-solving and measurement. Finally, approaches should seek to **improve supervision coverage**— to reach and support frontline health workers who are otherwise less supported, such as CHWs, which in turn can improve population access to services and health equity.

- In terms of *results,* the goals of each supervision approach may be different and thus their results cannot be compared against each other,

As such, our recommendations to practitioners and policymakers alike are to take forward most promising enhanced supervision approaches, which include:

- *Integrating evidence-based, quality-driven tools and processes* that streamline health workforce performance management with other health system performance data and information flows
  - QI methods promote problem-solving and data use at the service delivery level.
  - Digital data integration and interoperability (i.e., linked to broader health management information systems) can facilitate timely multi-level feedback on performance and reduce supervisor workload.
  - Linkages to health system performance indicators such as DHIS2, and data use to inform supervision priorities can help target resource allocation and improve quality and equity.
- *Scaling and replicating successful models* across service delivery areas and geographically across health districts
  - Most promising supervision systems can be adapted to expand use for public sector, private sector and community-based workers. However, scale-up requires contextualizing approaches to the macro-, micro- and individual level contexts, and adapting them based on the maturity of the approach.
- *Sustaining efforts* with mechanisms to support transition from external human and financial resources to local ownership, including communities
  - Approaches may also be effectively complemented by additional interventions, such as clinical mentoring, particularly for task shifting/task sharing.
  - Community engagement and feedback on the quality of services can complement district- or manager-level supervisory efforts, especially for supervising community health workers (World Health Organization, 2018b).

- In some cases, a "whole of system" approach was used to support health worker performance by capacitating supervisors, enhancing supervision for supervisees, and addressing the enabling environment, including through community engagement.

While many supervision enhancements and innovations may not be initially cost-effective, they could be when better integrated, scaled, and sustained within the existing system.

Though only a few resources fall into this combination of impact categories, the high number of supervision approaches that documented outputs, outcomes, and effects is encouraging. It is recommended that additional documentation and research should be conducted as nascent approaches are brought to scale, which will enable more thorough analysis of the modalities that can sustainably impact population health.

Limitations

The landscape analysis may be limited in terms of the documented supervision approaches included. First, there are few examples from Latin American and Asian contexts, which may be due to reviewing English-only resources. Second, resources that assessed the effectiveness of scaled, national health worker supervision systems were largely missing from the analysis, as they could not be identified by the team in the literature. Interventions were almost exclusively donor-supported (and thus not always sustained or scaled). This could perhaps be due to the database search methodology and criteria, and possibly because these systems are less likely to have had external donor support and/or research support. The team's decision to include review of USAID's DEC was an attempt to capture more operational documents. While including national policy documents/reviews may have served to describe the inputs and processes for supervision, they would not meet CASP criteria for inclusion in the landscape analysis, such as having defined research aims, documented results, and sufficient rigor of data analysis.

The cost of implementing a national (or nationally representative) research study on supervision that is not financed by external donors may be prohibitive for many LMICs. Alternatively, the motivation for building evidence on a supervision system as evidence for policy change may no longer be there when the system has already been taken to scale.

The format and focus of research articles and documents that adhere to the landscape analysis criteria may not adequately describe the context, inputs, and/or processes to fully capture the approach using the conceptual framework and taxonomy. The type of resource documents (i.e., RCT results) are not always intended for practitioner audiences; thus, some of the details on the implementation approach that were of interest to our team were sometimes underemphasized within the methods- and results-focused manuscripts.

The HRH2030 landscape analysis results—based on a total of 45 resources—may not include as many documented approaches as other more intensive database searches. Released in October 2018 after the landscape analysis was underway, the CDC Health Care Provider Performance Review included studies from the 1960s to 2016. Of these, it is estimated that 235 studies included supervision as an HRH strategy, and of these an additional 44 would meet our criteria for being documented in 2010 or later. Additional approaches could be analyzed according to our conceptual framework to test the strength of the landscape analysis recommendations.

Conclusion

Enhanced supervision can have the greatest impact to strengthen health systems when the approach is informed by and promotes continual use of supervisory and health system data using a QI cycle. The most successful approaches are integrated into other health system activities; can be adapted, scaled, and sustained beyond a single health worker type or disease area; and, eventually demonstrate cost-effectiveness as they are streamlined and taken to scale.

Further research is recommended to assess the outputs, outcomes, effects, and impact of the same enhanced supervision approach across different country contexts and health areas, for different types of health workers (e.g., public and private sector, facility- and community-based), and at different stages of maturity. The implementation approach should reflect the landscape analysis' most essential components to enhance supervision: using supervisory and health system performance data to inform the visits and standard supervisory checklists to ensure a consistent QI-focused modality, integrating visit results through digital platforms to deliver immediate feedback loops for both the supervisee and at the aggregate, often district, level.

In next steps, HRH2030 proposes to more rigorously test a best practice supervision enhancement through a digital health platform that includes data use, data integration, interoperability information systems, and ensures data quality to better determine how this supervision enhancement can be used across a variety of service delivery areas and standards of care to impact health outcomes.

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Annex A. Database Search Methodology and Results

Database searches

For the Phase I landscape analysis, HRH2030 searched and reviewed peer-reviewed publications and grey literature including end-of-project reports, systematic reviews, qualitative studies, journals, country case study reports, technical briefs, and conference presentations, among others.

The following databases and sources were included in the search (listed in the order of the number of results yielded in the initial search):

1. Popline
2. USAID's DEC
3. WHO Global Health Library
4. Health Systems Evidence
5. Cochrane Database of systematic reviews
6. Global Health & PubMed
7. Research Gate
8. HRH Global Resource Center
9. mHealth Compendium databases
10. Global Health Science and Practice journal
11. The Lancet research articles and published systematic reviews
12. References of articles from within the Bailey et al. 2015 systematic review
13. Healthcare Management Information Consortium

Search strategy

Key search terms applied were: "supervision," "enhanced supervision," "mentorship," "supportive," "team-based," "site-visit*," "coaching," "problem-solving," "check-list," "learn*," AND "health workers."

Inclusion criteria

- Relevant to health, health systems, and/or the health sector
- Approaches that were documented and/or implemented in 2010 or later
- Selected articles were those written in English or in another language, but which had a translated English version available
- Intervention implemented in a LMIC context
- Following the scoping of articles, titles, and abstracts were checked for relevance to the landscape analysis research questions
    - The population (does the article address *health workers*?)
    - The intervention/topic (does the article describe a *supervision approach*?)
- A demonstrated linkage between a supervision approach to: health worker performance and productivity, health service delivery, or health outcomes

Finally, resources were reviewed with the following questions in mind:

1. What are the components of health workforce enhanced supervision (i.e., defining the inputs and processes of the approach and classifying them according to the taxonomy terms)?
2. What is the impact of enhanced supervision on health worker performance, health services, and health outcomes?
3. What are the best practices for sustaining and scaling-up enhanced supervision?

CASP checklists for article inclusion

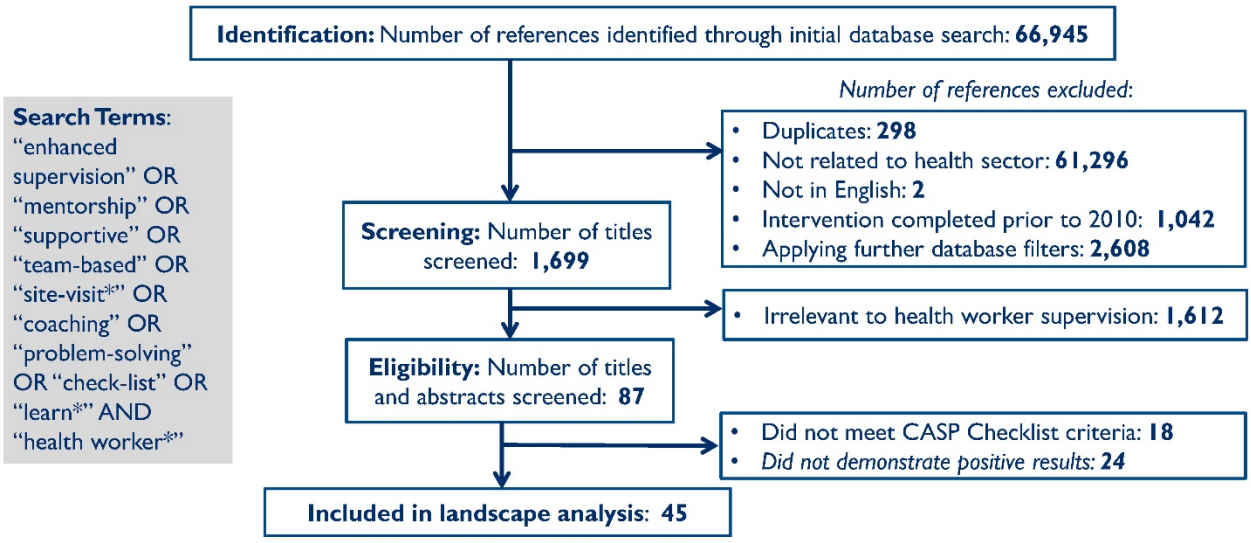
Articles meeting the criteria listed above were then assessed for the quality of their methodology by using CASP checklists[8]. This set of eight critical appraisal tools is designed to be used when reading research, including tools for different research methodologies: Systematic Reviews, RCTs, Cohort Studies, Case Control Studies, Economic Evaluations, Diagnostic Studies, Qualitative Studies, and Clinical Prediction Rule. Each checklist was developed to assess the quality of the respective research methodology, including: the clarity of the research question, how well results in the articles had been demonstrated, how well outcomes from the studies were presented, if the benefits shown in the studies were worthwhile, and if there were any potential biases on the part of the researcher(s).

Results

From May 1 to June 24, 2018, the database searches according to the search criteria above yielded a total of 66,945 initial results, of which 5,351 were relevant to the health sector, of which 4,309 were published in 2010 or later and 4,307 in English. In the case of USAID's DEC, additional filters were applied, yielding a total of 1,699 articles. The titles and abstracts of these results were then reviewed to ensure their relevance, yielding 87 articles. Of these, 69 met the CASP criteria. After further review based on their relevance, the strength of results, and the rigor of their documentation, a total of 45 resources documenting enhanced supervision approaches were retained for the inventory.

