



PREPARING THE NEXT GENERATION OF COMMUNITY HEALTH WORKERS: THE POWER OF TECHNOLOGY FOR TRAINING

MAY 2012

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ACKNOWLEDGEMENTS AND AUTHORSHIP

This study builds on the momentum and excitement generated by the launch of *mHealth Education* at the 2011 Mobile Health Summit in Cape Town regarding the use of mobile technology to support health education and training in developing countries. The findings and analysis presented in the chapters that follow would not have been possible without the individuals from more than 30 organizations who shared their insights, data and perspectives, as well as the peer reviewers, who provided valuable feedback and refinements.

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THIS REPORT IS DEDICATED TO THE COMMUNITY HEALTH WORKERS OF SUB-SAHARAN AFRICA.

“ A generation ago, few would have dreamed that mobile technology would create five billion points of contact around the world or that nine out of 10 internet users in Sub-Saharan Africa would access the internet through mobile devices. They could not have imagined how innovative technologies such as Skype, Facebook, and African-born solutions like M-PESA would transform spheres of business, politics, and society.

What if these same, disruptive technologies could be applied to transform global health for the next generation? ”

INTRODUCTION

Could technology be harnessed in transformative ways to address critical gaps in community health worker training in Sub-Saharan Africa?

For several years, stakeholders across the global health sector have recognized and expressed enthusiasm about the potential of mobile technology to improve health outcomes. That story is not new. Today, there are many mobile health (mHealth) deployments. Most remain small scale, but efforts are underway to understand their specific operational and health impacts, and to scale applications that work.

However, while mHealth applications proliferate, technology has not been greatly deployed in the training of community health workers, whose work is essential to reaching Millennium Development Goals (MDGs) 4, 5, and 6 as well as to reducing the associated burdens of child and maternal mortality and HIV/AIDS.

Thus, this report began with a simple question:

Could technology be harnessed in transformative ways to address critical gaps in community health worker training in Sub-Saharan Africa?

Community health workers, who provide essential access to inexpensive, basic, life-saving health care, are indispensable to improving global health outcomes and thus the focus of this report.

Developing countries face an acute shortage of health workers, as there is a global shortfall of 2.3 million physicians, nurses and midwives, and a shortage of more than 4 million health workers overall. In the absence of medical professionals, millions of people rely on community health workers (CHWs) as their only point of contact with the health system. CHWs deliver low-cost, life-saving interventions in areas such as child and maternal health, vaccinations, and basic health education. Overcoming persistent health challenges will require scaling the number of CHWs and improving the effectiveness of existing CHWs.

Sub-Saharan Africa needs at least one million more CHWs to address its health needs.

Expanding the number and effectiveness of CHWs globally requires improving and scaling CHW training. Although formal training is but one aspect in the broad ecosystem in which CHWs function, it is critical to their success. Recognizing the importance of training, numerous organizations, agencies, and governments have redoubled their efforts. These organizations have expanded the scope of training programs and the resources allocated to them – for example, USAID aims to increase by at least 100,000 the number of CHWs serving in priority countries by 2013.

Technology can improve training and widen its scope.

This study identifies opportunities to train CHWs more cost-effectively through technology-enabled multimedia content that leverages visuals, videos, or audio. Additionally, it highlights the potential to create open, easily sharable digital content that could act as a crucial ingredient for new approaches to training and learning in the future. The key findings are summarized below.

This report walks through existing approaches to CHW training and content development, current uses of mobile technology, and emerging evidence on effective approaches to training, and highlights advantages of digital and multimedia content for scale and disruption.

SUMMARY FINDINGS

Multimedia applications with digital content could enable the training of one million new CHWs at less than a quarter of the cost of disseminating conventional training.

Broadly disseminating digital training content could lower the marginal cost of a million new CHWs in Sub-Saharan Africa from an estimated \$65 per person to \$15 per person. Digital training materials are easier and significantly cheaper to transfer and localize than conventional training materials. These calculations are based on the costs of content development and required trainers, and rely on assumptions derived from research and interviews with over thirty stakeholders and experts. The higher upfront costs of producing digital training content could be overcome by innovative approaches, such as running global competitions for digital designers.

Multimedia applications can enable more effective training.

The most effective training includes the use of several pedagogies. “Blended” approaches that combine live training with multimedia applications align with the most effective pedagogical techniques: They foster interaction, repetitive learning, and supervision and monitoring. Digital content, including videos, animations, and other multimedia applications, is useful for engaging CHWs, who have received limited if any education and have limited levels of literacy. Multimedia can also enable faster and better training, according to studies cited in this report. In turn, mobile training and resources provide a link for repetition of training, supervision, and monitoring remotely.

Despite the advantages, fewer than 10 percent of CHWs trained by surveyed organizations are being trained with multimedia applications.

Multimedia content can enable faster, better training. Although both CHWs and the organizations that train them are hungry for technological applications, including new media and methods such as video and animation, 90 percent of organizations studied in this report continue to use paper-based training content, cumulatively training 341,800 CHWs with materials such as flipcharts, handouts and textbooks. In contrast, 7 percent of the CHWs trained by surveyed organizations, or 27,000 CHWs, were trained using multimedia content as part of a blended approach. The remaining 3 percent, or 10,000 CHWs, were trained with electronic content.

Experts estimate that up to 80 percent of training content could be standardized and shared. Open source, digital content which supports “blended” approaches to training could facilitate this sharing.

Content must be locally customized, which includes translation into local languages, cultural sensitivity, and locally relevant examples, so that the materials can be comprehended, used and adopted. However, a large share of content remains consistent and can be standardized, including treatment protocols and clinical guidelines such as proper administration of oral rehydration tablets.

However, today, more than half of the organizations surveyed create their own content from the ground up.

This is the result of a number of factors. First, donors tend to fund creation of outputs, which incentivizes production rather than collaboration. Second, local customization is essential and allows for engagement of stakeholders in the creation of content. While this is true, as noted above, there is the potential to standardize and share large portions of content, which can be adopted for

local use. Third, there is a timing and legacy dimension, as the expansion of mobile technology and possibilities of digital sharing of content is fairly new and continues to evolve. Beyond these factors, organizations interviewed expressed a desire for more sharing and collaboration in content development.

With mobile phone access as high as 80 percent among CHWs in some countries, mobile technology could do much more for training and informal learning.

There are more than 40 mHealth deployments supported by organizations such as Dimagi, the Grameen Foundation, D-Tree International and others, which are used by more than 2000 CHWs for support and training. Many of these training programs use mobile devices. But mobile technology's power for CHWs transcends specific mHealth applications. Every CHW with a mobile phone can use it to solve problems and seek advice from peers and supervisors—with just a phone call or SMS.

Widely available digital training content could dramatically alter formal CHW training and fuel entrepreneurial innovation and models that support continuous learning.

Africa is increasingly driving and appropriating technology to its own ends. Examples include M-PESA, a locally-developed mobile money service in Kenya that transformed access to financial services in Kenya, and Ushahidi, an open-source software used by citizens for crisis mapping in post-election violence in Kenya and post-earthquake Haiti. The “disruptive technology” trend could portend dramatic improvements in formal training and beyond, as entrepreneurs in the developing world leverage digital content in models that support both formal training and informal learning.

There are challenges to be overcome.

The use of multimedia technology and digital content enables exciting possibilities for disruption. But not much digital training content exists in readily sharable, open-source form. Sharing content will require adjusting donor's incentives in grant proposals, decoupling existing content from the underlying technology, as well as promoting platforms that aggregate and ease the sharing of open, digital content. There is limited experimentation with training approaches that incorporate multimedia and technology for CHWs specifically, and limited comprehensive and comparative effectiveness evaluation of such training approaches to inform ongoing learning and improvement.

Capturing the opportunities unleashed by technology will require a variety of stakeholders to consider and invest in the following:

- **Digital content development that focuses on addressing the needs of CHWs and the gaps in their performance in fresh, engaging ways. Such content might include, for instance, videos that demonstrate clinical procedures or educate patients on sensitive topics. One way to generate this content is to crowd source through competitions that engage digital designers.**

- **Greater collaboration in content creation and training implementation**, supported by funders who commission open, sharable content, and incentives which promote sharing and collaboration on content development and use, rather than focusing on content generation alone. mHealth developers should endeavor to disaggregate content from the underlying technology to speed the ease of sharing digital content. And, the global health community should invest in, promote and use platforms that facilitate the sharing of content, knowledge, and tools. This includes funders backing the development and maintenance of such platforms and implementers sharing and utilizing available resources.
- **Experimentation** with blended approaches and recommended pedagogies that leverage digital content for instruction, and mobile technology for continuous learning, building on what has been shown to be effective with other cadres of health workers.
- **More, and more comprehensive, evaluation** of blended approaches used with CHWs to inform training strategies going forward. This could be part of a community-wide learning agenda across funders, policy-makers and implementers to fill knowledge and evidence gaps.
- **Innovation that supports continuous learning** and uses the widening sweep of mobile technology and increasing volume of digital content to create new models that support informal CHW learning. This could include opportunities for impact investors to work with entrepreneurs to seed novel solutions.
- **Continued advocacy and support for the overall enabling environment** to improve the effectiveness of community health workers, recognizing that training is one component of the complex ecosystem in which CHWs operate.

CHAPTER 1:

THE IMPORTANCE OF COMMUNITY HEALTH WORKERS

This introductory chapter describes the critical role CHWs play in providing access to health care to low-income populations.

