The Intersection of Knowledge Management and Health Systems Strengthening: Implications from the Malawi Knowledge for Health Demonstration Project

October 2012
ACKNOWLEDGEMENTS

This Technical Brief was produced by Management Sciences for Health (MSH) and the Johns Hopkins Bloomberg School of Public Health Center for Communication Programs (JHU·CCP) under the Knowledge for Health (K4Health) Project. Funded by the United States Agency for International Development (USAID) through the Bureau for Global Health’s Office of Population and Reproductive Health, K4Health is a knowledge management (KM) project designed to improve access to and sharing of global, regional, and country-specific knowledge and tools to strengthen family planning/reproductive health and other public health efforts. The K4Health project is implemented by JHU·CCP in partnership with FHI 360 and MSH.

The Technical Brief reflects the hard work and contributions of writers Piers Bocock, Natalie Campbell, Liz McLean, Tara Sullivan, and Sara Wilhelmsen, as well as of K4Health Malawi project team members Thoko Bema and Brian Jumbe. We want to thank Mariah Boyd-Boffa and Elizabeth Walsh for their editing and formatting.
# TABLE OF CONTENTS

ACKNOWLEDGEMENTS..............................................................................................................2
ABBREVIATIONS .......................................................................................................................4
INTRODUCTION ..........................................................................................................................5
DEFINING KNOWLEDGE MANAGEMENT ..................................................................................5
MALAWI CASE STUDY – EVIDENCE FROM PRACTICE ..............................................................7
  Project Interventions ..................................................................................................................8
  Expected Results: Improvement in FP/RH and HIV/AIDS Knowledge Management ...............9
  Unintended Results: Improvements in Health System Performance ...........................................10
ROLE OF KM IN HEALTH SYSTEMS STRENGTHENING: AN INTEGRATED APPROACH ..........13
CONCLUSION AND RECOMMENDATIONS .................................................................................15
ABBREVIATIONS

AIDS Acquired Immune Deficiency Syndrome
CHW Community Health Worker
DLC District Learning Center
FP Family Planning
HIV Human Immunodeficiency Virus
HSS Health Systems Strengthening
JHU Johns Hopkins University
K4Health Knowledge for Health
KM Knowledge Management
LDP Leadership Development Program
mHealth Mobile Health
MOH Ministry of Health
NGO Non-Governmental Organization
RH Reproductive Health
SMS Short Message Service
INTRODUCTION

People working within a health system—whether they are health care providers, program managers, policy makers, or others—rely on specific knowledge to inform their decision making, improve the quality of services, and reduce duplication of effort across programs and activities. Knowledge management—connecting the right people to the right data, information, and knowledge at the right time—is increasingly being considered as an effective approach to help strengthen health systems.

The Malawi Knowledge for Health (K4Health) Demonstration Project (2010–2011) was a knowledge management intervention designed to improve the quality of health service delivery in family planning, reproductive health, and HIV/AIDS. At the end of the project’s implementation period, an evaluation identified some unanticipated benefits from the project that went beyond the three target health areas to improve the overall health system.

This technical brief explores the value of integrating knowledge management (KM) into health systems strengthening (HSS) efforts, through the lens of the Malawi K4Health Demonstration Project. It is written for health program designers and implementers to build their awareness of the value of KM and to provide a model of how KM approaches can support HSS efforts.

DEFINING KNOWLEDGE MANAGEMENT

Health practitioners today use a common language of the six building blocks to describe health systems, based on a framework developed by the World Health Organization. The blocks include:

- health service delivery
- health workforce
- health information system
- medical products, vaccines and technologies
- health systems financing
- leadership and governance

No matter which building block practitioners are working in, they need specific data, information, and knowledge to inform their decision-making process—this is where knowledge management can play an integral role.

Practitioners unfamiliar with knowledge management might think that KM approaches, practices, and tools fall just within the health information building block, which focuses on data sources, indicators, data management, and data dissemination and use. A recent study notes that despite the availability of infrastructure, policies, and tools within a health information system, what is often undeveloped is the capacity for data users outside of the health information system to access and

---

share data easily.\(^2\) This is one area in which KM can add value. Furthermore, by facilitating knowledge access, exchange, and use, KM goes beyond the health information system and cuts across all six building blocks.