Figure 2 (repeated here) shows the database search methodology and results. Table 1 shows disaggregated search results by database through the CASP checklist criteria.

Figure 2. Enhanced supervision landscape analysis: Database search results



[8] https://casp-uk.net/casp-tools-checklists/

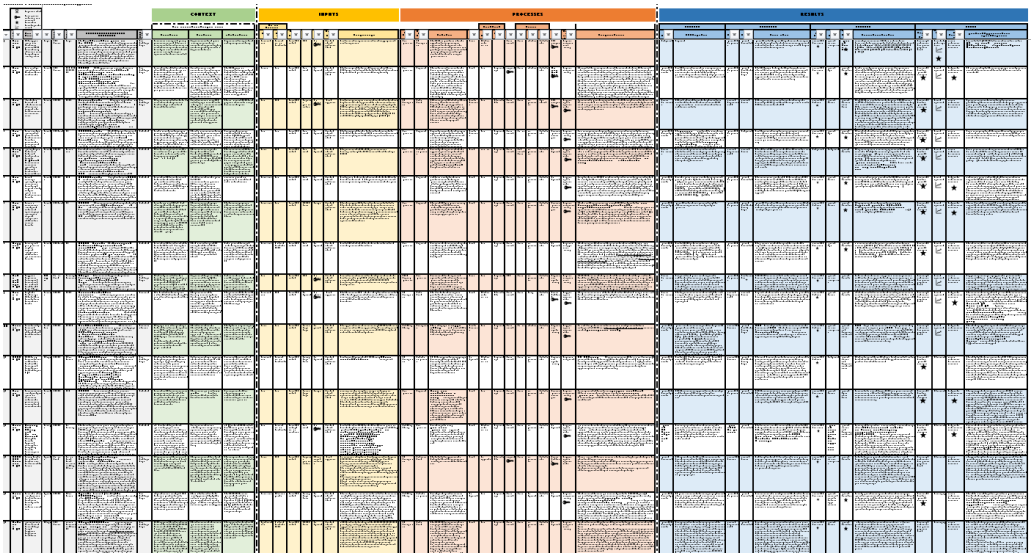
Table 2. Search results disaggregated by database

Database	Initial search results	After removing repeats	Related to health (for multi-disciplinary databases)	Since 2010	In English	Further search using database filters	Relevance of title & abstract	Selected after CASP checklist
1. Popline	49,873	49,873	118	118	118	118	3	**3**
2. USAID DEC	15,200	15,197	4050	2972	2972	364	20	**16**
3. WHO Global Health Library	613	383	383	362	362	362	0	**0**
4. Health Systems Evidence	470	470	155	286	286	286	0	**0**
5. Cochrane Database of systematic reviews	281	281	281	226	226	226	2	**1**
6. GlobalHealth & PubMed	151	151	151	94	94	94	24	**21**
7. ResearchGate	133	132	132	110	108	108	8	**7**
8. HRH Global Resource Centre	94	94	15	79	79	79	6	**5**
9. mHealth Compendium Databases:	80	16	16	16	16	16	4	**4**
10. Global Health: Science & Practice journal	27	27	27	27	27	27	10	**10**
11. The Lancet	13	13	13	9	9	9	0	**0**
12. References from Bailey et al 2015	10	10	10	10	10	10	10	**2**
13. Healthcare Management Information Consortium (HMIC)	0	0	0	0	0	0	0	**0**
TOTAL	**66,945**	**66,647**	**5,351**	**4,309**	**4,307**	**1,699**	**87**	**69**

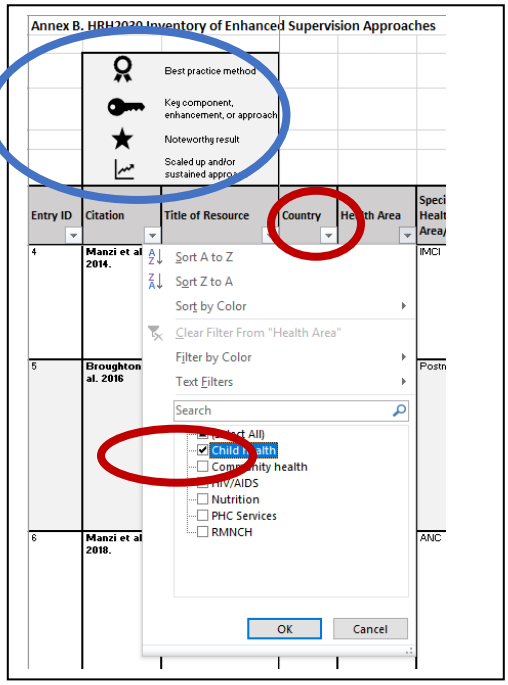
Annex B. Inventory of Enhanced Supervision Approaches

Please see the separate Excel file: Enhanced-supervision-landscape-analysis-inventory.xlsx

- The first tab, titled Inventory, contains the inventory of all approaches as analyzed according to the conceptual framework.



  - Users can filter results according to their category of interest. For example, if a user was interested in reviewing evidence on supervision approaches for child health, then this filter could be applied. (*See red circles in the screenshot at right*).
  - Icons are used within the inventory to visually highlight best practice intervention evaluation methods, key supervision components or enhancements, noteworthy results, and approaches that have been taken to scale and/or sustained. (*See legend within the blue circle in the screenshot at right*).



- The second tab, titled Taxonomy lists, provides the complete drop-down lists for the taxonomy by category and classification.
- The third tab, titled Conceptual framework, repeats Figure 2 within this report for reference.

Annex C. Case Study on Mentorship and Enhanced Supervision for Health Care and Quality Improvement (MESH-QI)

The following case study is based on cited literature, including a comprehensive implementation guide, as well as key informant interviews with Partners in Health undertaken in person in August 2018 and by phone in November 2018.

Introduction

MESH-QI[9] is an enhanced supervision approach established in 2009 and implemented since 2010 in two health districts in Rwanda by Partners in Health (PIH), its sister organization *Inshuti Mu Buzima* (IMB), and later adapted and scaled nationally in collaboration with the Rwandan Ministry of Health. PIH and local partners have also adapted MESH-QI for implementation in Liberia and Malawi. Funded through the Doris Duke Charitable Foundation's African Health Initiative, it was initially piloted to support primary health care nurses and improve the quality of integrated management of childhood illness (IMCI) and antenatal care (ANC).

MESH-QI "enables mentors to visit health centers to provide one-on-one clinical mentorship for nurse mentees; on-site education sessions for facility staff; quality improvement (QI) coaching; and data collection, all to improve programs and the quality of patient care" (Manzi, Kirk, and Hirschhorn, 2017). MESH-QI has since been documented to improve the quality of RMNCH, IMCI, HIV, nutrition, mental health, and non-communicable disease (NCDs) services in PIH-supported districts; the approach has been adapted and scaled by the Ministry of Health of Rwanda nationally (Anatole, Magge, and Redditt, 2012) (Manzi *et al.*, 2014)(Manzi, Mugunga, Iyer, *et al.*, 2018) (Magge *et al.*, 2014)(Manzi, Kirk, and Hirschhorn, 2017) (Manzi, Nyirazinyoye, *et al.*, 2018).

Using the HRH2030 enhanced supervision landscape analysis conceptual framework and taxonomy, the MESH-QI implementation context, inputs, processes, and results are classified (as shown in Figure 5) and further described in the sections below.