The findings presented here are based on interviews with experts from more than 30 organizations, including leaders in the field of mobile health (mHealth), experts in technology and media, ministries of health and training implementers who, collectively, have trained more than 378,000 CHWs¹ across Sub-Saharan Africa. The report also draws from a literature review of CHW training programs, mostly in Sub-Saharan Africa, with a focus on the use of mobile and multimedia applications.

Developing countries have pressing health needs and a shortage of physicians and nurses to meet them.

According to the World Health Organization, there is a global shortfall of 2.3 million physicians, nurses and midwives, and a shortage of more than 4 million health workers overall. Most of this shortfall is in developing countries.² One billion of the world's seven billion people will never visit a health worker for care. Of them, 350 million are children.³

CHWs help fill the global health worker gap by providing access to basic health care in a cost-efficient manner.

Around the world, CHWs play a profound role in filling the global health worker gap by providing basic, low-cost health care, social services and health information to individuals and groups that lack access to professional health care. For millions of people in the developing world, CHWs are the first and often only point of contact with the formal health system. In regions with limited resources, CHWs cost comparatively little to train and offer low-cost interventions that save millions of lives. Training a CHW for one year costs 2.5 percent as much as training a doctor,⁴ takes less than one-fifth the time, and allows the delivery of simple solutions that cost \$3.50 per person to supply annually.⁵ A typical CHW provides care for 100 households.⁶

In particular, CHWs can contribute greatly to the achievement of Millennium Development Goals 4, 5 and 6, improving child and maternal health. Each year, 8.8 million children die before the age of five, and 350,000 women die from complications related to pregnancy or childbirth. Many of those deaths could be prevented by access to the basic health care that CHWs provide.

There are not enough CHWs. Sub-Saharan Africa bears the brunt of the global health worker shortage. In Europe, 173,000 doctors are trained each year.⁷ In Africa, just 5,100 are trained each year. In 2009, the High Level Taskforce on Innovative International Financing for Health Systems estimated that developing countries need an additional 2.6 to 3.5 million CHWs to achieve the Millennium Development Goals by 2015.⁸

CHWs provide cost-effective healthcare

2.5%

The cost of training compared to training a doctor

< 1/5

The time required to train compared to training a doctor

\$3.50

The per patient cost of annual supplies required

0

The number of new hospitals required for a marginal CHW

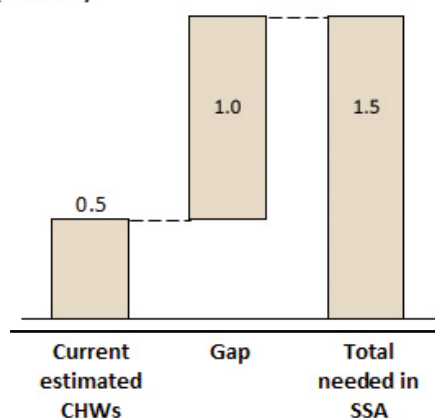
100

Households a typical CHW covers

Sub-Saharan Africa needs more than a million additional community health workers.

Figure 1: Estimated Community Health Worker Shortage in Sub-Saharan Africa

Gap of CHWs relative to estimated need in SSA (millions)



The number of CHWs working in Sub-Saharan Africa is difficult to ascertain, as the cumulative number of CHWs trained is not comprehensively tracked. Based on limited statistics currently available, this report estimates that 500,000 CHWs work in Sub-Saharan Africa today.⁹ As advocated in a 2011 Earth Institute Technical Task Force report,¹⁰ at least a million more are needed to meet basic maternal and child health needs.¹¹

Earth Institute, 2011; WHO, 2006; Dalberg analysis

Community health workers deliver cost-effective, high-impact interventions in a variety of areas, including hygiene, sanitation, reproductive health, first aid, and, in some cases, vaccinations and rudimentary interventions such as oral rehydration therapy for infants. Most of them are women. Their functions differ from country to country, and the term “community health worker” can refer to workers with a variety of local titles: community health-education worker, community health aide, family health worker, lady health visitor, and health extension worker, among others.

CHWs display similar variation in their skill sets and levels of training, but all are trained for shorter periods of time than professional physicians, nurses and midwives—from just a few hours to one to two years. CHWs are a type of frontline health worker, but the term “frontline health worker” is broader, as it also includes nurses and midwives. For the purposes of this report, CHWs are defined as having some formal health training not exceeding two years.

(Sources: WHO, McKinsey Quarterly)

Table 1 shows the wide variation among CHWs in terms of training length, integration and status within the national health system, tasks, remuneration, required education, and accreditation.

Table 1: Types of CHWs and interventions they deliver

LENGTH OF TRAINING	ILLUSTRATIVE NAMES	ROLE IN THE HEALTH CARE SYSTEM	ILLUSTRATIVE MAIN TASKS	REMUNERATION	MINIMUM EDUCATION	ACCREDITATION	EXAMPLES
< 1 week	Volunteer Health Worker	Informal	Gather basic data house to house	No	None	No	Senegal, Nigeria, Ghana, Mali, Tanzania
1-2 weeks	Village Health Worker	Formal	Provide health education in community and house to house	No	Primary School	No	Uganda, Rwanda
2 months to 1 year	Community Health Worker	Formal	Provide basic health care services in clinic setting: vaccination, growth monitoring, etc	Yes	High School	Yes	Zambia, Ghana, Kenya*, Malawi, Mozambique**
> 1 year	Health Extension Worker	Formal	Provide primary clinical care: diagnosis, treatment, referral if necessary; safe birth delivery	Yes	High School	Yes	Nigeria, Ethiopia

*Remuneration is performance-based

** CHWs will be formally recognized as part of the health system in Mozambique under planned program revisions

Source: Singh and Sullivan, "One Million Community Health Workers", The Earth Institute, 2011; Bhutta, Lassi, Pariyo and Huicho, "Global Experience of Community Health Workers for Delivery of Health Related Millennium Development Goals", GHWA, 2010; Conway, Michael D., Gupta, Srishti, and Khajavi, Kamiar, "Addressing Africa's health workforce crisis," McKinsey Quarterly, November 2007.

The most informal CHWs are unpaid, receive a week or less of training, and are neither accredited nor formally integrated into national health systems. Typically, they visit patients' dwellings, gathering community health information and perform few actual health services.

On the other end of the spectrum are CHWs that provide primary care, including diagnosis, treatment of common illnesses such as pneumonia, vaccinations, and referrals to clinics. These CHWs are typically required to have at least a high school education, a year or more of training and accreditation. They are paid and occupy a formal role in the national health system. These highly trained CHWs are less common, but play a vital role in countries such as Ethiopia and Nigeria.

A wide range of CHWs falls between these two extremes. These CHWs may provide services such as vaccination, growth monitoring and community education.

Renewed global attention makes this a unique and promising moment to capitalize on the power of community health workers.

Although the global health community has long recognized CHWs' importance for improving public health, the past few years have seen renewed international attention to CHWs. The run-up to the 2015 target date of the Millennium Development Goals and the UN Secretary General's

Every Woman, Every Child movement have spotlighted maternal and child health in the developing world, along with the potential of CHWs to improve it. The Frontline Health Workers Coalition advocates for additional US spending on CHWs.¹² Ongoing efforts by the Health Workforce Taskforce, the Global Health Workforce Alliance, Human Resources for Health and CORE Group continue to focus on expanding the number of CHWs. Last year saw the formation of the MDG Health Alliance, which intends to leverage the private sector to support increased public financing for CHWs.

To be sure, this is not the first time global attention has focused on CHWs. The 1970s and 1980s saw a wave of community health worker programs. But many were implemented on a small scale, and others failed to thrive.¹³ Thirty years later, the possibilities for CHW effectiveness have expanded, in part because of the rapid spread of technology, including mobile technology, and the potential use of multimedia and digital content. Technology presents opportunities to improve CHW training, to make it more cost effective, and to scale training interventions more easily.

CHAPTER 2:

THE LANDSCAPE OF TRAINING

This chapter describes training as a vital part of the ecosystem in which CHWs operate, and documents the various types of training and players involved in training across Sub-Saharan Africa.