KM is a systematic approach to ensure that health practitioners have access to the latest knowledge, and that they can apply that knowledge to their work at all levels within the health system—the global, regional, and national levels, as well as the front lines.\(^3\)

KM programs are supported by three key components: people, processes, and technology. **People** generate, store, and share knowledge, and can help cultivate an environment that encourages knowledge sharing and use of KM systems. **Processes** are the methods used to capture, organize, and share knowledge. **Technology**, when used appropriately and within the right context, can expedite knowledge storage, retrieval, and exchange.

An effective KM cycle includes identifying the knowledge needs of a particular audience and then capturing, generating, organizing, and sharing knowledge relevant to them. The global K4Health project has developed a model that is built around these five elements, as defined in the box below, with people, processes, and technology forming the foundation.

### FIVE ELEMENTS OF KNOWLEDGE MANAGEMENT

**Knowledge assessment.** Knowledge assessment maps the knowledge assets that are already known and identifies needs and gaps. This information allows program designers and implementers to tailor product and services to meet specific target audiences.

**Knowledge capture.** Searching, selecting, cataloging, and storing knowledge into systems and tools (such as databases) allows knowledge seekers easier access to key information.

**Knowledge synthesis.** Given the extensive amount of knowledge available on many topics, it is important to pull together and summarize key knowledge. This is especially important for busy health professionals who do not have time to sift through vast amounts of information.

**Knowledge generation.** Knowledge generation is supported by research initiatives that generate evidence and by processes that capture best practice. These lead to new insights and new innovations, thus furthering the knowledge cycle.

**Knowledge sharing.** Sharing knowledge helps to disseminate innovations and to share best practices and lessons learned. Knowledge sharing occurs in formal and informal settings and face to face and through online forums. Knowledge sharing ranges from interpersonal communication to communication through mass media.

---


Adopting KM strategies and practices can improve the performance of health care workers and programs and contribute to improving health outcomes. The Malawi Knowledge for Health Demonstration Project is a good example of how a knowledge management approach can result in improvements within a health system.

MALAWI CASE STUDY – EVIDENCE FROM PRACTICE

The Malawi Knowledge for Health (K4Health) Demonstration Project was an 18-month initiative designed to evaluate the impact of KM activities on family planning/reproductive health (FP/RH) and HIV/AIDS services. Working with health managers and service providers at the national, district, and community levels in Malawi, the project hoped to show that providing health workers with access to current, relevant FP/RH and HIV/AIDS health information and knowledge improves the quality of health services. Efforts to strengthen service delivery focused on two districts—Salima and Nkhotakota—chosen because they were rural yet still close in proximity to Lilongwe, the capital city of Malawi.

The project aimed to address gaps in the FP/RH and HIV/AIDS information pathway—the linkages between information use and performance (see Figure 1). The interventions focused on the first four stages (shown in shading): assessing users’ needs, access to and exchange of information and knowledge, use of information, and provider knowledge.

Figure 1. K4Health Information and Knowledge Pathway

A health information needs assessment, conducted early in the project with input from health care professionals throughout Malawi’s health system, provided important information on the problems faced by health care workers in the two districts of Salima and Nkhotakota.4,5 The assessment also revealed the causes of those problems and potential promising or evidence-based interventions to consider.

The needs assessment was complemented by a net-mapping6 exercise. Net-Mapping is a low-tech, low-cost interview-based tool that illustrates formal and informal interactions among key actors in a

knowledge network, their degree of influence, and patterns of communication and information exchange. Together, the needs assessment and net-mapping exercise identified significant weaknesses linked to three of the six health system building blocks: information; health workforce; and medicines, vaccines and technologies.

- **Information**: The assessment showed that health care managers and providers working to address FP/RH and HIV needs lacked up-to-date and relevant information. Existing information was scattered, difficult to access, and not easily understood. Internet access was available at the national level, but it was limited at district and community levels. National AIDS Council and government websites were poorly maintained, yet they were the only central locations for current country information on HIV and FP/RH. Printed materials, mostly written in English, had a low readership, especially among community health workers (CHWs), for whom English was a second language. CHWs also relied on District Health Office libraries, but they were poorly stocked with books and reference materials. It was also noted that Malawians’ oral culture does not prioritize reading, which further contributed to a weak culture of information use in general.