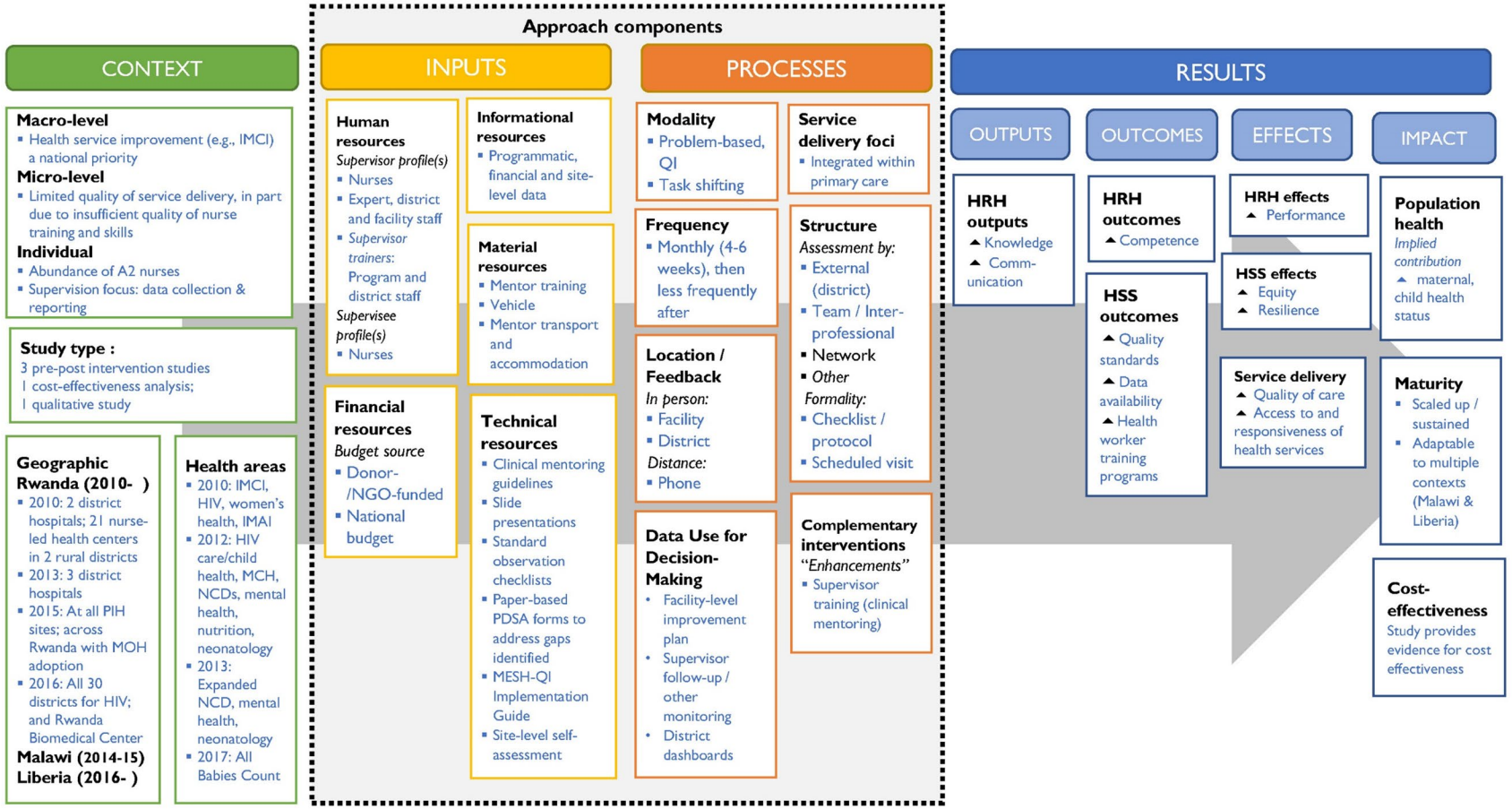
CONTEXT

Macro-level factors - At the health system level, the Ministry of Health has sought to strengthen the health care delivery system in selected remote and underserved districts in the country. A proxy for health systems effectiveness is the infant and under-five mortality rates, which were both high. In 2006, IMCI emerged as a national priority to address infant and child health. The ministry worked with partners, including PIH, to develop an IMCI protocol, which was among the first service areas for implementing MESH-QI. The MESH-QI approach was rooted in the principle of complying with existing national and global health sector policies and guidelines and addressing Ministry of Health priorities to implement the IMCI protocols effectively. Globally, Rwanda is remarked as a country context in which political will has shown to be a strong enabling factor to facilitate effective change and policy implementation, including in the health sector.

Micro-level & individual factors - At the workplace or health facility level, Rwandan primary care health centers faced challenges including high costs of centralized didactic training, limited clinical supervision (which mostly focused on data collection and reporting), and supply-chain issues. These factors contributed to the limited implementation of Ministry of Health evidence-based clinical protocols, such

[9] In its nascent and developing stages, the approach was called "Mentorship and Enhanced Supervision for Hospitals" (MESH). As the approach developed, PIH adapted it in more facility settings (changing the "H" to stand for "health care"), and to more deliberately integrate QI approaches, thus renaming it Mentorship and Enhanced Supervision for Health Care and Quality Improvement, or MESH-QI.

Figure 5. MESH-QI enhanced supervision implementation in Rwanda



Source: HRH2030 2019. Adapted from Dieleman et al 2009, GHWA 2014, and informed by Campbell et al 2013.

as IMCI, in care delivery in many health centers. Health center IMCI services were limited in quality, poor training coverage, and effective supervision models difficult to sustain. First, there was a shortage of health center nurses formally trained in their assigned clinical area, partly due to high turnover and partly due to the abundance of A2-level nurses, with only a high-school degree. In 2006, the Ministry of Health stopped training and deploying A2-level nurses out of concern that their skills were insufficient for delivering quality care, and instead shifted to upgrading A2-level nurses' skills. The Ministry of Health and PIH identified the need for all nurses to gain competency across services, while recognizing the concern that task shifting without adequate support could diminish the quality of care.

Geographic area - From 2010 to present, MESH-QI implementation has expanded in Rwanda from being implemented in two district hospitals, Kirehe and Rwinkwavu, and 21 nurse-led health centers in two rural districts, Southern Kayonza and Kirehe (Anatole, Magge, and Redditt, 2012). In 2013, the Butaro District Hospital implemented MESH-QI. By 2015, all PIH-supported sites across Rwanda were using MESH-QI, as well as across Ministry of Health sites, as the Rwanda Biomedical Center had adapted MESH-QI for national scale. By 2016, all 30 districts in Rwanda used the MESH-QI approach to enhance the quality of HIV services.

In 2014, MESH-QI was implemented in Malawi, as well as in 2016 in post-Ebola Liberia. These implementation experiences are documented under the Maturity section.

Health area – MESH-QI has been used to enhance the existing primary health care supervision system as well as emerging, more specialized health needs. In 2010, health areas included maternal and child health, HIV, and integrated management of adolescent illness (IMAI). In 2012, MESH-QI expanded to non-communicable diseases (NCDs) and mental health. Building on successful implementation of the MESH-QI program, a neonatal mortality reduction initiative known as "all babies count (ABC)" was designed and implemented in Kirehe and Kayonza district hospital catchment areas. In collaboration with the Ministry of Health, PIH is expanding the ABC initiative in other district hospital catchment areas as part of their plan to reduce maternal and neonatal deaths. Per key informants, this is part of the ministry's unconventional plan that calls for activities to promote engagement of leadership and management in the quality of maternal and newborn care, and particularly in data review and use for quality improvement.

Study type - MESH-QI implementation and results have been documented in five peer-reviewed journal articles—including a case study, qualitative study, and three pre-post intervention studies—summarized in the table below.

Citation	Description
Anatole, M., Magge, H., and Redditt, V. (2012) 'Nurse mentorship to improve the quality of health care delivery in rural Rwanda,' Nursing Outlook. Elsevier Ltd, 61(3), pp. 137–144. doi:10.1016/j.outlook.2012.10.003.	This initial **case study** documents the process and outcomes of training Rwandan nurse-mentors in QI and mentoring techniques. It describes how the approach was integrated into the Ministry of Health's district supervisory team to provide ongoing, on-site individual mentorship to health center nurses, and to drive systems-level quality improvement activities.
Magge, H. et al. (2014) 'Mentoring and quality improvement strengthen integrated management of childhood illness implementation in rural Rwanda,' (May). doi: 10.1136/archdischild-2013-305863.	This **pre-post intervention study** measures change in quality of care (QOC) after didactic training followed by 12 months of MESH support. Change in QOC support measured by case observation using a standardized checklist. Study sample was children age 2 months to 5 years presenting on the days of data

	collection (292 baseline, 413 endpoint). This intervention and study occurred in all 21 nurse-led health centers in two rural districts in Rwanda, Southern Kayonza and Kirehe, serving an estimated population of 530,000.
Manzi, A. et al. (2014) 'Clinical mentorship to improve pediatric quality of care at the health centers in rural Rwanda : a qualitative study of perceptions and acceptability of health care workers,' 14(1), pp. 1–9. doi: 10.1186/1472-6963-14-275.	A **qualitative study** using focus group discussions and an in-depth interview was conducted to investigate perceptions of the MESH program across health system stakeholders. It took place from January to March 2012. Forty health workers from Kirehe and Southern Kayonza Districts participated, including two hospital managers and two mentors.
Manzi, A. et al. (2018) 'Beyond coverage : improving the quality of antenatal care delivery through integrated mentorship and quality improvement at health centers in rural Rwanda.' BMC Health Services Research, (December). doi: 10.1186/s12913-018-2939-7.	This **pre-post intervention study** evaluated the effect of MESH-QI on the completeness of danger sign assessments in routine ANC services, measured by expert nurse mentors using standardized observation checklists. Checklists completed from October 2010 to May 2011 (n = 330) were used as baseline measurement and checklists completed between February and November 2012 (12 to 15 months after the start of MESH-QI implementation) were used for follow-up. A mixed-effects linear regression model was used to assess the effect of the MESH-QI intervention on the danger sign assessment score, controlling for potential confounders and the clustering of effect at the health center level.
Manzi, A., Mugunga, J. C., et al. (2018) 'Cost-effectiveness of a mentorship and quality improvement intervention to enhance the quality of antenatal care at rural health centers in Rwanda,' International Journal for Quality in Health Care, pp. 1–6. doi: 10.1093/neuros/nyx506.	This **pre-post intervention study** included a **cost-effectiveness analysis** of MESH-QI intervention from provider perspective in Kirehe and Rwinkwavu District Hospital catchment areas. It measured the incremental cost per ANC visit with complete danger sign and vital sign assessments. Two rural MESH-QI intervention districts (Southern Kayonza and Kirehe) were compared with standard district ANC supervision practices in Rwanda.

In addition, in 2017, PIH published the detailed MESH-QI Implementation Guide (Manzi, Kirk, and Hirschhorn, 2017). It describes the main components and processes for MESH-QI and documents how the approach has been implemented.

INPUTS

Inputs for the MESH-QI approach were classified by type: human resources, financial, informational, equipment, supplies, and technical inputs.

Human resources

Supervisor – In Rwanda, MESH-QI clinical mentors are embedded within the existing Ministry of Health district-level supervisory team and report to district hospital leadership to avoid creating a parallel system and promote sustainability. The mentors were selected by PIH/IMB are Rwandan nurses with a post-secondary nursing degree (i.e., A0- or A1-level) and several years of experience and formal training

in their clinical area, so considered peer mentors. Mentors were recruited following the national hiring procedures and based on World Health Organization clinical mentoring guidelines (Anatole, Magge, and Redditt, 2012). Key informants noted that within MESH-QI implementation, "supervisor" has increasingly been transformed to "mentor" as it has more positive connotations. Translated into Kinyarwanda, "mentor" translates to "those who improve understanding," whereas "supervisor" translates to "investigator." Recently developed Ministry of Health national guidelines in Rwanda also use "mentorship" instead of "supervision" (i.e., national mentorship guidelines).

Supervisee – Supervisees (also referred to as mentees) were hospital and health center nurses, most of whom were trained to the A2 level.

Supervisor trainers – Senior clinical, Monitoring and Evaluation (M&E), and quality experts, to deliver continuous coaching and mentoring support to the clinical mentors.