THE VALUE OF TRAINING

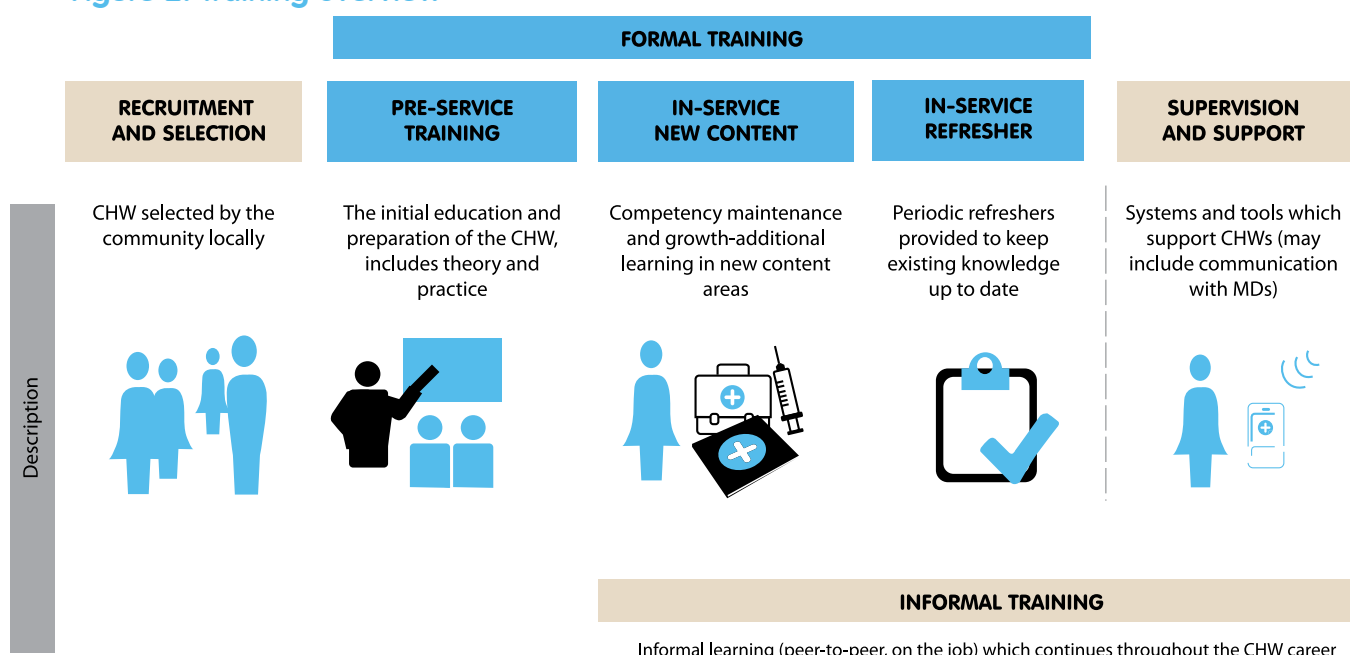
Among the many factors that support or detract from a CHW's effectiveness, training plays a preeminent role.

Formal training, whether initial pre-service education or continuing in-service training, has a demonstrably positive effect on CHW performance: The better trained a CHW is, the more empowered he or she is to deliver health care in his or her community.¹⁴ Though less studied, informal training (on-the-job, through peer networks) also plays an important role in a health worker's knowledge base.

All CHWs in Sub-Saharan Africa as defined by this report have received some type of formal training, which ideally occurs throughout a CHW's career.¹ After being recruited within his or her community, usually by local officials or community leaders, CHWs undergo **pre-service training**. Pre-service training communicates baseline knowledge, theory and practice, and is typically conducted by the national ministry of health, an NGO or a partnership between the two.

A number of studies have found that continued training is as important as initial training because it prevents the loss of acquired skills and knowledge.¹⁵ While practicing, a CHW can add to his or her competencies through **in-service training on new content**. Often this is conducted by a different NGO than the one that led his or her pre-service training. To keep his or her knowledge up-to-date, a CHW can receive periodic **in-service refreshers**. Refreshers are typically conducted by the entity that provided the pre-service training.

Figure 2: Training overview



Training landscape based on Dalberg analysis

¹ As defined by this report, a CHW is someone who has received formal training - from several hours to 2 years.

Another aspect of CHW training is **informal training**, which includes lessons learned on the job, peer-to-peer knowledge transfer and informal links to mentors and medical professionals.

Although the role of informal training has been less documented and is, by its nature, difficult to measure or quantify, it undoubtedly contributes to performance, retention and overall effectiveness.¹⁶

It is important to remember that training is one factor in the complex ecosystem in which CHWs operate. According to research by the Earth Institute and GHWA, six additional factors in this ecosystem can contribute to her effectiveness and retention:¹⁷

- **Remuneration and recognition:** Financial and non-monetary incentives, such as recognition and acknowledgement, foster loyalty and commitment, and improve retention rates.
- **Equipment and supplies:** Access to an appropriate toolbox, such as oral rehydration salts and zinc for diarrhea, allows CHWs to treat patients effectively. Equipment also increases CHW motivation and enhances their credibility within the communities they serve.
- **Supervision:** Supervision improves effectiveness and helps CHWs feel connected and valued within a national health system. It is often provided by local NGOs, private contractors, or more senior CHWs, and can include direct communication with physicians and nurses and systems and tools.
- **Opportunities for advancement and recognition:** Certification and promotion up a career ladder provide incentives that keep CHWs active and engaged.
- **Accreditation:** Formal acknowledgment within a health system empowers CHWs and improves retention rates.
- **Integration within the national health system:** Links to clinics, formal health centers and medical professionals provide crucial health information and support for CHWs, increasing their retention rates and effectiveness. The ability to seek assistance in emergencies and/or refer someone who needs care enables effectiveness.

THE TRAINING LANDSCAPE

As the resources devoted to global health have grown over the past two decades, an increasing number of NGOs, agencies and governments have engaged in CHW training. From 1990 to 2007, assistance for global health grew from \$5.6 billion to \$21.8 billion.¹⁸ Of this, World Vision International has estimated that \$5 to \$6 billion per year goes to basic health programs, part of which – albeit a small part – includes CHW training.¹⁹ USAID has been a leader in this endeavor, partnering with non-governmental organizations and national governments to train some 300,000 CHWs in Sub-Saharan Africa.

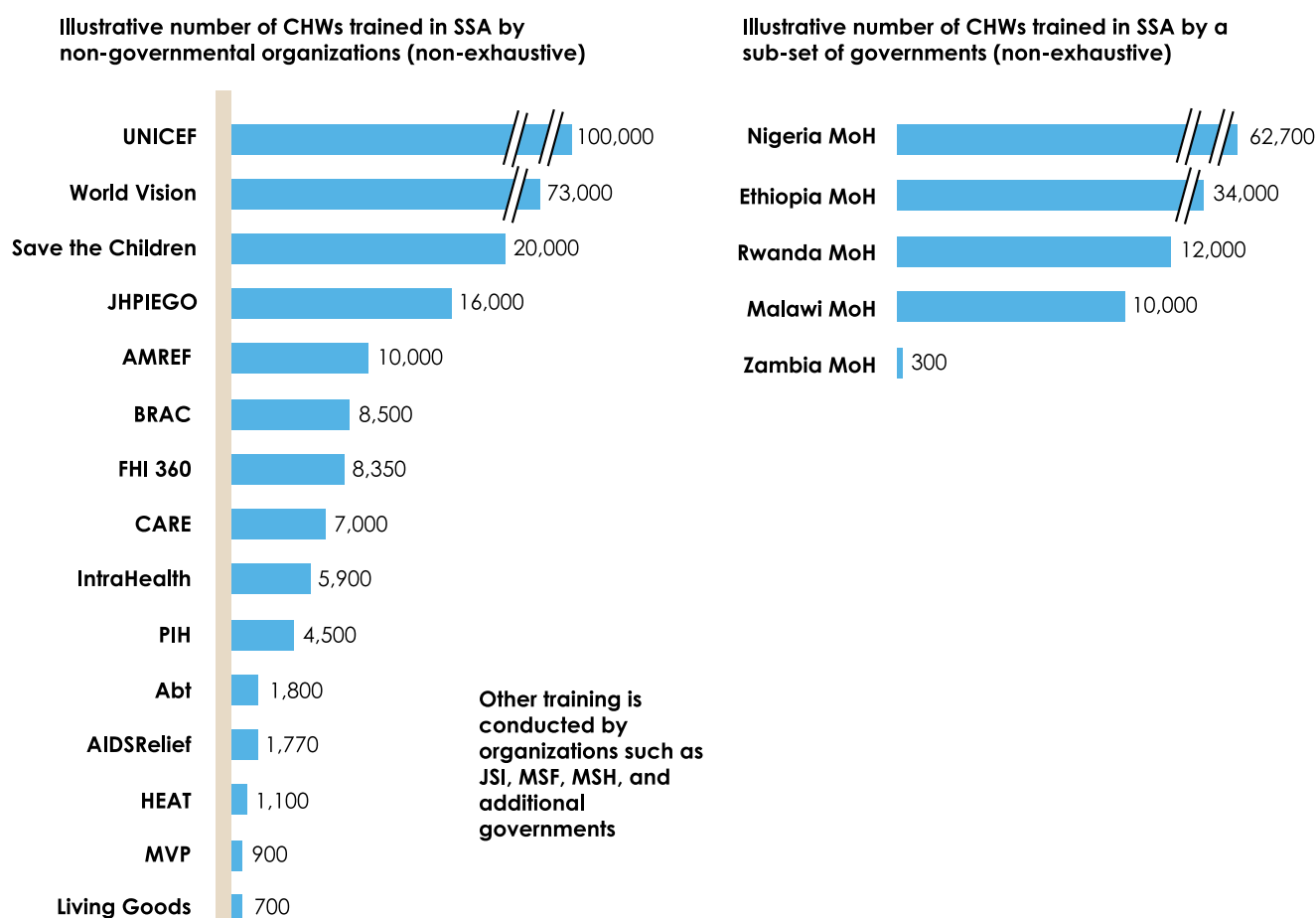
The role of governments in CHW training

National ministries of health play a role in training CHWs, either on their own or with the support of NGOs. NGOs support approximately 30 percent of the government training programs reviewed for this report. For example, CHAI supports the Zambian Ministry of Health to implement its national CHW strategy in recruitment, training and deployment. In addition, ministries of health work with NGOs to coordinate in-service training, which is often conducted by outside organizations interested in a particular issue, such as CARE's training on maternal and child health. Overall, more than 50 percent of the CHWs in Sub-Saharan Africa represented in this study were trained directly by NGOs or by NGOs supporting governments. These NGOs play a vital role in training.

More than 20 non-governmental organizations train CHWs in Sub-Saharan Africa.