- **Health workforce**: The assessment indicated that human resource capacity constraints were impeding the health system’s responsiveness to the needs of target populations. CHWs tended to rely on outdated information, even when new guidelines/protocols had been introduced at higher levels of the health system. Furthermore, NGOs lacked the capacity to organize and manage knowledge in existing professional networks, and District Health Information Management Officers were chronically overworked, leaving very little time for knowledge management. Finally, Health Surveillance Assistants were also overloaded by government and NGO partners for health delivery activities.

- **Medicines, vaccines, and technologies**: The assessment also revealed that both districts lacked a system to quickly communicate stock-outs; this resulted in health workers walking long distances to request commodities and other supplies.

**Project Interventions**

Based on information from the assessment and net-mapping, four interventions were selected for their ability to improve knowledge management at the national, district, and community levels:

1. **Leadership Development Program (LDP)**. Developed by Management Sciences for Health, the LDP introduces leadership practices and tools over a series of workshops to help participants address specific workplace challenges and achieve measurable organizational

---

results. In Malawi, an LDP adapted for knowledge management mobilized stakeholders from the national level as well as from the Salima and Nkhotakota districts to create a common vision and action plan for improving knowledge management. Through the LDP, the participants formed a Malawi Knowledge Management Task Force, which had not previously existed. The task force was charged with overseeing all aspects of the intervention and played a major role in aligning and mobilizing stakeholders at the community, district, and national level around the KM project.

2. **FP/RH and HIV/AIDS Toolkits.** Toolkits are designed to be a central online data bank housing current country-specific information on FP/RH and HIV/AIDS. The project chose to use and build on existing networks, such as Malawi’s national FP/RH and HIV/AIDS Technical Working Groups housed within the Ministry of Health, to build the toolkits. These groups had the mandate to share information with their network members.

3. **District Learning Centers (DLCs).** DLCs were embedded in district hospitals and served as central hubs of information for district- and community-level health care providers. Internet access is generally limited at the district level to senior managers. The DLCs expanded access to information for other health staff such as nurses, midwives, and medical assistants. Having access to the Internet also provided access to the toolkits. DLCs also had printed materials available and housed the SMS hub (see point 4 below), which fielded questions from the CHWs—both community-based distribution agents and health surveillance assistants.

4. **SMS Network.** In Malawi, the mobile phone penetration rate was 25% in 2011, and most health care providers at the community level had a mobile phone with SMS capability. The K4Health Demonstration Project integrated an SMS intervention that used Frontline SMS to provide nurses, doctors, and CHWs with immediate access to up-to-date, relevant health information. The SMS system also allowed health professionals to immediately communicate and exchange information with each other.

**Expected Results: Improvement in FP/RH and HIV/AIDS Knowledge Management**

Ten months after the project’s launch, participants had met or surpassed almost all their original targets for improving knowledge management. One goal, for example, was to ensure that 40% of program managers at the district level would be accessing comprehensive, accurate, and up-to-date information about FP/RH and HIV/AIDS. By June 2011, 65% of the targeted workers were

---


9 Community-based distribution agents are male and female volunteers selected by and based in their communities to provide family planning counseling, oral contraceptives, and condoms. Health surveillance assistants are salaried community-based health care workers that deliver various services including immunizations, family planning, well-child visits, and disease surveillance.

accessing information through the toolkits, DLCs, and the SMS network. At the community level, the goal was to achieve a 60% increase in the number of health care workers in Salima and Nkhotakota accessing information through the KM tools. By the end of the project, more than 77% of CHWs were sending and receiving information through their mobile phones.

**Unintended Results: Improvements in Health System Performance**

The K4Health Demonstration Project provided evidence that the KM interventions related to FP/RH and HIV/AIDS contributed positively to higher-quality service provision and care. Through quantitative and qualitative evaluation methods, it also identified some unintended improvements in health system performance that were not the main focus of this pilot program. These findings illustrate the important contributions knowledge management can play in improving health system performance.  