Financial

Since 2009, the approach has been donor-/NGO-funded, in part by the Doris Duke Charitable Foundation's African Health Initiative: Population Health Implementation and Training Partnership (Anatole, Magge, and Redditt, 2012), and PIH. Adaptation and scale-up within Ministry of Health districts were funded by the national health sector budget. In 2018, initiatives were being implemented in seven additional districts in Rwanda under a program focusing on neonatal health care. Further, the ministry launched its national HIV and maternal and child health mentorship programs.

Informational resources

Resources to inform the specific situation at a facility include clinical records, national health management information system (HIMS) reports, district health sector strengthening plan, as well as data monitored by the QI Plan-Do-Study-Act (PDSA) approach.

Material resources

In addition to the materials required for mentor training, resources required include: mentor transport and overnight accommodation at health centers, as well as printed clinical observation forms and other standardized tools (see below). Providing overnight accommodation for mentors was noted to be an implementation challenge (Manzi, Mugunga, Iyer, *et al.*, 2018), however it is optional when there is a reliable transport system, or when health centers are accessible.

Technical resources

Standardized technical resources used to implement the MESH-QI supervision process include:

- National mentorship guidelines established as the program scaled-up and adapted to additional service areas:
    - 2011: For nurse mentors focusing on IMCI, women's health, HIV and a pilot project on integrated management of adolescent illness (IMAI);
    - 2012: expansion of MESH-QI to support NCD and mental health program,
- Standardized tools adapted from existing resources reflecting Rwanda's Ministry of Health guidelines for care.
    - **Clinical case management observation checklists** to document nurses' adherence to clinical protocols during direct patient care, including the IMCI protocol nationally developed in 2006.
    - Case recording forms; baseline assessment data tools; technical advisor monthly report; clinical protocols; training materials) See sample checklists.
        - IMAI
        - IMCI

        - Infectious disease
        - Non-communicable disease
        - Women's health
    - Teaching aids such as clinical case studies, simulation exercises, and clinical vignettes
    - Mentor activity log
    - Quarterly health center survey to measure presence of essential IMCI-related equipment and medications
- MESH-QI Implementation Guide (Manzi, Kirk, and Hirschhorn, 2017). It describes in detail the main components and processes for MESH-QI, noting the importance of customizing it to contexts and organizational goals by using a self-assessment survey.

PROCESSES

Modality & intervention type

The MESH-QI approach focuses equally on **clinical mentorship**; **systems-focused QI**; and **data-driven improvements to quality of care**. The Guide suggests "these three building blocks interrelate to establish an effective implementation model to improve care and engage caregivers, teams, and leaders" (Manzi, Kirk, and Hirschhorn, 2017). After immediate feedback is provided, mentors and mentees formulate joint actions plans using the Plan-Do-Study-Act (PDSA) methodology.

MESH-QI is designed around **systems-focused QI** to address broader issues such as inadequate staffing or inefficient procedures (Manzi, Kirk, and Hirschhorn, 2017). During supervision, mentors work with teams to formulate joint action plans and other team-based QI projects using PDSA techniques to respond to various gaps (Anatole, Magge, and Redditt, 2012).

Clinical mentors conduct **side-by-side observation** and **mentoring on clinical case management** by "accompany[ing] mentees in their clinical duties, working with mentees to manage complex cases, enhance physical exam skills, and strengthen clinical reasoning" (Anatole, Magge, and Redditt, 2012). To facilitate this work and provide information for QI, they use clinical observation checklists to document nurses' adherence to clinical protocols during direct patient care.

The MESI-QI Implementation Guide recommends that mentors spend about 80% of their time conducting mentoring visits. On average, clinical mentors spend 68% of time providing mentoring, 10% conducting feedback meetings, 7% providing clinical service, 12% conducting didactic trainings, and 3% on holiday or other activities. Mentors in Rwanda are reported to observe an average of 52 IMCI cases, and 40 maternal health cases per month (Anatole, Magge, and Redditt, 2012). According to (Magge *et al.*, 2014) health centers received an average of 11.8 mentoring visits during the study intervention period.

Location, frequency & feedback

Supervision visits take place **in hospitals and at health centers** in rural health districts. Mentors conduct intensive visits to each health center in their assigned district every four to six weeks. When possible, they stay for two to three days, staying overnight at facilities to optimize mentoring time by minimizing travel time to remote facilities and to strengthen relationships with health center staff. After the first six months of mentoring, the frequency and duration of visits were tailored to meet individual health center needs. When MESH-QI implementation began in November 2010, it started with four health centers at a time, achieving full-district coverage within five months. Mentors are expected to also be available by **phone** for **distance mentoring support** as needed.

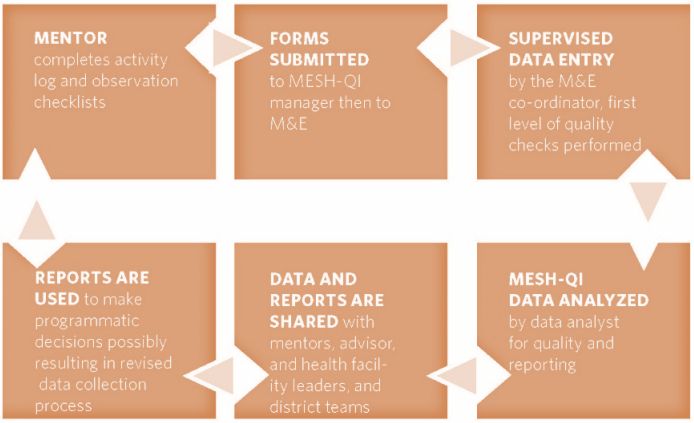
During their visits, mentors provide **immediate feedback on individual and systems performance** and review overall findings and recommendations with nurse-mentees and the health center director. Constructive, supportive feedback is shared to build a trusting relationship and model

professional behavior. One-on-one mentoring is "supplemented by group teaching sessions, including clinical presentations, case discussions, skills demonstrations, review of documentation practices, and group mentoring on QI" (Anatole, Magge, and Redditt, 2012). "Immediate and non-judgmental correction of a mistake or missed step… plus general feedback" on site was appreciated by mentees and considered a "key beneficial strategy for MESH[-QI] to address challenges in classification and treatment" (Manzi *et al.*, 2014).

Mentors also share monthly **district-based debriefing meetings at district hospitals**, which has helped to "discuss strategies to fix gaps" (Manzi *et al.*, 2014).

Figure 6 shows the data feedback loops designed within MESH-QI. According to the implementation guide, "the data flows and the controls in place ensure quality collection and a continuous improvement loop" (Manzi, Kirk, and Hirschhorn, 2017).

Figure 6. MESH-QI Mentor Communication Loop



Service delivery foci

All the studies reviewed on MESH-QI evaluated specific, but often **integrated**, disease, or program service delivery improvements within primary health care and hospital settings. See the health areas under the Context section, and service delivery improvements in the Results section.

Structure

Clinical checklists observed **individual** supervisees within services, while additional QI coaching took place across **interprofessional** facility teams. Supervision was carried out by an **external supervisor** except one study where the supervision occurred internally within the facility. In five of the MESH-QI studies, supervision was done in teams while in one study, the supervision was individual. In terms of the "formality" the MESH-QI approaches reviewed were based on a scheduled visit and the use of checklists during supervision.

Data use for decision-making

According to key informants, Rwanda MESH-QI implementation relies on paper-based records and program data. Advancements were made in the MESH-QI implementation in Malawi to include electronic checklists and other digital records.

The MESH-QI Implementation Guide recommends establishing a "clear reporting and communication structure… of what gets reported to whom, when and how [to] ensure data and information are shared and available for use by all relevant leadership" (Manzi, Kirk, and Hirschhorn, 2017, page 23). Supervision data help formulate joint action plans, including team-based QI projects using PDSA methodology to respond to identified gaps.

Aggregated program data are also analyzed routinely across health centers and districts to monitor changes in quality and nursing practices, inform future mentoring activities, guide data-driven QI projects, and identify high- or low-performing health centers for changes in support. District-wide

findings are shared with key health center, district-level, and PIH staff during monthly district reporting and supervision meetings in order to develop joint action plans to address priority issues.

Complementary interventions

Complementary interventions to enhance the MESH-QI approach include:

Supervisor training (clinical mentors): Two-day workshop adapted from the I-TECH Clinical Mentoring curriculum (I-TECH, 2008), plus continued mentoring and support in systems-based QI, including monthly on-site mentoring in first three months, then every two months thereafter. This ensured the quality of the supervisors and their ability to effectively coach. Post-training follow-up and ongoing supervisor coaching occurred.

Supervisee training: Formal, pre-service didactic training lasts one week at decentralized district health facilities. Formal training of health center nurses to meet minimum standard of 60% coverage of nurses per health center (average 8 to 15 nurses per health center). When possible, didactic trainings were shortened, decentralized to the district and health center levels, and made more practical. The goal was to increase the focus on practice-based learning, to reduce cost, and to decrease strain on health centers related to prolonged nurse absences while they attended longer training sessions in the capital city.

"Whole-of-system" approach: Implicit in the systems-focused QI is an approach to address health system challenges by engaging relevant leadership.

RESULTS

HRH outputs

After implementation from MESH-QI has demonstrably **improved skills, knowledge and attitudes of health workers** and **improved communication during clinical consultations:**

- For IMCI consultations, there was an increase in percentage of nurses communicating with caregivers to advise on fluids and feeding (8.4% to 96.3%, $p<0.001$); and to advise on when to return (34.2% to 99%, $p<0.001$) (Magge *et al.*, 2014).
- "Interactive, collaborative capacity building": MESH-QI was cited as building confidence for IMCI nurses to handle more complex cases, and the trust established with mentors "improv[ed] mentees' openness to learning (Manzi *et al.*, 2014).
- Related to results on health worker competence below, nurses conducting ANC visits were delivering more complete assessments (Manzi, Nyirazinyoye, *et al.*, 2018). However, the documented literature does not distinguish if this increase is filling a "know-do" gap (i.e., improving the application of nurses' knowledge in their practice), or if knowledge gaps were filled and/or attitudes improved.