This study compiled a non-exhaustive list of organizations involved in CHW training in Sub-Saharan Africa, ranging from World Vision (involved in supporting the training of more than 73,000 CHWs)²⁰ to the Zambian Ministry of Health (involved in a pilot training program with more than 300 CHWs).²¹ Ten of the organizations listed below train fewer than 10,000 CHWs each.

Figure 3: Illustrative organizations involved in CHW Training



This is a non-exhaustive list with overlap. Some of the organizations listed here provide CHW training with the United States Government's (USGs) PEPFAR or other sources of USG funding. Organizations such as UNICEF often work in partnership with or fund other organizations to implement training. World Vision represents a cumulative figure for HIV related volunteers. Zambia's Ministry of Health is scaling up its program to more than 5000 CHWs.

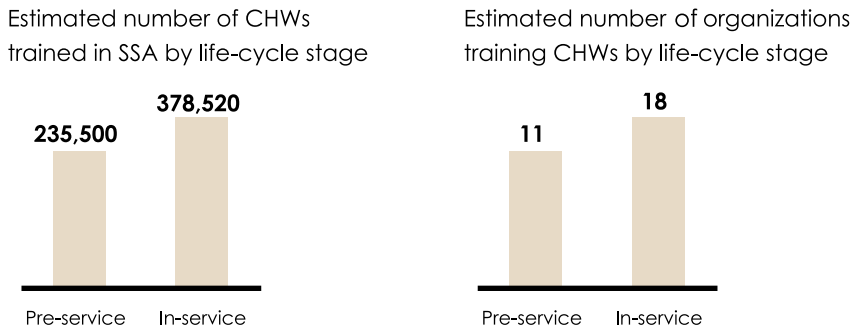
Source: Dalberg analysis and expert interviews.

There is overlap between these numbers, particularly between ministries of health and the NGOs operating in country. For example, in Ethiopia, the Ministry of Health, HEAT, and AMREF are all working together on different elements of an integrated training approach.

In order to scale the number of CHWs, additional pre-service training for new CHWs is needed. However, efforts tend to focus on in-service training, perhaps because of donor incentives.

Despite the recognized shortage of CHWs, interviews revealed that NGOs tend to focus their efforts on in-service training of existing CHWs rather than on selection and pre-service training of new workers. All of the 18 organizations profiled above implement in-service training, but only slightly more than half implement pre-service training. Noting the lack of investment in expanding pre-service training capacity, public health experts Marko Vujicic et al. surmise, “One likely reason behind the heavy emphasis on in-service training—particularly for the Global Fund and GAVI grants—is the nature of proposal evaluation criteria.”²² In-service training produces more visible results in a shorter time frame than recruitment and pre-service training, which also require larger investments of time and money.

Figure 4: Overview of CHW training by life-cycle stage



CHW TRAINING			
Pre-service training	In-service new content	In-service refresher	Supervision and support
Local governments	Abt Associates	Local governments	Dimagi
Abt Associates	AMREF	Abt Associates	D-Tree International
AMREF	AIDSRelief	AMREF	
BRAC	BRAC	BRAC	
HEAT	CARE	HEAT	
IFRC	DFID	IFRC	
Jhpiego	FHI 360	Jhpiego	
JSI	Grameen	JSI	
Living Goods	HEAT	Living Goods	
Millennium Villages	IntraHealth	Millennium Villages	
MSF	IFRC	MSF	
Partners in Health	Jhpiego	Partners in Health	
World Vision	JSI	World Vision	
	Living Goods		
	Local governments		
	Millennium Villages		
	MSF		
	Partners in Health		
	Save the Children		
	UNICEF		
	World Vision		

Source: Dalberg analysis and expert interviews

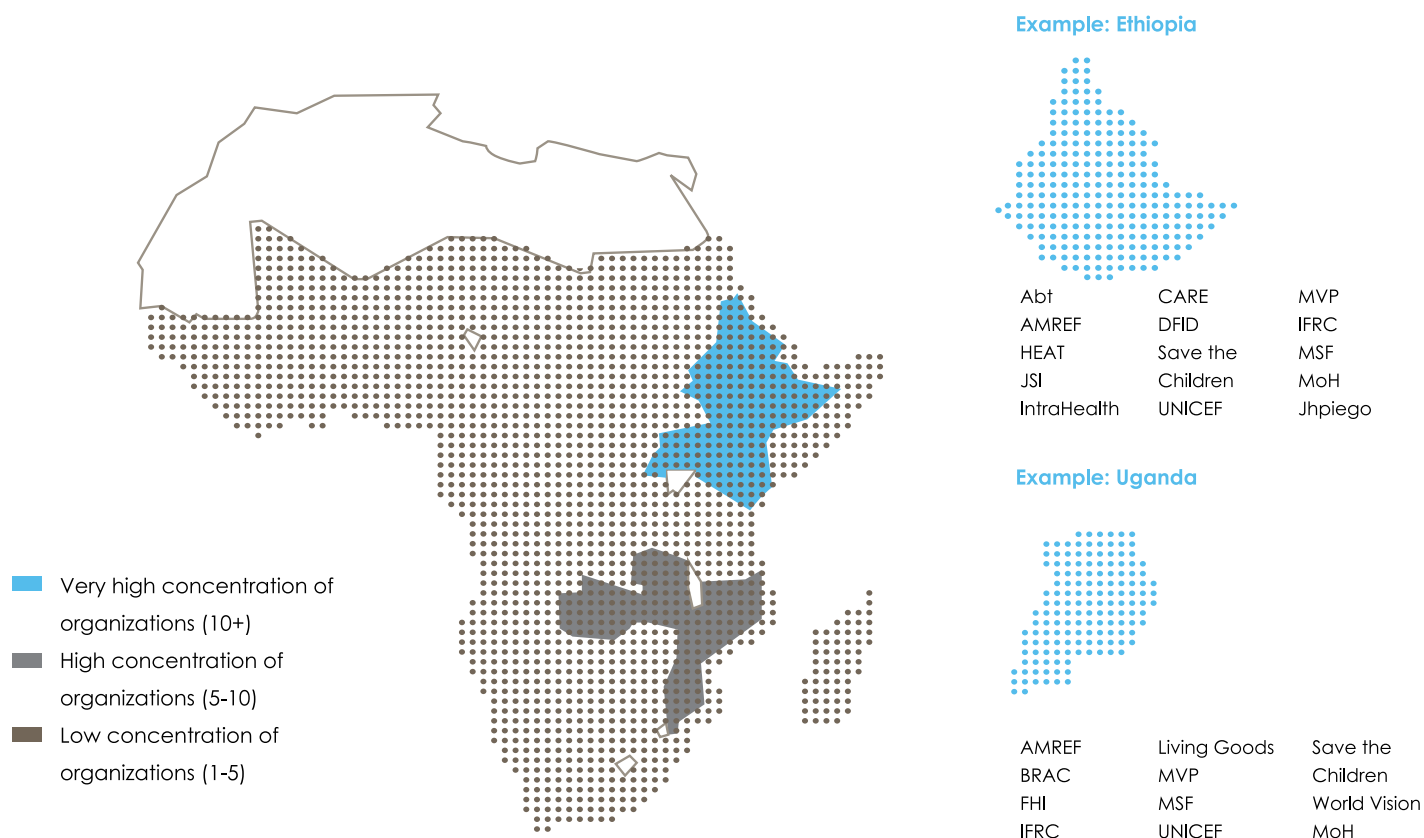
Often, many players are involved in CHW training within a single country. In regions such as East Africa, multiple organizations operate in the same country.

In Uganda and Kenya, for instance, at least 10 organizations are involved in training CHWs, either independently or in partnership with the government. More than a dozen organizations play a role in training CHWs in Ethiopia. While the number of organizations quickly adds up, in many countries, organizations have divided areas of geographic focus. Despite their efforts, the significant gaps and needs in CHW training persist due in part to limited overall resources and historical priorities of the global health community.

With many players present, coordination among implementing organizations and ministries of health can be challenging.

As illustrated in several case studies, lack of coordination among implementing NGOs leads to variability and, at times, duplication of efforts.

Figure 5: Training efforts by country



Note: Map based on interviews with 19 implementers and is non-exhaustive
Source: Dalberg research and analysis, government websites



MANY CHW TOUCH POINTS IN UGANDA. At least 11 organizations train CHWs in Uganda, at times operating in the same districts. This can lead to duplication in training efforts, which runs the risk that some CHWs are trained by multiple organizations. It's not necessarily sustainable, either. "Each organization takes on additional health issues, and after a while, the CHWs end up doing work far outside their standard program and in some cases practically take on full-time health care responsibilities," says Sean Blaschke of UNICEF's Alive Program in Uganda. "This is a huge problem because it diverts attention from the core health package, and is largely unsustainable because as soon as the NGO funding ends, so does much of this additional work."



IMPROVING COORDINATION IN ZAMBIA. In Zambia, the Ministry of Health conducted a study on its country's CHWs. It reported wide variation in training received by CHWs with similar duties.²³

The ministry has since created a strategy to formalize and standardize CHW training, recruitment and deployment. The resulting program lasts one year and comprises an integrated curriculum of theoretical and practical training. Coordination between the ministry and implementing partners has improved. According to an implementing organization interviewed for this report, there is now a clearer division of partners. "When we enter an area, we spend a year doing an 'assessment' with other district partners, the government, and NGOs.... For example, there are four NGOs in our district. During the year assessment, boundaries are developed....We divide the district so we know how far each organization goes. There is no duplication of resources."