The evaluation showed:

- improvements in information flow from the baseline evaluation
- changes in stakeholders’ influence over the flow of and access to information
- more timely restocks of medicines and commodities
- improved efficiency of referrals, wider service coverage, and prompt response to disease outbreaks.

In total, the evaluation highlighted more than 10 ways that this project improved health system performance across five of the six building blocks: health information, health workforce, medicines, vaccines and technology, service delivery, and leadership and governance. Table 1 on the following page illustrates specific areas of improved health system performance by building block.

---

11 Net-Mapping was used to track the changes in the network over the life of the intervention. Lot Quality Assessment Surveys explored lines of communication between CHWs as well as with their supervisors at the district level, and evaluated the effectiveness of the mobile phone network established for CHW use. The frequency, purpose, duration, and cost of communications were compared with how CHWs communicated prior to having mobile phones.

<table>
<thead>
<tr>
<th>Number</th>
<th>Area of Improved Health System Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Improved reporting:</td>
</tr>
<tr>
<td></td>
<td>• Reduced time for CHWs to report important events (for example, stock-outs, transportation breakdowns) and receive feedback from their supervisor, from an average of 19 hours to an average of 9 minutes using SMS</td>
</tr>
<tr>
<td></td>
<td>• Four-fold reduction in cost, from an average of US$3.06 using public transport to reach supervisors at the district level to US$0.48 using SMS</td>
</tr>
<tr>
<td>2</td>
<td>Increased access to information:</td>
</tr>
<tr>
<td></td>
<td>• 65% of targeted workers in both districts were accessing information through K4Health KM tools including DLCs, SMS, and Toolkits.</td>
</tr>
<tr>
<td></td>
<td>• 77% of CHWs in the two districts gained access to the SMS system, from a baseline of zero.</td>
</tr>
<tr>
<td>3</td>
<td>More reliable clinical information about treating patients through access to the Internet, Toolkits, and SMS system connecting CHWs with medical staff</td>
</tr>
<tr>
<td>4</td>
<td>Stronger communication between CHWs and supervisors and with people with technical expertise</td>
</tr>
<tr>
<td>5</td>
<td>Health workforce</td>
</tr>
<tr>
<td></td>
<td>Reduced time for supervisors to give technical support, from an average of 29 hours to 9 minutes</td>
</tr>
<tr>
<td>6</td>
<td>Increase in CHW self-confidence and in trust between CHWs and communities because CHWs were able to address and answer questions quickly. CHWs were also able to text clinics or hospitals to ensure services were available before making referrals.</td>
</tr>
<tr>
<td>7</td>
<td>Medicines, vaccines, and technologies</td>
</tr>
<tr>
<td></td>
<td>Detection and prevention of stock-outs (for example, averted stock-outs of Depo injectable contraceptives, male and female condoms)</td>
</tr>
<tr>
<td></td>
<td>• When CHWs run out of supplies, they now send an SMS and are often resupplied on the same day, whereas in the past it could take up to one week.</td>
</tr>
<tr>
<td></td>
<td>• Average time required to report stock-outs reduced from 8.7 hours without the SMS to 3 minutes with the SMS</td>
</tr>
<tr>
<td></td>
<td>• High cases of stock-out messages reported by CHWs triggered a review of the system, which revealed deficiencies in transport and logistics management. This led to changes in the frequency and quantity of stocks distributed to community health centers.</td>
</tr>
<tr>
<td>8</td>
<td>Service delivery</td>
</tr>
<tr>
<td></td>
<td>Increased efficiency of referrals because CHWs could send messages to the district hospital or clinics to ensure services were available before making referrals</td>
</tr>
<tr>
<td>9</td>
<td>Widened service coverage due to more time available; CHWs are no longer biking to meet with supervisors or report stock-outs and so are spending more time in the community. Average number of clients visited per CHW per month in the project districts was 74 compared with 30 in the control district.</td>
</tr>
<tr>
<td>10</td>
<td>Leadership and governance</td>
</tr>
<tr>
<td></td>
<td>Prompt responses to cholera, meningitis, and measles outbreaks</td>
</tr>
<tr>
<td>11</td>
<td>At the time of the project’s transition to the local government, the KM Task Force was in the process of becoming a permanent sub-committee of the Ministry of Health.</td>
</tr>
</tbody>
</table>
Comments from health care workers involved in the pilot also referred to areas of improvement across the building blocks. As one Malawian health care worker noted, “Before the K4Health project, information on reproductive health in Malawi was scattered and difficult to access, but today it’s just clicking a button on the computer and all literature is found instantly.”