HRH outcomes

Improved health worker competence (Magge *et al.*, 2014)

- Correct IMCI classifications improved (56.0% to 91.5%, $p<0.001$), and correct pneumonia, diarrhea and fever classifications improved (58.7% to 98.7%, $p<0.001$)
- Proportion of children seen using an IMCI case recording form increased from 65.5% to 97.1% ($p<0.001$)
- Proportion of children treated by an IMCI-trained nurse increased from 83.2% to 100% ($p<0.001$).
- Variability in quality of IMCI as explained by the nurse performing the consultation decreased from baseline to endpoint.

- "Observed ANC visits where nurses checked all vital signs and fetal wellbeing assessment items (fundal height, heart rate, movement, and position) improved significantly (1% to 55%, 37% to 89%, respectively, $p < 0.001$). Completeness of counseling improved significantly as well (2.2% to 51.0%, $p < 0.001$). Medical history assessment including previous surgeries, current medications, use of traditional medications, tobacco, and alcohol, domestic violence, and checking and documenting HIV status had less improvement, although the change was significant (2.1% to 14.0%, $p < 0.001$)" (Manzi, Nyirazinyoye, *et al.*, 2018).

HSS outcomes

Improved quality standards of health services

- From (Anatole, Magge, and Redditt, 2012): For IMCI visits, the percentage of consultations correctly classified increased from 34.6% at baseline to 53.3% ($p=0.0001$). For IMAI visits, the percentage of consultations correctly classified increased from 40.5% at baseline to 53.5% ($p=0.0001$)
- From (Magge *et al.*, 2014): IMCI integrated assessment index improved from 0.64 to 0.96 in children above 2 years of age, and from 0.61 to 0.92 among those below two years of age ($p<0.001$).
- From (Manzi, Nyirazinyoye, *et al.*, 2018): "Complete assessment of all danger signs at ANC visits improved from 2.1% at baseline to 84.2% after MESH-QI ($p< 0.001$). Similar improvements were found for 20 of 23 other essential ANC screening items. After controlling for potential confounders, the improvement in danger sign assessment score was significant. However, the effect of the MESH-QI was different by intervention district and type of observed ANC visit. In Southern Kayonza District, the increase in the danger sign assessment score was 6.28 (95% CI: 5.59, 6.98) for non-first ANC visits and 5.39 (95% CI: 4.62, 6.15) for first ANC visits. In Kirehe District, the increase in danger sign assessment score was 4.20 (95% CI: 3.59, 4.80) for non-first ANC visits and 3.30 (95% CI: 2.80, 3.81) for first ANC visits."

HRH effects

As illustrated by the HRH outcome results, in five of the MESH-QI studies health worker *performance* was impacted while in one study, health worker *productivity* was impacted by MESH-QI.

HSS effects

Improved equity: While this measure was not explicitly demonstrated, the team felt improved equity was implied when increasing the skills of (mostly A-2 level) nurses at nurse-led facilities in rural health centers, where the QOC would otherwise be lower than at health centers and hospitals staffed with A0 and A1-level nurses and other more highly trained health workers, such as doctors. Improved availability of drugs, such as the example noted in Magge *et al.*, 2014.

Service delivery effects

Improved quality of care: See the HSS effects evidence cited above that demonstrates improvements in service delivery attributable to MESH-QI.

Improved access to and responsiveness of health services: The IMAI mentor observed that nurses across health centers had difficulty managing sexually transmitted infections (STIs) due to knowledge gaps and medication stock-outs. In response, he implemented an health center-based STI training plan and collaborated with district authorities to address the irregular drug supply (Anatole, Magge, and Redditt, 2012).

Population health

While decreases in infant and under-five mortality cannot by any means be exclusively attributed to MESH-QI, it may have contributed. Infant mortality declined from 50 deaths to 32 deaths per 1,000 live births between the 2010 RDHS and the 2014-15 RDHS. Under-5 mortality has declined from 76 deaths in 2010 RDHS to 50 deaths per 1,000 live births in 2014-15 RDHS (NISR 2015).

Maturity

Scaled-up / sustained: Key informant interviews in 2018 confirmed that the MESH-QI approach has progressively grown and has continued to be applied at different levels of the Rwandan health system. Currently in Rwanda, the approach has been adopted by the Ministry of Health in the national "mentoring program."

Adaptability to multiple contexts

MESH-QI was applied with success in other resource-constrained settings in new countries and health service areas in recent years. As there was less documented about these approaches, they are summarized below.

Malawi

MESH-QI activities took place in Malawi around 2014 and 2015 with a focus on the training of clinical officers and nurses who are responsible for most health centers and who are Ministry of Health employees. The training is coordinated by two mentors, one from Ministry of Health and the other from PIH. Since early 2018, MESH-QI in Malawi has been implemented in Neno district hospital, which supports eight health centers. In Malawi, MESH-QI checklists have been shifted from paper-based to electronic/tablet-managed versions that have been incorporated to Commcare-based applications for ANC, malaria, and other clinical checklists.

Liberia

MESH-QI has been applied in Liberia since April 2016 under a post-Ebola HSS program called the Integrated Clinical Mentorship and Improvement Collaborative. It was funded by the United States Centers for Disease Control and Prevention (CDC) through the Global Health Security Agenda (GHSA). This largely supported health centers for ANC, infection prevention and control (IPC) and other MNCH and primary health care programming. The newest application of MESH-QI took place in Maryland County in southeast Liberia. As of early 2018, this application is in inpatient QI coaching. In Liberia, mentors are the physicians, physician assistants, clinical officers, pharmacists, and trained nurse midwives (currently mentors are PIH employees). These mentors train local Liberian clinicians who are tasked with the responsibility to deliver direct care at the hospital and conduct mentorship visits at health centers. In a post-emergency setting and with budget constraints, it may have been more challenging to ensure the sustainability of the approach, though key informants report MESH-QI remains an approach to raise the standards of care and support implementation of the evidence-based practices and tools like WHO Safe Childbirth and Surgical Safety checklists.

However, results from the hospital and health centers have demonstrated significant improvements in eight health areas, including MNCH and infectious diseases.

At health centers, the percent of MNCH service points including antenatal care, well-baby clinic, and labor and delivery areas with essential hand hygiene (soap, water, or sanitizer) facilities improved significantly in both Maryland and Grand Kru Counties, 31% to 66% and 62% to 70%, respectively ($p=0.02$). Similarly, significant increases in percent of observed antenatal care with HIV-testing

performed were reported in Maryland and Grand Kru countries, from 5% to 54% and 35% to 61%, ($p<0.001$). Although not statistically significant, we found improvements in the percent of observed providers with appropriate hand hygiene practices in Maryland from 34% to 59% and Grand Kru, from 31% to 48%, ($p=0.07$). However, results in 19 clinics have demonstrated improvement in eight health areas, including maternal and child health and infectious disease (Ogongo *et al.*, 2016).

At the hospital level, preliminary results demonstrated a significant increase in percent of patients informed of danger signs in maternity from 31% to 97% (<0.001) (Anyango *et al.*, 2019).

Cost effectiveness

Per (Manzi, Mugunga, Nyirazinyoye, *et al.*, 2018) the total annual cost of standard ANC supervision was 10,777.21 USD at the baseline, whereas the total cost of MESH-QI intervention was 19,656.53 USD. Human resources (salary and benefits) and transport drove the majority of program expenses (44.8% and 40%, respectively). Other costs included training of mentors (12.9%), data management (6.5%), and equipment (6.5%). The incremental cost per ANC visit attributable to MESH-QI with all assessment items completed was 0.70 USD for danger signs and 1.10 USD for vital signs.

As reflected in the landscape analysis, it is exceptional within the literature that an enhanced supervision approach was documented from development through implementation, scale, and adaptation to additional contexts.

Annex D. Case Study on the Health Network Quality Improvement System

This case study was developed based on the cited literature, as well as key informant interviews conducted by phone in November 2018 with Population Services International staff in Kenya and Cambodia and through exploration of the Health Network Quality Improvement System application demo, downloaded from Google Play.

Introduction

To enhance supervision for private and public sector providers, Population Services International (PSI) developed the Health Network Quality Improvement System (HNQIS). HNQIS was designed to address health system challenges and constraints related to monitoring and improvement of quality of care in LMICs, in particular across networks of private providers, such as social franchises or private outlets, and community-based health workers. It is an electronic tablet-based application used to improve quality of health services and effectively reach health impact at scale.

The HNQIS is composed of four modules that support healthcare supervisors to: (1) **plan** supervision visits, using a prioritization matrix that presents facility-specific quality scores and patient volume, (2) **assess** providers' quality of care against clinical standards, (3) **improve** providers' quality of care through tailored feedback, and (4) **monitor** quality improvements over time. HNQIS was developed to link with HMIS data from the District Health Information Software 2 (DHIS2) which is free and open-source. HNQIS assists QI teams to assess quality of care of providers' services, to measure provider proficiencies in respective skills, and to highlight and monitor identified areas for improvement.

CONTEXT

Macro-level factors

In many LMIC health systems, while data are abundantly produced, there is limited interoperability and use to inform health worker performance support. Governments have invested in DHIS2, but the robustness, completeness, and timeliness of DHIS2 data remains limited in many contexts. Further, the application or use of available health systems data across multiple data streams has not reached its full potential. Private sector networks struggle to ensure compliance from individual providers.

Micro- & individual level

At the workplace or facility level, "key constraints for monitoring and improving quality of care in lower and middle-income countries include the lack of enforcement of standards of clinical procedures, lack of or delayed performance feedback, and poor use of monitoring data to prioritize supervision visits where they are most needed" (Lussiana et al 2016). Per key informants, HNQIS was introduced to address the efficiency gaps of a paper-based system; data collection, entry, and management were all time-consuming.

Geographic & health areas

HNQIS has been customized and implemented in diverse contexts across 19 countries in sub-Saharan Africa and Asia to reinforce standards of care across 13 different health areas. In addition to the implementation experiences described in Table 6 below, HNQIS will go "live" in Ghana in June 2019 and in Côte d'Ivoire by the end of 2019; other countries for anticipated roll-out include Bangladesh, Ethiopia, Niger, Somaliland, and South Africa.