CHAPTER 3:

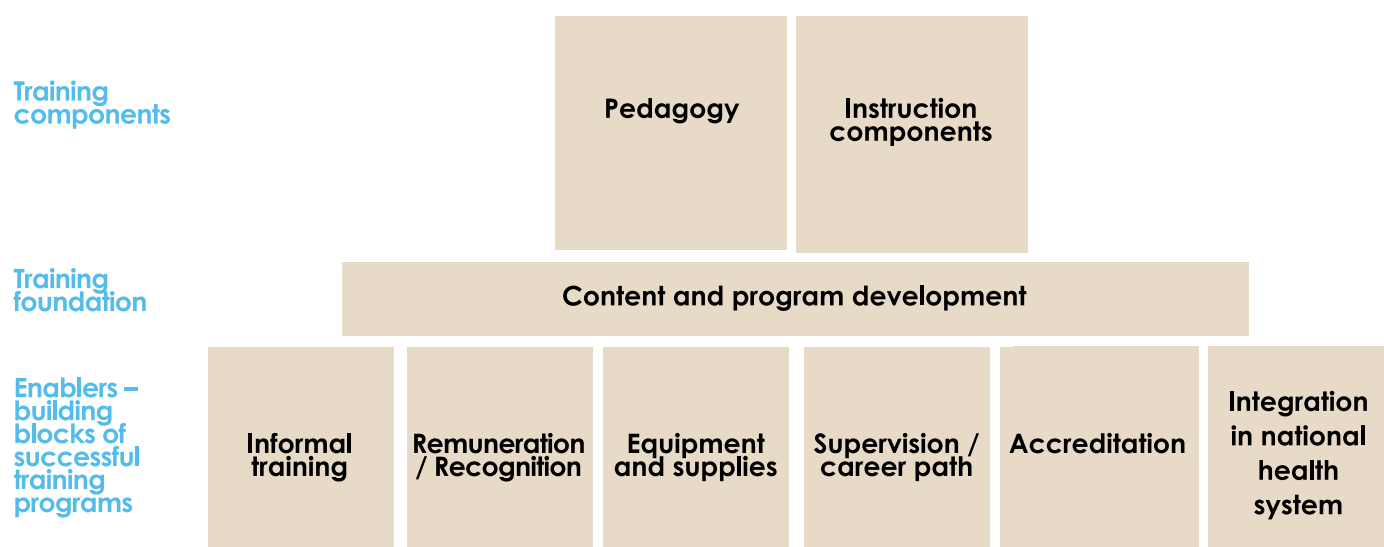
CURRENT APPROACHES TO CHW TRAINING AND CONTENT CREATION

This chapter describes the techniques, topics, and curricula used to train CHWs, and how various types of technology, including mobile and video, could be leveraged within them.

The design of training programs: pedagogy and instruction components

Designing formal training programs involves a series of choices in two broad areas: **pedagogy**, or the way the material is taught, and **instruction components**, or material. Underlying these components is the **content and program development** theory upon which the training program is based. Formal training is one aspect of CHW support, and the success of any training program depends on non-curricular “enablers” such as remuneration, recognition, equipment and supplies, supervision, accreditation and integration into the health system, and informal training.

Figure 6: Overview of training components, foundation and enablers



A. PEDAGOGY

There are many techniques, time frames, locations, and modes of teaching a training program can use.

Trainers can employ two main types of educational techniques.²⁴ **Didactic techniques**, based on lectures or readings, result in a passive educational experience. **Interactive techniques**, on the other hand, are premised on interaction and dialogue between learners and facilitators and may feature simulations, role play, or case-based learning. Trainers must also decide how frequently to present the material. They can present information **once in its entirety**, or **repetitively**, reiterating the information over time. The location of the training has pedagogical consequences. **Offsite training** takes place in a classroom or at a central location, while **on-site training** occurs at the health facility or within the community where CHWs will work. The teaching mode includes a range of technological options, including visuals, audio and multimedia.



Technology-aided training is currently limited.

A literature review by Jhpiego of 69 studies focused on health worker education and revealed that among these pedagogies, certain ones are most effective:²⁵

- **Interactive pedagogies**
- **Repetitive learning**
- **On-site learning**
- **The incorporation of multimedia materials**

Table 2: Training pedagogies ²⁶

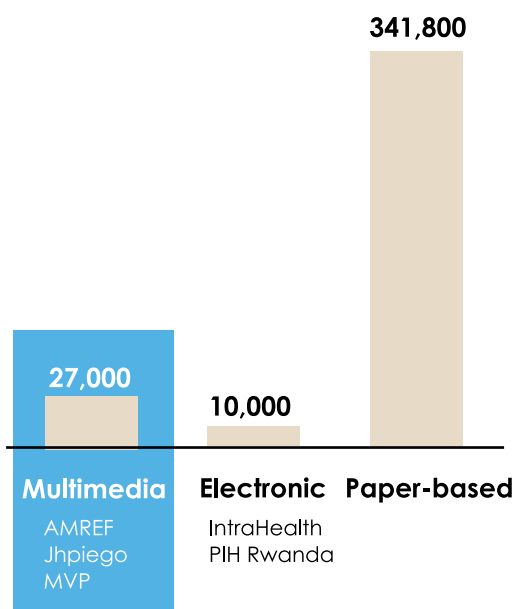
Pedagogy types		Description	Studies on health providers reveal certain pedagogies work best
Educational techniques	Interactive techniques	Active educational experience that allows interaction and dialogue between the learner and facilitator, includes simulations, role play, or case-based learning	The use of case-based learning, clinical simulation, and practice and feedback have been found to be more effective for knowledge and skills acquisition than didactic techniques
	Didactic techniques	Passive educational experience, including lectures or reading	
Timing	One time	Information presented in its entirety at once	Information presented and repeated over spaced intervals produces better learning outcomes and is retained more effectively than single training interventions
	Repetitive	Information repeated several times	
Location	Offsite	Trainees receive instruction in a classroom or in a central location	Learning should occur in an environment as similar to the practice setting as possible
	Onsite	Trainees receive instruction at the health facility in the community where they will work	
Teaching mode	Live	Paper-based	Multimedia learning is more effective than learning from words
		Electronic-based (no animation)	Audio and visuals demonstrate aspects of health care that cannot be captured in text
		Multimedia-based	Multimedia can contribute to interactive, repetitive, onsite training (E.g., Khan Academy model)
	Distance learning		Distance learning is at least as effective as live learning

Currently most training pedagogies rely on paper.

Although implementers recognize the appeal of multimedia-based pedagogies, the vast majority of CHW training organizations surveyed for this report rely on paper-based modes, teaching some 341,800 (or 90 percent) of CHWs represented in our survey, in this way. Significantly fewer CHWs, approximately 27,000 (or 7 percent), received multimedia-based training. Only 10,000 (or 3 percent) received electronic training.

Figure 7: Training by delivery mechanism

Estimated CHWs trained by delivery mechanism, non-exhaustive



B. INSTRUCTION COMPONENTS

Most CHW training programs prepare health workers in a particular competency, such as diagnosing malaria, basic maternal and child-care, or explaining birth control. In teaching those competencies, training organizations emphasize some degree of **knowledge transfer and skills development**.

Instruction based on knowledge transfer consists of conventional instruction, similar to the instruction of physicians and nurses. A knowledge-transfer program on reproductive health, for example, would describe how the reproductive process works before it dived into birth control options. The CHWs who attend such training usually have a more formal role in the health system and can undergo long periods of instruction. **Skills-based instruction**, in contrast, takes a pragmatic, non-theoretical approach. Such programs are shorter and more appropriate for CHWs, who often have low levels of education.²⁷ A skills-based program on reproductive health would focus on how to teach others to use birth control and how to follow up with patients.

Content creators are now emphasizing skills development over knowledge transfer.

“There is a big shift now to skills based training,” explains Anne Liu of the Millennium Villages Project. “**With technology, it’s easier to follow up, monitor, and support after training, so the pre-service training can be shorter.**” Technology can facilitate skills-based instruction through job aids and innovations such as mobile clinical decision-making algorithms. The majority of organizations surveyed in this study use skills-based instruction rather than knowledge-based instruction.

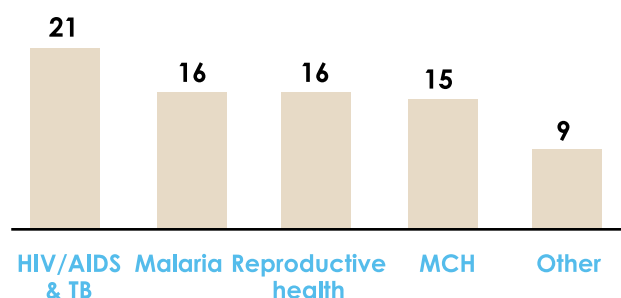
C. CONTENT AND PROGRAM DEVELOPMENT

Training organizations tend to focus on the same core topics:

These include HIV/AIDS and tuberculosis, malaria, reproductive health, and maternal and child health. Topics such as sanitation, hygiene, and nutrition have received less attention.

The graph below shows that in a sample of 25 organizations, 21 covered HIV/AIDS and tuberculosis; 16 covered malaria and reproductive health; and 15 covered maternal and child health. The HIV/AIDS examples included in this section reflect historical patterns of funding mobilized to fight this epidemic.

Figure 8: Estimated number of organizations training CHWs by topic*



* Sample of 25 organizations, majority focused on more than one topic

MCH refers to Maternal and Child Health

Source: Organizations website

Despite topical overlap, many organizations develop their curricula independently.