Additional comments related to other health building blocks such as the health workforce, medicines, vaccines, and technology, and service delivery are captured below in Table 2.

Table 2. Health Worker Comments on the Benefits of the Malawi K4Health Demonstration Project

<table>
<thead>
<tr>
<th>Health workforce: Improved knowledge and confidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Before the Knowledge for Health Project, I was not confident enough to help my clients because I was not sure when answering some of the technical questions that some of my clients were asking me. But with the phones that we received from K4Health, I am able to help my clients with the first-hand information from the coordinator, and the phone has also helped me to know a lot of things that were giving me problems when asked by my clients.”</td>
</tr>
<tr>
<td>Health Surveillance Assistant, Nkhotakota, Chididi Health Facility</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Medicines, vaccines, and technologies: Decreased stock-outs and reduced stock-out times</th>
</tr>
</thead>
<tbody>
<tr>
<td>“At first it was taking us weeks without having the supplies whenever we had stock-outs, but with the coming in of this project we are able to get all the supplies that we want in time, because now it’s just a matter of sending an SMS to the supervisor, and if he does not have the supplies we send it to the Hub, and we get the response immediately from the Family Planning Coordinator that we can go and collect some. Sometimes the Coordinator also sends the supplies to us when the Ambulance is coming to our Health Facility or when one of us went to the DHO [District Health Office].”</td>
</tr>
<tr>
<td>Community-Based Distribution Agent, Nkhotakota, Chididi Health Facility</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Service delivery: Strengthened referral system</th>
</tr>
</thead>
<tbody>
<tr>
<td>“With the coming in of this system, a lot of people go to the hospital when they have been referred and they get the help that they are supposed to receive because we are able to make follow-ups with the DHO health workers using the phones that we received. And this has made a lot of people in our catchment areas come to us first before they go to the DHO, because they know that when we refer them, they get the help they require since we make follow-ups.”</td>
</tr>
<tr>
<td>Health Surveillance Assistant, Salima, Changunda Health Facility</td>
</tr>
</tbody>
</table>

“...The phones have also helped us to have a lot of clients because with the trust that the people in our communities have on us, they are able to encourage one another not to go to the DHO whenever they have problems but rather to see us first and then go to the DHO only when they have been referred by us.”

Community-Based Distribution Agent, Nkhotakota, Chididi Health Facility

---

Although the evaluation demonstrated that the pilot project increased access to and use of health information to improve services, communication, and the ability of health care workers to provide quality services and care, further analysis is needed to evaluate whether the interventions have contributed to changes in population-level health outcomes.

**ROLE OF KM IN HEALTH SYSTEMS STRENGTHENING: AN INTEGRATED APPROACH**

Based upon the results of the Malawi K4Health Demonstration Project, the integration of KM approaches, tools, and processes into a holistic health systems strengthening program shows great potential for maximizing results through the continuous assessment, capture, synthesis, generation, and sharing of relevant information and knowledge.

The process for achieving sustainable health outcomes through an integrated approach combining knowledge management and health systems strengthening is illustrated in Figure 2 below. This conceptual framework integrates a health systems performance improvement model with knowledge management principles and processes; the end result is improved access, increased quality, and/or better coverage of health services. In an integrated approach, KM processes can be built in from the very beginning, with the KM approach and tools tailored to each proposed health intervention and to the particular health system context.

**Figure 2. KM and HSS Conceptual Framework**
The first part of the model (on the left) is focused on identifying the most important cause of a health problem using epidemiological analysis. Information is needed about the target population’s knowledge of the health problem, its cause(s), and behaviors that prevent the health problem or reduce morbidity. Characteristics of the target population, such as their geographic distribution, socioeconomic status, risk factors, and where and when they access health care are also important. Identifying who could benefit most from increased knowledge about the health problem is critically important to having a targeted approach.