Table 6. HNQIS implementation by country, health area, and context

Country	Year started	Health program areas			Public / private	# of facilities supervised*
		Malaria	FP	Other*		
Angola	2018	X	X	PAC, WEA	Both	30
Benin	2018	X	X	CC, PAC, WEA	Private	60
Burundi	2018	X	X	HIV, PAC	Private	228
Cambodia	2016	X	X	WEA	Private	1,433
Cameroon	2018	X	X	CC, HIV, HT	Private	300
DRC	2017			IMCI	Private	189
Kenya	2015	X	X	CC, HIV, HT, MNH, IMCI, Newborn resuscitation, TB, WEA	Private	327
Laos	2017	X			Private	276
Madagascar	2017		X	PAC	Private	392
Malawi	2018	X	X	CC, HIV, HT, IMCI, MNH, VMMC	Private	299
Mali	2017	X	X	CC, PAC, WEA	Both	363
Mozambique	2017		X		Both	60
Myanmar	2016	X			Private	4,000
Nepal	2019		X	PBCC, PAC, WEA	Private	300
Nigeria	2016	X	X	CC, HIV, HT, IMCI, WEA	Private	342
Tanzania	2016	X	X	CC, IMCI, PAC, WEA	Private	205
Uganda	2015	X	X	CC, MNH, Newborn resuscitation, PAC, WEA	Private	172
Vietnam	2018	X		HT	Private	350
Zimbabwe	2017			VMMC	Both	173

Other health program acronyms:

CC = cervical cancer
HT = hypertension
MNH = maternal and newborn health
PAC = post-abortion care
PBCC = provider behavior change communication
VMMC = voluntary male medical circumcision
WEA = work environment assessment

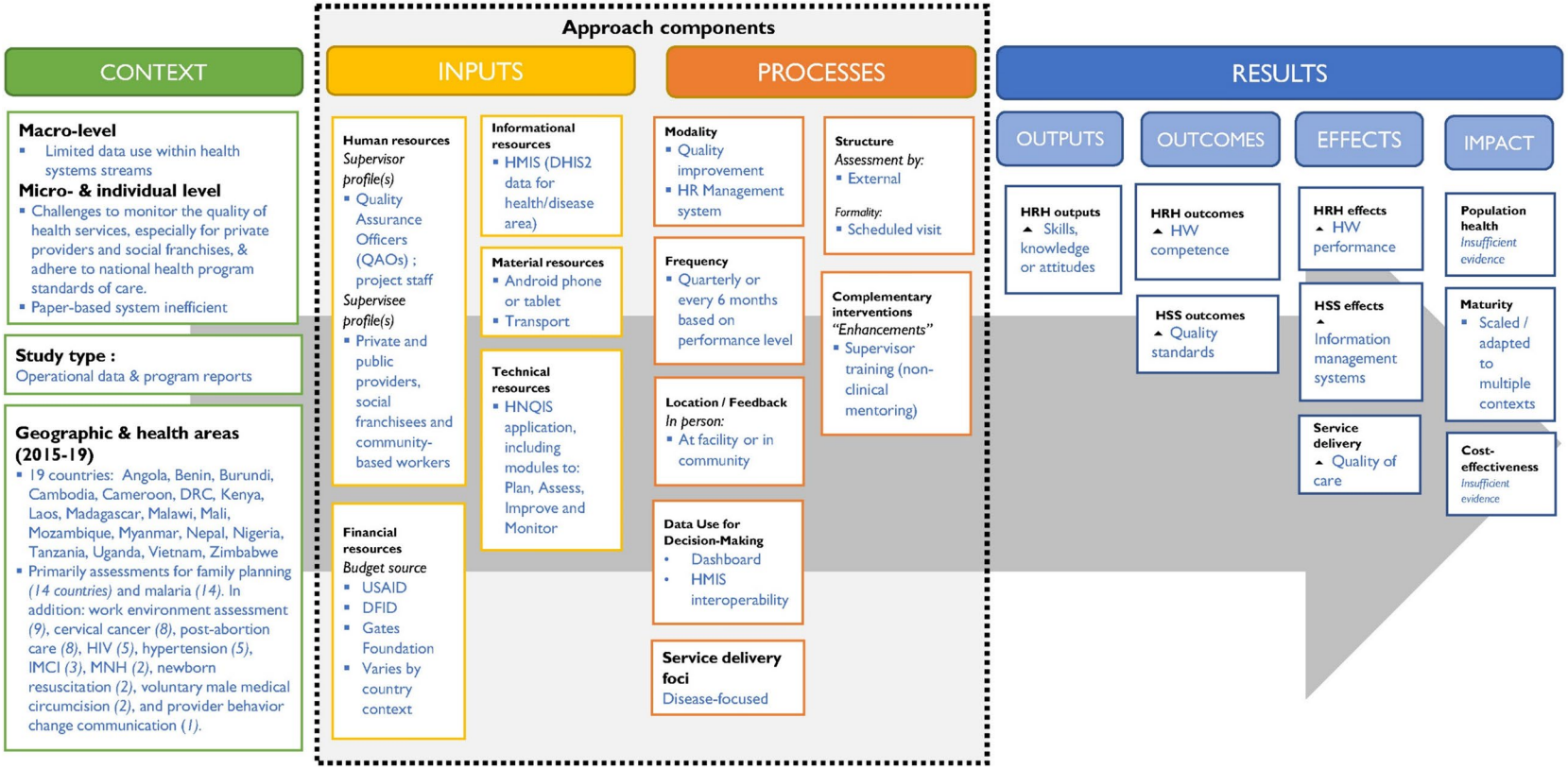
* In some cases, facilities have one provider; in others more than one provider is assessed at the same facility.

Study type

HNQIS implementation results are documented in programmatic reports on PSI's website,[10,11] blogs,[12] and as well as at conference fora[13,14] and poster presentations (Lussiana et al 2016).

[10] https://mis.psi.org/using-dhis2-to-improve-health-service-quality/?lang=en
[11] https://mis.psi.org/where-is-hnqis/?lang=en
[12] https://docs.dhis2.org/2.25/en/user-stories/html/user_story_psi.html
[13] https://dhis2symposium2018.sched.com/event/Diyc/the-future-of-hnqis
[14] https://www.globaldigitalhealthnetwork.org/sites/mhealthwg.org/files/rebecca_potter_-_harnessing_dhis2_for_malaria_surveillance_psi_potter_12-5-17_1.pdf

Figure 6. HNQIS enhanced supervision implementation



Source: HRH2030 2019. Adapted from Dieleman et al 2009, GHWA 2014, and informed by Campbell et al 2013.

As shown in Figure 6, the HRH2030 landscape analysis conceptual framework can be applied to HNQIS to illustrate the components of the enhanced supervision approach.

INPUTS

Inputs for the HNQIS enhanced supervision approach were classified by type: human resources, financial, informational, equipment, supplies, and technical inputs.

Human resources

Supervisor – Quality Assurance Officers (QAOs) are the primary supervisors and implementers of the HNQIS approach across PSI sites. They are project staff assigned to monitoring implementation of PSI/partner projects. QAOs are trained to use the HNQIS app; their main responsibility is to plan, assess, monitor, and follow-up with providers using HNQIS as a supervisory tool. The supervisor trainers are also project staff from PSI and partners.

Supervisee – Supervisees vary by context, encompassing both facility- and community-based health workers. Most are private providers of diverse professions, including pharmacists, clinicians, physicians, or nurses who use or interact with products and health services from PSI social franchise networks or are operating within the PSI health program sites.

Financial

The HNQIS software application was developed with support from the Department for International Development (DFID) of Great Britain and the Minister for Foreign Trade and Development Cooperation of the Netherlands. It is made possible by the support from USAID. HNQIS funding varies for each country and includes support from both donor and domestic funding. For example, Cambodia HNQIS is implemented with support from USAID, DFID, and the Gates Foundation.

Informational resources

Informational resources used in the HNQIS approach are largely from digital health worker performance data stored in the HNQIS application, as well as other HMIS data (e.g., DHIS2). At the central level, project staff use the HNQIS system to also monitor supervisors by checking information such as number of visits made by the QAOs to providers and patient volumes (see Figure 10a).

Material resources

The primary material resources for HNQIS are Android smart phones or tablets to download and use the HNQIS application itself, as well as transport to supervision sites. In most contexts, PSI has provided Android phones. HNQIS works offline, so consistent connectivity is not required; it is needed only to send data upon completion of the assessment, or on a routine basis (e.g., daily or weekly) to upload all assessment completed during the period (i.e., in Mozambique, the team uploads data on a weekly basis).