More than 50 percent the organizations surveyed generated their own training components and curricula, suggesting that a great deal of time and resources are spent duplicating existing materials. For instance, there are more than a dozen manuals for training CHWs on HIV/AIDS interventions. A review of the contents of each revealed that the majority includes the same four topics: how HIV is introduced, medication for HIV, birth and nursing with HIV, and reducing HIV risk.

Figure 9: Sample of HIV/AIDS training manuals which may be used for CHW training



Figure 10: Illustrative table of contents for HIV/AIDS training materials

Curricula	HIV introduction	HIV medication	Birth and nursing with HIV	Reducing risk/ safe sex	Coping with stigmatization	Risk of TB
Addressing the challenges of HIV prevention in Southern Africa	✓	✓	✓	✓	✓	
AMREF Integrated HIV/AIDS Prevention, Treatment and Care	✓	✓	✓	✓		
Curriculum national de formation pour la prestation de soins et support aux orphelins et enfants rendus vulnérables par le VIH/SIDA (Haiti)	✓	✓	✓	✓	✓	
HEAT Programme: Communicable Diseases Module	✓	✓	✓	✓	✓	✓
Kenya PMTCT National Training Curriculum	✓	✓	✓	✓		
Mozambique Positive Prevention Training Manual	✓	✓	✓	✓		✓
Positive Living Association of Liberia	✓	✓	✓	✓	✓	✓
Prevention for Positives (Family Health International)	✓	✓	✓	✓	✓	
Tanzania Ministry of Health and Social Welfare	✓	✓		✓	✓	✓

Majority of HIV/AIDS training programs contain these four standard components

The extent of topical overlap suggests untapped opportunities for collaboration and sharing in content development.

Training content and implementation must be tailored to local needs and parameters, but given a core set of clinically recognized content and globally recognized training techniques, there may be missed opportunities for standardization and sharing via open source platforms. Training implementers and content developers alike agreed during the survey that some content can be standardized, as described in the section below.

Opportunity for increased sharing

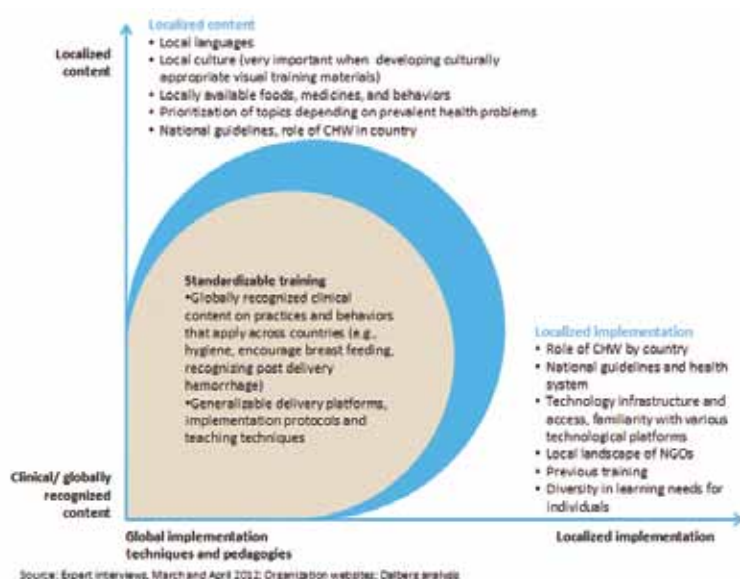


Figure 11: Training standardization

Figure 11 depicts the training components that could be standardized and those that should be localized, according to experts interviewed in this study.²⁸ The graph's inner layer of standardizable training includes "clinical health messages" – globally recognized, medical content on practices and behavior that apply across countries. Hygiene protocols, for instance, are universal. Encouraging breast-feeding is a globally recognized priority. The signs of post-delivery hemorrhage do not vary from country to country.

Though implementation is much more influenced by local context, some teaching techniques can also apply across countries and localities. Across a variety of contexts, for instance, role-play is useful in training CHWs to conduct sensitive conversations about HIV/AIDS transmission, and photos illustrate common symptoms better than verbal or textual descriptions alone.

The graph's outer layer of training reflects content and implementation factors that must be localized. Effective content development is sensitive to factors such as:

- **Languages**
- **Cultural norms, which are especially important to take into account when developing visual aids**
- **Availability of local foods and medicines**
- **Local behaviors and customs**
- **Local health priorities and challenges**
- **The role of CHWs in the country**
- **National guidelines and health system requirements**

In addition to the factors above, effective implementation must take into account additional local context, particularly:

- **Infrastructure and access to technology**
- **The local landscape of NGOs**

“As much as 80 percent of CHW clinical health messages in training, especially around child and maternal health, could be transferable”

- Lesley Anne Long, Deputy Director of the Open University's International Development Office.

Content is more easily transferred to other contexts when it was “written from the outset to be as generic as possible,” notes Lesley Anne Long, deputy director of the Open University. If written to be generic, as much as 80 percent of CHW clinical health messages, especially regarding child and maternal health, could be transferable, says Ms. Long. From there, the content could be customized to specific local contexts. Other content developers, such as the NGO Hesperian Health Guides, also aim to create broadly generalizable content; some of Hesperian's training materials have been translated into 80 languages.

Health educators in six Sub-Saharan African countries and from two areas in India have contacted the Open University's program in Ethiopia, HEAT, and reported that they are using HEAT materials in their training programs. These far-flung trainers use HEAT materials for training CHWs and for refresher training for nurses, midwives, paramedics and, in one case, medics.

Transferring actual programs is a different matter, in part because national governments have different approaches to CHW training. For example, health extension workers in Ethiopia are enrolled in one-year programs with comprehensive curricula, while in Rwanda, many CHWs are trained in specific areas, such as water and sanitation or nutrition.

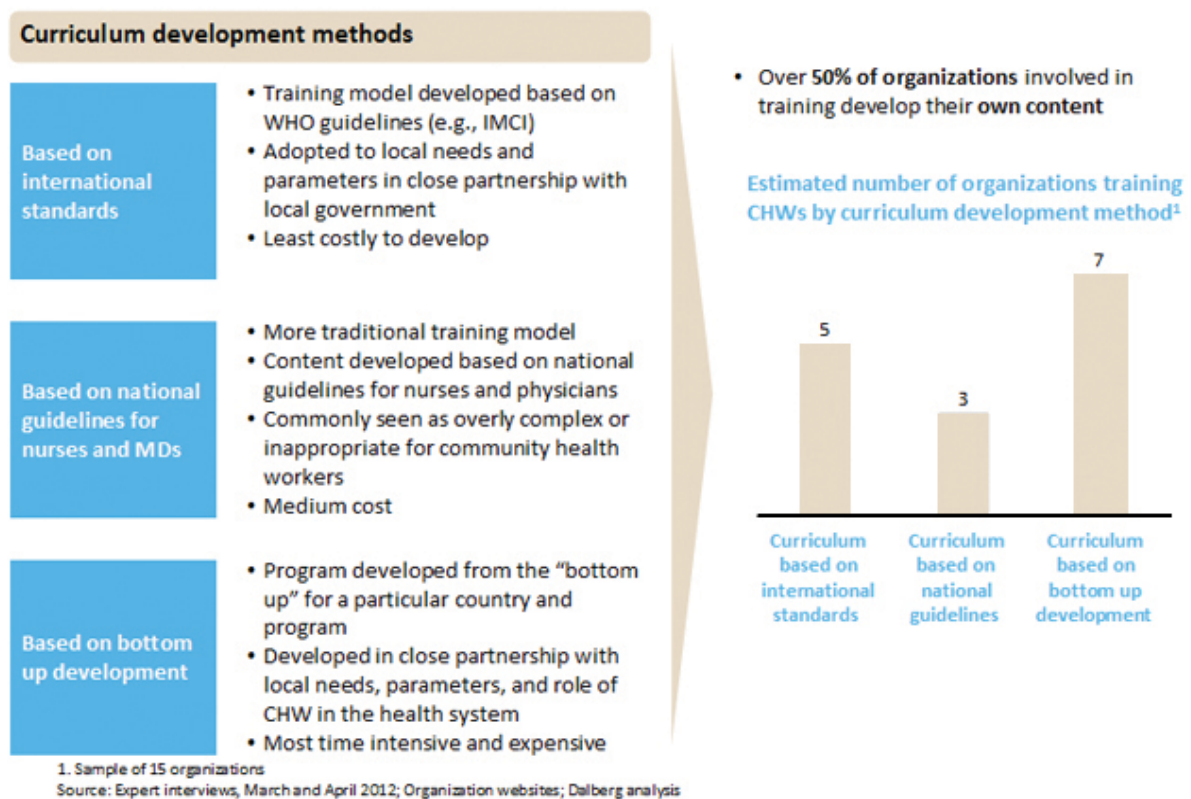
Costs of content development

Many organizations do not use standardized content and instead develop content with “bottom-up” approaches.