In addition to epidemiological analysis, it is important to understand the context in which a project will be implemented. Participatory mapping of the flow of knowledge helps to understand the people and resources in the health system, and it helps to identify potential gaps in knowledge translation. Knowledge mapping provides an entry point to discussion at all levels of the health system about the ways KM can be used to improve health services and health outcomes. Several case studies\(^\text{14}\) have documented how knowledge mapping was integral to designing interventions that addressed challenges at multiple health-system levels: policy-making, institutional management, technology research and development, clinical practice and services, and community-based services.

In addition to knowledge mapping, there are other KM processes and tools that can ensure that relevant health knowledge flows throughout the six building blocks of the health system, which are illustrated in the center part of the model. In the Malawi project, for example, the use of SMS technology facilitated knowledge sharing and directly impacted the medicines, vaccines, and technology component of the health system, cutting the average time to report stock-outs from more than eight hours to less than three minutes. The leadership development intervention, which strengthened KM capacity, yielded a long-term change in the leadership and governance building block, with integration of the newly formed Knowledge Management Task Force as a permanent sub-committee of the Ministry of Health.

Other proven KM approaches with the potential to improve outcomes related to the health systems building blocks include “communities of practice,” eLearning, mLearning, and mHealthEd. Communities of practice are groups of people who gather to share information around a particular topic to improve knowledge and action related to that topic. The following comment from a development practitioner clearly illustrates some of the knowledge gaps in human resources for health—the health workforce building block—that a community of practice centered on this topic might help overcome:

\[\text{I still find out most of my important health workforce information via word of mouth. Yes, I regularly read the latest journal articles and subscribe to half a dozen human resources for health (HRH) and health systems listserves, follow over 250 people on Twitter, and receive RSS updates from several HRH}\]

The terms eLearning, mLearning, and mHealthEd refer to the use of electronic devices—often mobile devices—to expand access to health information and knowledge. These approaches are often targeted to those working in rural communities with less access to formal training opportunities and are geared to improving service quality, a component of service demand and delivery. It is important to note that while technology is often relied upon to help capture and share knowledge, research has shown that many health care professionals prefer face-to-face interactions for knowledge exchange. Because of this, an integrated KM/HSS project might consider including both mLearning and communities of practice as components within a program.

The finance building block ensures that a health system has adequate funds. One example of a role that KM can help play in this part of the health system is to help identify financial barriers to service access. Community net-mapping to determine why local residents are not accessing services could determine that service fees are reasonable but the cost of medications is out of reach. Knowing what stands in the way of a target population’s access to services helps ensure that there are options to overcome these barriers and get people the health care they need.

As noted in the opening of this paper, KM goes beyond the health information building block by addressing the capacity for data users outside of the health information system to access and share data and information easily. The ability to generate and access quality data and information within all of the health building blocks is critical to informed decision-making.

Applying the elements of the KM process (knowledge assessment, capture, synthesis, generation, and sharing) to the six health systems building blocks can contribute to improved access, quality, and coverage, as illustrated on the right side of the model. Ultimately, the integrated approach for knowledge use and health system performance is designed to yield stronger health systems and improved health outcomes.

CONCLUSION AND RECOMMENDATIONS

A 2004 Lancet study noted, “There is an increasing consensus that stronger health systems are key to achieving improved health outcomes. There is much less agreement on how to strengthen health systems. Part of the challenge is to get existing and emerging knowledge about more (and less) effective strategies into practice.” While there is now a more robust body of research surrounding

---


the role and value of HSS interventions, there is a persistent dearth of relevant research linking knowledge management and health systems strengthening in developing countries.

While the Malawi example is compelling, further research is needed on how KM interventions and health systems strengthening programs—using this model or another—can contribute to increased access, coverage, and quality of health programs, and ultimately lead to improved health outcomes. Better understanding is needed to identify the conditions that facilitate the integration of KM into health systems strengthening projects, and to identify the limitations on what can be achieved through KM interventions. New programs that integrate KM into health systems strengthening interventions must include research components to determine the link between KM and stronger health system performance.

Information from rigorous evaluations of these types of interventions will help individuals, organizations, donors, and local implementing organizations to change their assumptions and behaviors in simple and fundamental ways.