Technical resources

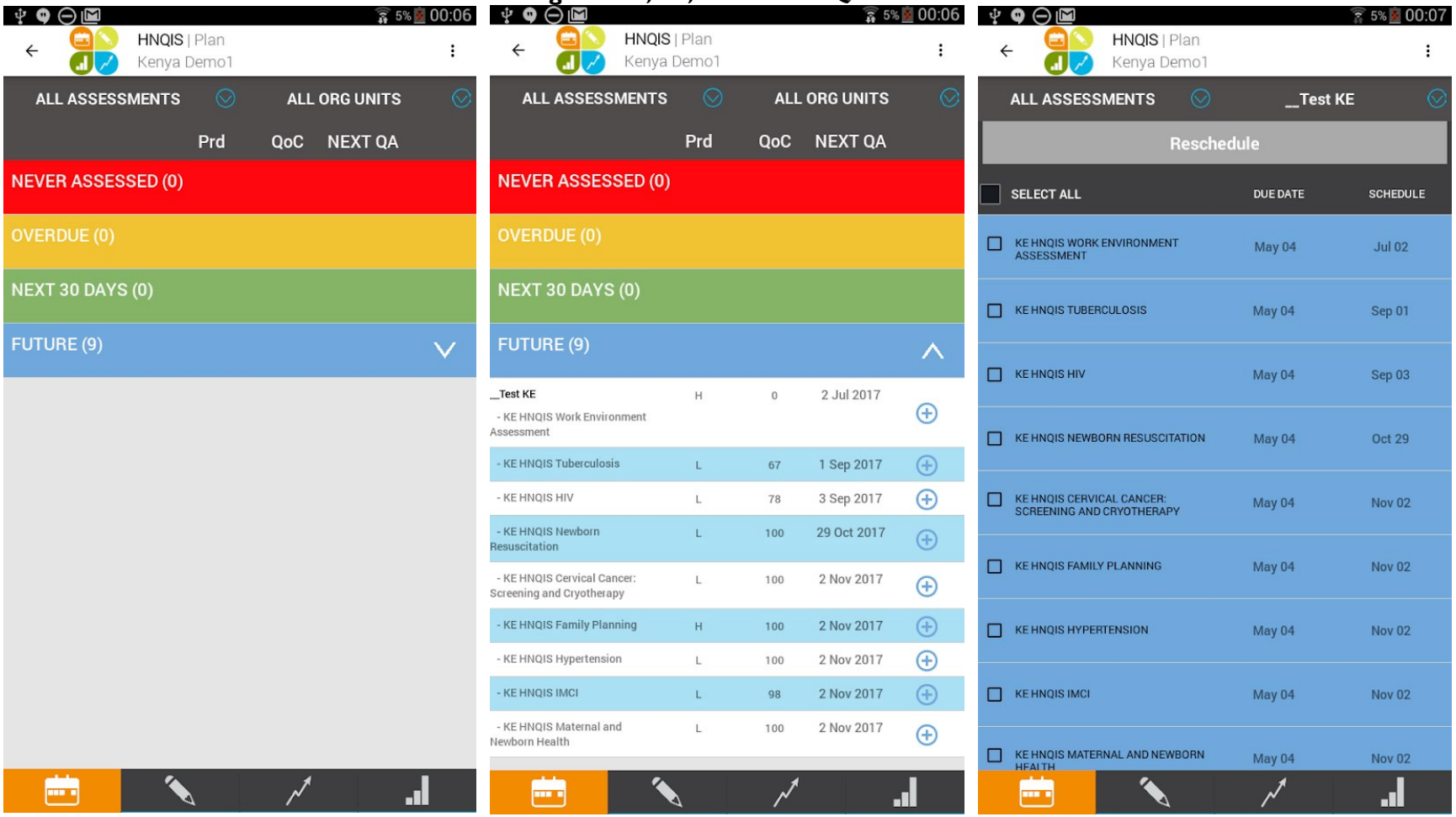
The HNQIS application is Android-based and was developed by PSI in collaboration with EyeSeeTea, Ltd and KnowTechTure (KTT), who developed the Android codes and made the link with DHIS2; BAO Systems supports DHIS2 server configuration to "host" the application.

In each country and for each health program area, the HNQIS content and algorithms must be customized within the standard modular process and according to national guidelines:

- **Module 1: Plan** supervision visits using a prioritization matrix that reckons quality scores and patient volume. (See Figure 7.)

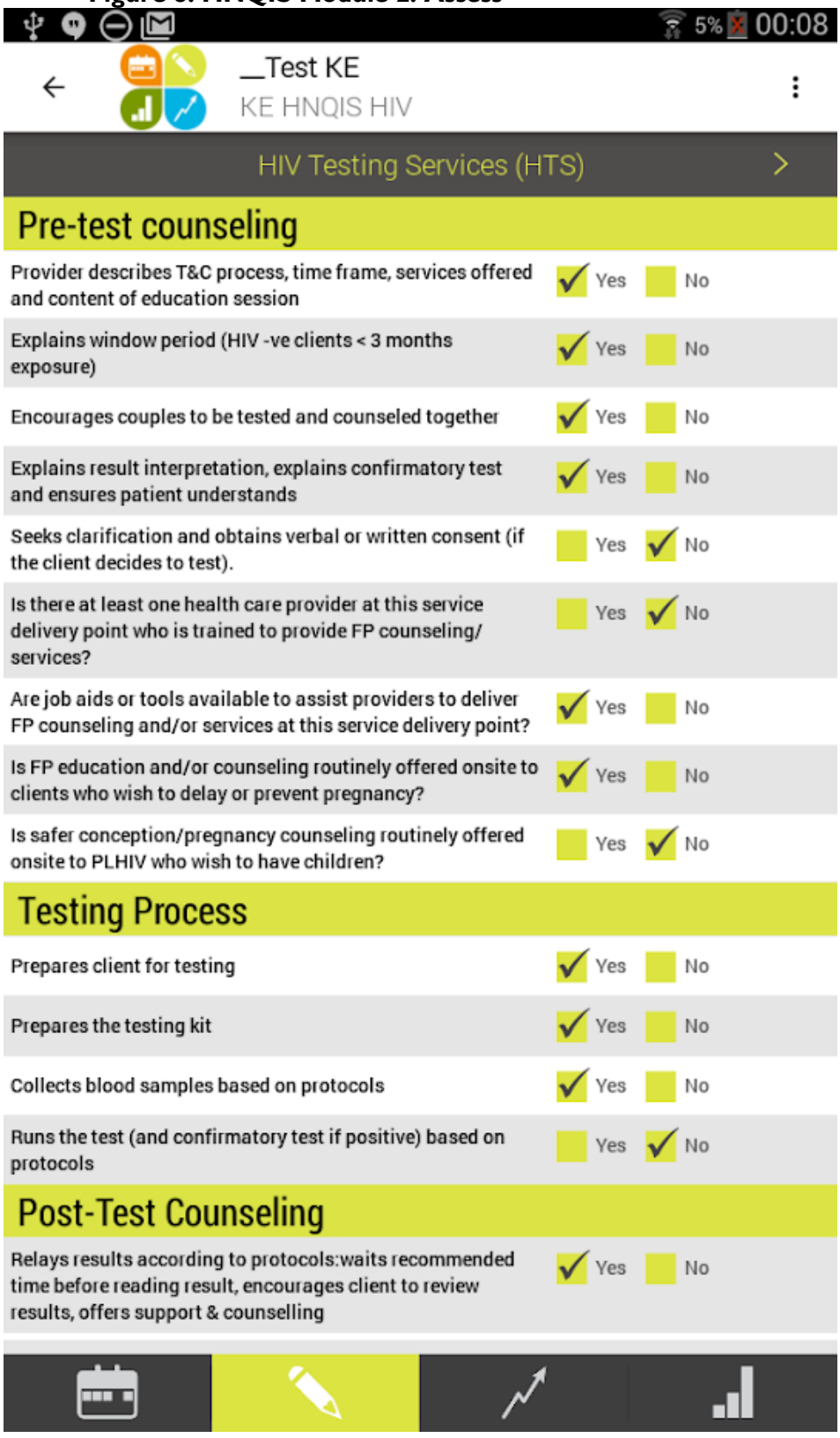
- **Module 2: Assess** supervisees' quality of care against national clinical standards using a checklist. (See Figure 8.) Within the checklist, some questions are compulsory to ensure comparability of scores across providers and over time by using a set of minimum standards for comparison.
- **Module 3: Improve** supervisees' quality of care through tailored feedback, which is based on defined standards and guides the supervisor to deliver specific, relevant, constructive, facilitative support while also promoting quality services. (See Figure 9.)
- **Module 4: Monitor** quality improvement over time. Data dashboards for this module should be customized. Supervisors access the program's DHIS2 instance to review population health data alongside HNQIS's interoperable health worker performance data. (See Figure 10.)

Figures 7a, 7b, and 7c. HNQIS Module 1: Plan



7a. Initial Plan screen; 7b. Schedule of future visits showing service scores and next planned visit; 7c. Supervision reschedule, service, and date

Figure 8. HNQIS Module 2: Assess



PROCESSES

Modality & intervention type

HNQIS assists **quality improvement** teams to assess quality of care of providers' services, to measure provider proficiencies in respective skills, and to highlight missed critical steps. QAOs use the HNQIS app to calculate the quality of care scores for providers in their networks, to schedule support visits, and to prioritize provider support. HNQIS also serves as a human resources management tool, given its visit-scheduling functions.

The HNQIS process is guided by four modules to support supervisors through the **plan-assess-improve-monitor** cycle. The process is consistent for HNQIS application around the world, though scheduling criteria, QoC threshold scores, feedback, and data dashboards for monitoring may vary based on context and need.

From start-up to implementation, the step-wise customization process is: respond to the expression of interest; develop the QA checklist for service areas; configure the checklist within app; implement user testing; release the final country version of HNQIS; subsequently, launch and roll-out to QAO supervisors; and, finally, conduct end-user and analytics training. When transitioning from paper-based to digital supervision reporting using HNQIS, in several country contexts supervisors preferred using both reporting mechanisms (paper and digital) until they gained confidence in HNQIS data capture.

Structure, frequency, location, & feedback

Plan: On-site external supervision visits can be scheduled in the HNQIS plan module in increments of **three or six months based on performance levels**, with lower-performing facilities and providers receiving more frequent visits. However, during key informant interviews, it was suggested that in Cambodia, supervisors maintain a regular quarterly schedule for all facilities. The rationale was to continue providing motivation and attention to high-performers, who appreciated the support.

Assess: The service checklists are used to observe supervisees. In most cases, observations and feedback are for **individual** health workers, while in some country contexts, checklists have been adapted to accommodate **health worker teams**.

Improve: The HNQIS app provides **immediate feedback** by calculating a quality of care score (QoC), which is displayed to the supervisor with a prompt to share results with the supervisee. Specific points of feedback are developed based on algorithms to deliver instructive recommendations and areas for improvement according to national standards. Then collaborative **action** planning takes place to identify how the supervisee will make improvements. In Cambodia, feedback includes links to technical videos, so that a supervisor may choose to play them for a supervisee for targeted and immediate on-the job-training. Figure 9 shows screenshots of QoC scores and feedback that supervisors can use to guide their conversations with supervisees.