The dominant mode of curriculum development is “bottom-up,” highly tailored to specific locales. Bottom-up approaches begin with detailed consideration of local needs, culture and context, parameters at the district or national-level, and roles of CHWs. Partners in Health, for example, develops unique training programs based on extensive review of local conditions, culture and CHW roles. Although they require the heaviest investments of time and money, as illustrated below, bottom-up approaches have become the dominant mode of curriculum development.²⁹

Figure 12: Curriculum development methods ³⁰

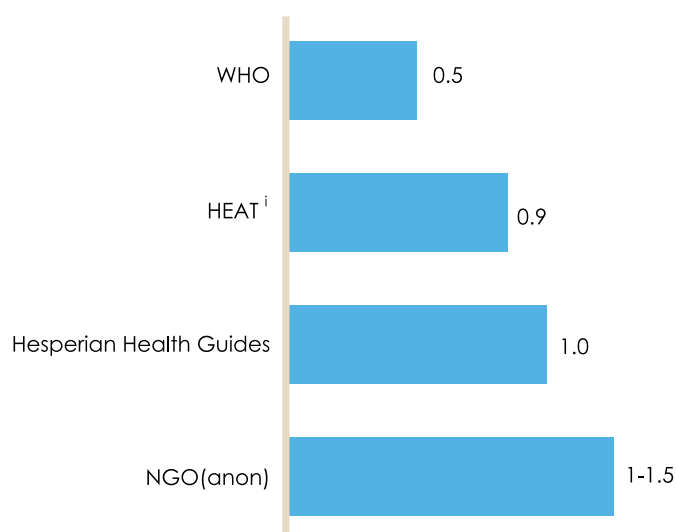
Bottom-up curriculum development is expensive, with organizations reporting the cost of



developing content for a new CHW training curriculum as at least \$500,000 (the World Health Organization) and as much as \$1 million to \$1.5 million (anonymous NGO implementing training in Sub-Saharan Africa). This includes only the cost of content development, not the additional costs of materials, printing and conducting the training.

Other less expensive sources for curricula can inform curriculum development. Some developers rely on **international standards**, such as WHO guidelines on Integrated Management of Childhood Illness, and adapt them to local needs and parameters in partnership with the local government. A decreasing number rely on **national guidelines** for nurses and physicians, which had been a traditional source for curricula but are now seen as too complex or technical for CHWs.

Figure 13: Cost ranges for content development for a new CHW training curriculum (USD millions)



Source: Expert interviews, March to April 2012

While developing new training materials is expensive, adapting existing content to local needs costs less.

Given the comparative costs of content creation and content transfer, it is anywhere from two to ten times more expensive for an organization to create content from the bottom-up, than to transfer generic content.

The cost of adapting a basic CHW manual or curriculum to a different country, for instance, ranges from \$25,000 to \$300,000, according to content developers such as HEAT, Dimagi, and Hesperian Health Guides.³¹ That cost includes translation, adapting images to accord with cultural norms, printing and distribution. In the case of Dimagi, it can also include application creation and iteration, field implementation support, and new feature or report development.³²

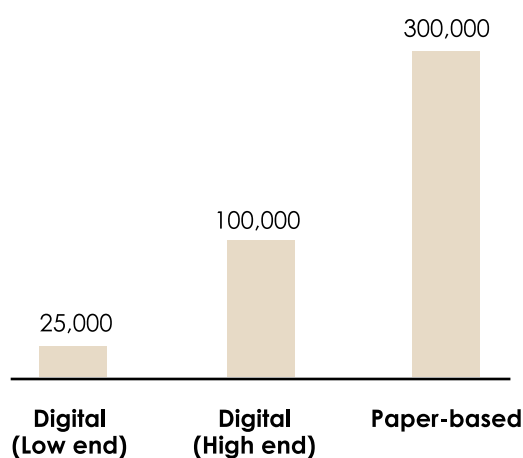
Digital content is estimated to be less costly to transfer than conventional content.

Transferring digital content between countries costs \$25,000 or less, while transferring, printing and distributing paper-based content can cost up to \$300,000, according to experts interviewed for this report.

ⁱ Costs of HEAT content development involved working with 57 health experts within Ethiopia to develop content (which also allows building capacity in Ethiopia), developing 450 hours of high quality materials, writing all of the assessments, providing model answers and marking guidance for the tutors, training tutors and writing a tutor training manual. Tutor training is estimated to be a small portion of the total cost.

Figure 14: Cost of transferring content across countries

Approximate cost of transferring content to a new country, USD



Source: Expert Interviews

Experts and implementers agree that there is opportunity to collaborate on CHW training content and to standardize portions of it. Despite NGO and national government interest in doing so, the dominant mode of curriculum development has become more bottom-up and localized. There are several reasons for this.

The structure of global health financing may discourage collaboration among CHW curriculum developers.

Aid donors need to measure results—a standard metric is how many CHWs have been trained—and collaboration is difficult to measure. “The problem is the way in which donors write project guidelines,” said a source interviewed for this report. “They don’t discuss collaboration. They discuss production. Recipients need to create a certain number of programs and meet certain guidelines.” This leaves the role of collaboration up to organizations themselves or to national governments, which may not have the resources to drive collaboration or recognize areas of duplication.

Even when donors do fund collaboration among project partners, the project partners may not necessarily be working in the same field or country, or with similar goals, notes Dr. Margaret Usher-Patel, World Health Organization scientist (retired June 2011). “Some donor supported proposals are so time-bound and number-driven that collaboration to develop one national curriculum and training process—which is always more complex and time consuming than developing your own—may not be viable or appealing,” she says.

Some governments are leading efforts to standardize training and curricula.

In Kenya, “a multiplicity of organizations and entities involved in CHW training developed different training manuals,” says an interviewee of the Kenyan Ministry of Public Health. “We need a better way to manage our partners.” The Ministry is working with various international agencies to create one document that will standardize CHW training in terms of content, technical approaches and guidelines. “We want the Ministry of Public Health to control that content so we can standardize it,” says the interviewee. These efforts require government resources.

Recognizing the costs of duplication in developing training content, some organizations and national governments have tried to overcome fragmentation and collaborate. For example, the Partnership for Maternal, Newborn and Child Health, in partnership with Aga Khan University, aimed to create consensus on the content for reproductive, maternal, newborn and child health care.

The output of their work lists interventions that should be made available to women and children, and includes information on how to deliver the interventions: what types of health workers should provide them, the commodities required for delivery, and applicable health guidelines. These guidelines, available online, could be used to inform content development for broader CHW training. However, such examples are rare.

Source: <http://www.who.int/pmnch/en/>

The use of sharable, digital content can help overcome duplication in developing conventional training content.

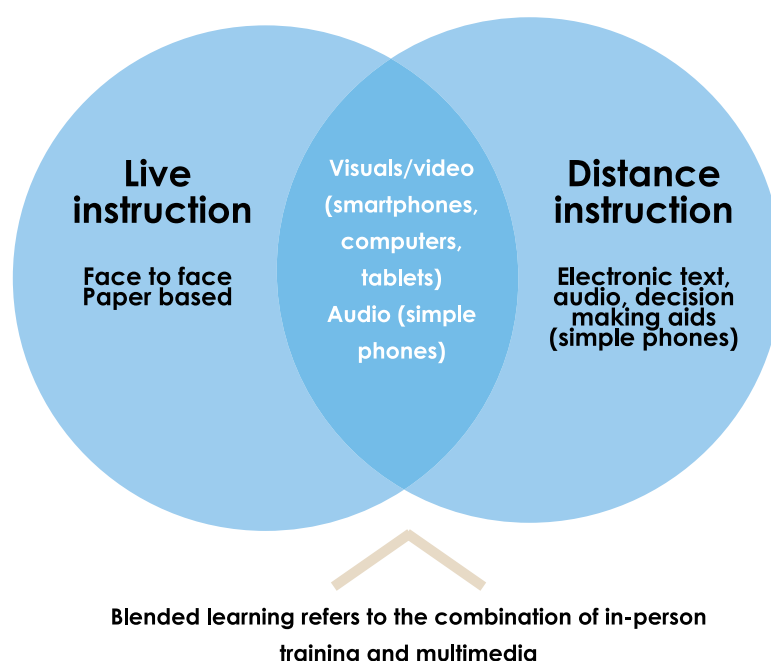
Developing interoperable platforms for content would facilitate sharing. Increasing the creation of open source, demand driven, digital content that is written from the outset to be generic and easily transferable would ease collaboration across countries.

CHAPTER 4:

EMERGING EVIDENCE ON THE POTENTIAL OF BLENDED LEARNING

This chapter explores emerging evidence on the use of technology, especially multimedia applications, in CHW training. Teaching approaches that blend multimedia with live training present an opportunity to increase training effectiveness. To the extent these “blended approaches” complement preferred pedagogical techniques, they are at least as effective—and possibly more effective—than conventional approaches. Further, they are appropriate for CHWs, highly cost efficient, and scalable.

Blended learning, as defined by this report, anchors CHW training to live, in-person training but incorporates multimedia technology either in the classroom or remotely. Multimedia technology leverages visuals, videos or audio. The deployment of multimedia applications and digital content at this time primarily occurs within classroom settings—for instance, through videos shown in class. Over time, with the expansion of smartphones, computers and broadband, multimedia may extend to the palm of each CHW’s hand.



ADVANTAGES OF BLENDED LEARNING

Blended learning has three main benefits for the training of community health workers, which this chapter describes:

1. It can be effective. Evidence shows that some pedagogies work better than others. Multimedia can complement and facilitate these pedagogies. The live component of blended learning is important for skill practice and feedback.
2. It is appropriate for CHWs, because many of them have low levels of literacy. Even basic technologies that can be used in low-connectivity environments, such as pre-recorded audio training on mobile phones, can increase support and learning.
3. It is cost-efficient, because blended learning offers opportunities for remote training and low-cost supervision and follow-up.