Service delivery foci

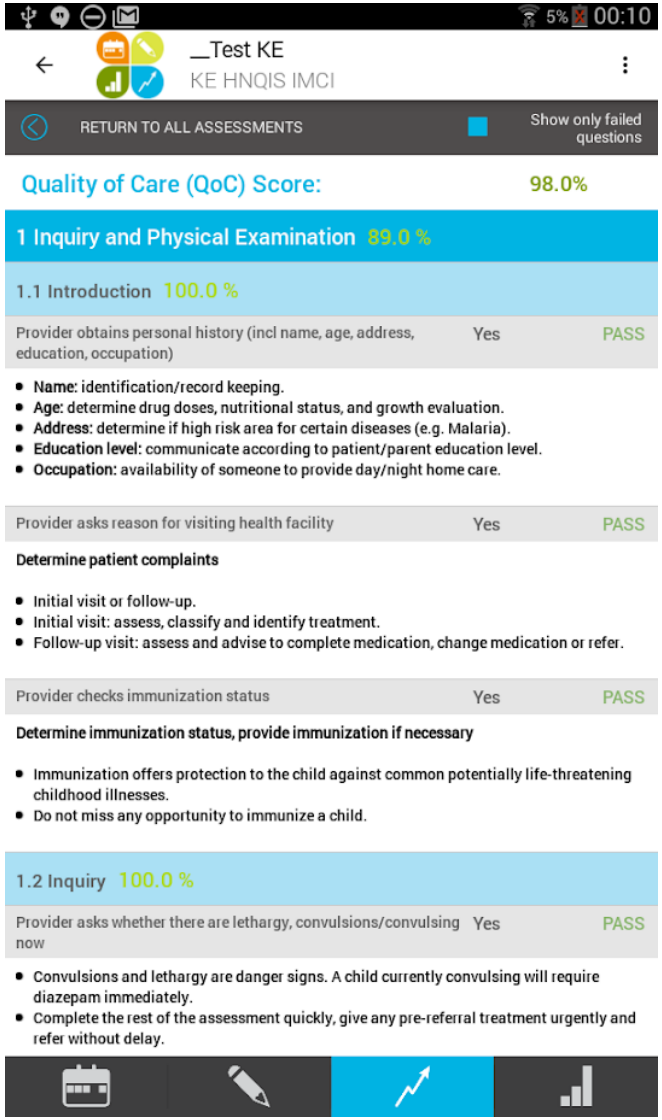
Per Table 6, the service delivery foci for supervisors varies by country. For some programs, the supervisor evaluates only one or two **disease-focused** service areas, while in others, it is more **integrated**. However, it should be noted that due to the time it takes to observe each service area, providing integrated supportive supervision across services would take more than one day.

Data use for decision-making

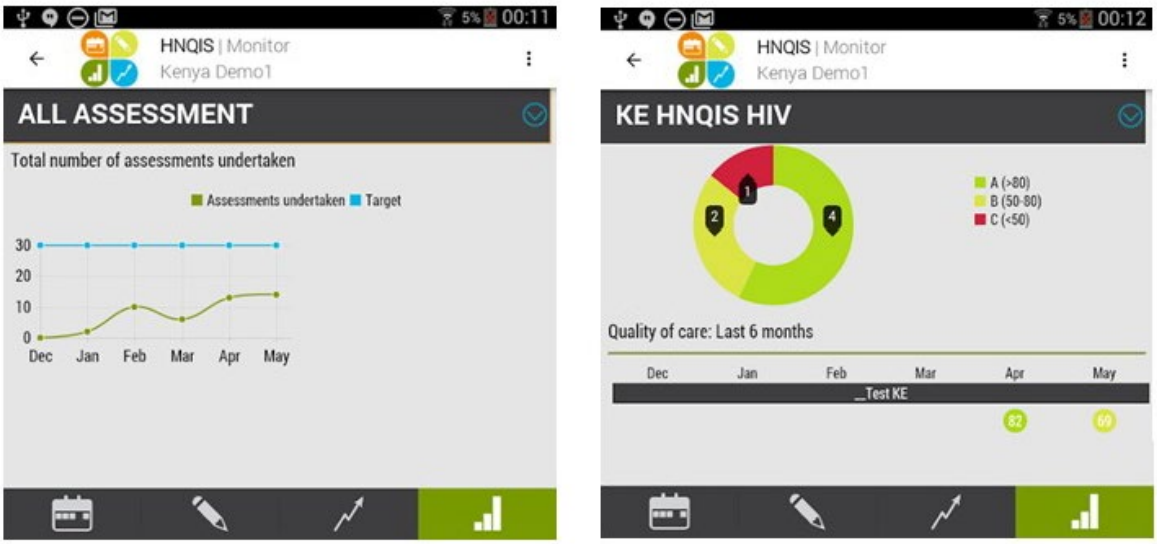
Monitor: The fourth HNQIS module displays health facility and supervisee performance data; the app's **HMIS interoperability,** achieved by geocoding all facilities to link to real-time data in DHIS2,

facilitates more timely performance monitoring, including supervisor performance. Figure 10 shows sample monitoring dashboards where providers are classified by QoC scores (10b).

Figures 9a & 9b. HNQIS Module 3: Improve



Figures 10a & 10b. HNQIS Module 4: Monitor



Complementary interventions

A complementary enhancement to implement HNQIS is non-clinical supervisor training to ensure effective use of the application; the QAOs were already selected based on clinical competence.

RESULTS

HRH outputs

- **Increased skills, knowledge, or attitudes:** The QoC scores for each supervisee can be tracked to show improvements in terms of observed skills to provide services according to defined standards of care. Figure 11 notes these improvements, with a larger proportion of supervisees achieving "Class A," where they meet 80 percent or more of the quality standards of care.

HRH & HSS outcomes

- **Increased health worker competence** and **health worker responsiveness** as a result of applying HNQIS, as described by key informants and evidence in Figure 11.
- **Improved quality standards**: Overlaying HMIS data—such as disease surveillance, patient load, and commodity availability—with supervisee performance indicators allowed supervisors to monitor and achieve higher quality standards.

HRH & HSS effects

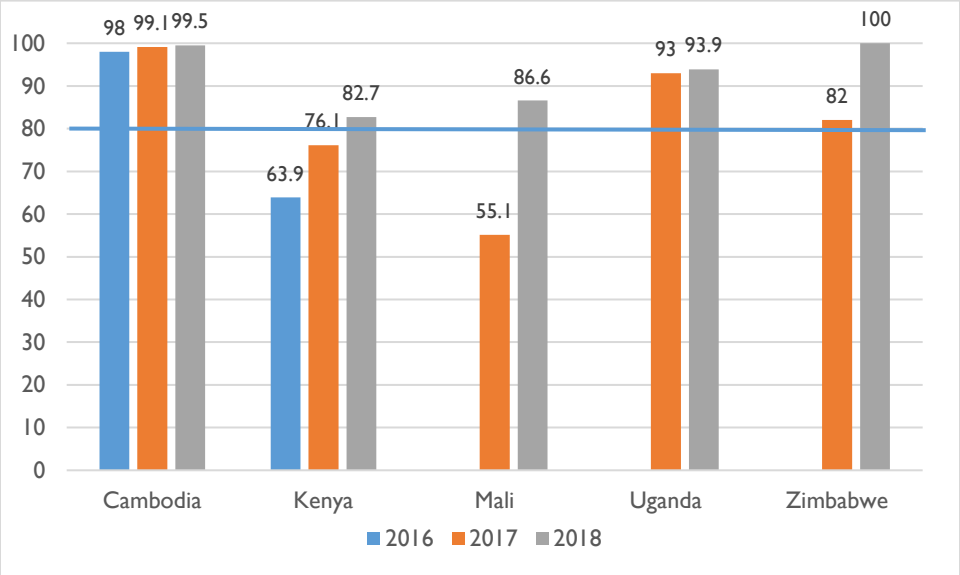
- **Increased health workforce performance:** This is linked to the service delivery effects and improved quality evidenced by Figure 11 and reinforced through key informant interviews. For example, in Cambodia the supervisors' use of HNQIS dashboards contributed to improved productivity among malaria and family planning program staff due to faster collection, use, and analysis of program data compared to the pre-2016 period when the process was only paper-based.

- **Improved efficiency**: Due to the reduced workload of data collection, entry, and management, key informants observed a large reduction in the supervisory workforce needed. For example, in Cambodia after HNQIS implementation fewer supervisors could manage more supervisee providers.

Service delivery effects & population health

- **Improved quality of care:** QoC scores from HNQIS assessments were documented for family planning in Cambodia, Kenya, Mali, Uganda, and Zimbabwe from 2016 to 2018 and increased during that time. See Figure 11 below.

Figure 11. Percentage of family planning providers in Class A (≥80%) for QoC scores from HNQIS assessments



There is anecdotal evidence of improved service delivery efficiencies on the basis of the ease in data sharing and use of the HNQIS monitoring dashboard. There is not yet sufficient evidence to attribute improved population health outcomes to HNQIS implementation, though such studies could be undertaken with relative ease given the systems' HMIS interoperability.

Maturity & adaptability to multiple contexts

HNQIS has been **scaled** and **adapted** for implementation in **19 countries** and with supervisory checklists for at least **77 country-specific service areas** to support more than **8,000** health service providers through **31,000 supervisory assessments** as of March 2019.

Cost effectiveness

There is currently insufficient evidence provided on the cost-effectiveness of HNQIS.

As reflected in the landscape analysis, it is exceptional within the literature that an enhanced supervision approach was applied in such a range of contexts and for so many service areas. Additional evidence on how HNQIS can be sustained and scaled, especially within the public sector and for community-based health workers, could help inform country stakeholders with important considerations for investing in enhanced supervision approaches.

Into the future, it is envisioned that HNQIS features will be moved into 'core DHIS2,' so that the custom Android app will no longer be needed. Instead, DHIS2 users around the world can download a 'metadata package' (e.g., the DHIS2 app) directly from their respective DHIS2 instances and use it to conduct QI-focused supportive supervision visits.

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