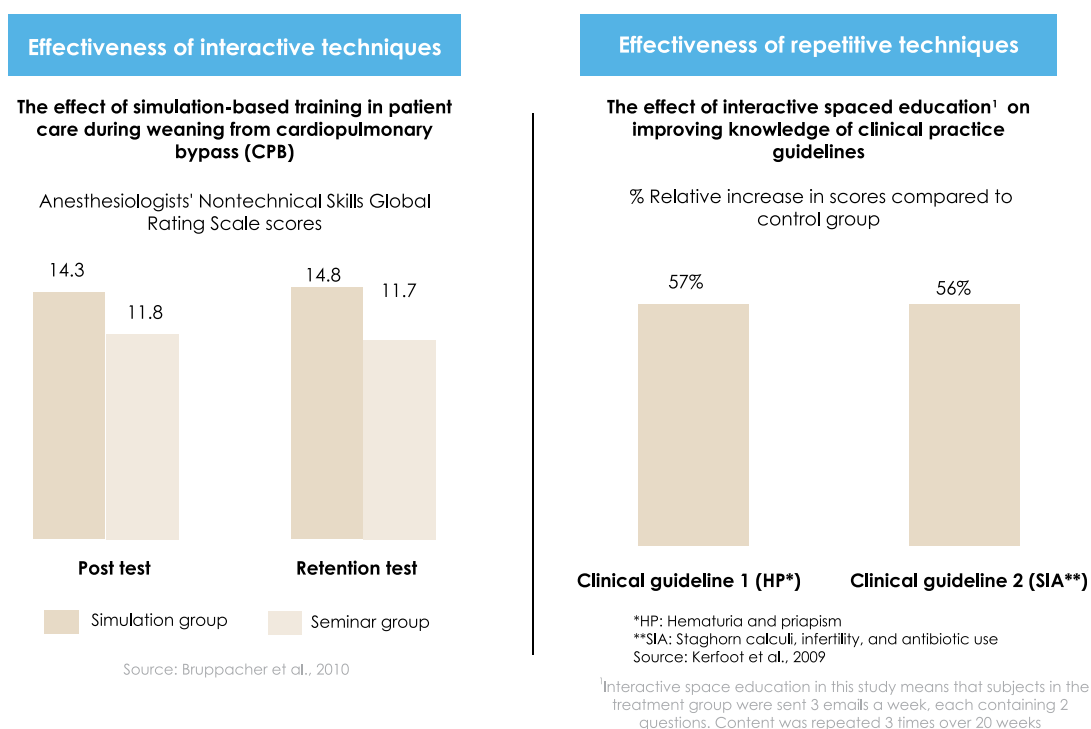
EFFECTIVE

Blended learning can be effective, because it can complement and facilitate preferred pedagogies.

Jhpiego's 2012 literature review on 69 studies of training health workers (Table 2),³³ surveys teaching pedagogies and identifies those that are interactive, repetitive, and delivered on-site or in an environment as similar to the workplace as possible, as the most effective overall. On-site learning can also be more efficient and provide for more practice and feedback, critical for skill development. Excerpts from this evidence base on interactive and repetitive techniques leading to improved scores are highlighted in the figure below.

Figure 15: Effects of interactive and repetitive teaching methods

To the extent that multimedia enables interaction, repetition, and on-site training, it can be a highly



effective training tool. Studies with health workers show that, indeed, multimedia can facilitate interactive, repetitive, and on-site pedagogies. For instance, audiovisual content, images, and animation can facilitate and provide fodder for simulations, case-based learning, and role-play. One study that compared types of media utilized for case-based learning, found similar outcomes with cases of live standardized patient and computer-based virtual patient.³⁴ Another showed that nursing students in the United Kingdom learned the theory and practice of handwashing at least as well with computer-assisted learning modules as with live methods.³⁵

Multimedia content enables repetitive learning, allowing learners to access information to be presented and repeated over time, and is shown to be more effective than single media learning among health workers.³⁶ Under certain circumstances, multimedia can also facilitate on-site learning, favored by experts who believe that learning should take place in a setting similar to the practice setting. Additionally, audiovisual and multimedia teaching materials engage CHWs better than words alone.³⁷

Building on the data points and evidence emerging in the use of blended approaches used in training of various types of health workers, there is reason to believe that it could be comparably effective for CHWs. There is not yet data on the effectiveness of blended approaches for CHW training specifically, as this concept is relatively new and has not been broadly evaluated in CHW contexts.

There is also emerging evidence on the ability of mobile applications to improve CHW effectiveness through in-service education.

mHealth applications are already being used to train and support CHWs, as illustrated in Figure 16. Further, although not specific to blended learning, there is emerging evidence on the ability of mobile applications to improve effectiveness of CHWs through in-service education, as noted below in studies which use SMS and rich media job aids, as illustrated in Figure 17.

Figure 16: Mobile applications are being used to train and support CHWs

Illustrative list of existing mHealth tools and training programs for CHWs

TRAINING TITLE	TRAINING TYPE	TOOL TITLE	TOOL TYPE
Healthline	Consultation/support	eMocha	Data collection & surveillance
eMocha	Reference materials /resources and learning support	ChildCount+ (rapidSMS)	
FrontlineSMS: Learn	Curriculum delivery	Pesinet Mali	
HEAT	Curriculum delivery	CommCare	
Health Information Network	Reference materials /resources	Uganda Health Information Network	
Mobile IMCI	Reference materials /resources and learning support	Mozambique Health Information Network	
IMCIICATT	Curriculum delivery	IQCare	
Health Informatics Building Blocks	Curriculum delivery	RapidSMS Rwanda	
CommCare	Treatment protocols	MOTEC	
e-IMCI	Treatment protocols	Medic mobile / Frontline SMS	
Mobile Academy	Curriculum delivery	Nompilo	Counseling tool
		Management Survey Tool	
		Mobile Kunji	Supply chain management
		mTrack	

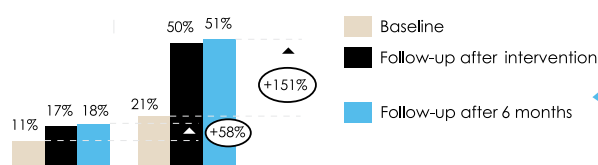
Source: Expert Interviews, March- April 2012. Literature review and company websites

Note: a full catalogue of mHealth training and support tools for CHWs will be hosted in the Content Library of the mHealth Alliance's Health Unbound (HUB).

Figure 17: Mobile applications have proven to be effective for health workers

The effect of mobile phone text-message reminders on adherence to malaria treatment guidelines

% Correctly managed pediatric malaria cases by health workers in Kenya

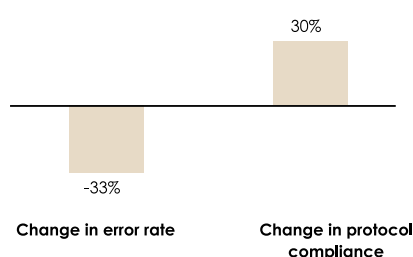


Health workers' malaria case-management practices often differ from national guidelines. This study found that sending text-message reminders to health workers' mobile phones could improve adherence to guidelines by 23.7 points immediately after the intervention and 24.5 points 6 months later

Source: Zurovac et al., 2011

The effect of clinical guidelines implemented as interactive rich media job aids on small-format mobile platforms in CHWs performance

% Change in error rate per case and task and % change in protocol compliance after introduction of rich media aids



CHW performance is often less than optimal, characterized by high error rates and low protocol compliance, even when equipped with paper-based job aids. This study showed that when equipped with rich media job aids with text, audio, and images/video, on small-format mobile phones, error rates were reduced by 34% and protocol compliance increased by 30%

Source: Florez Arango et al., 2011

Use of blended approaches will require baseline infrastructure, equipment and maintenance.

The success of blended learning will require enabling factors, such as equipment, technology, ICT support and national infrastructure report for the program. As with any new initiative, there are costs, although scale could allow such programs to be cost-effective. Costs include initial equipment, such as computers, mobile phones or tablets to deliver multimedia content, and repairs.

APPROPRIATE

Blended learning is appropriate for many CHWs for three reasons.

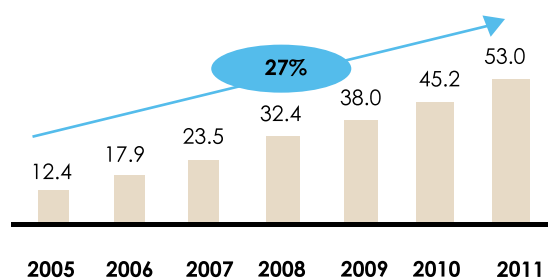
First, many CHWs, especially in remote areas, may have better access to mobile phones than to libraries, textbooks and other physical resources. As mobile phones widen their sweep and sophistication in Sub-Saharan Africa, they provide an opportunity to distribute content to people who couldn't otherwise access it. Second, blended learning allows for CHWs to do more learning on-site, with immediate opportunities for practice and feedback, critical for skill development. Third, multimedia, audio and visual content engage most learners, as described above. This is especially true for CHWs, who often have low levels of literacy and are learning skills rather than theory.

Access to mobile technology and broadband has rapidly expanded in Sub-Saharan Africa.

Per-capita mobile phone subscriptions have risen dramatically in recent years, from 12.4 in 2005 to 53 in 2011. There are some 700 million cellular connections in Africa—the number has been growing at an annual rate of 19 percent—and mobile networks cover 66 percent of the continent. Twelve percent of the market has 3G subscriptions.³⁸ The reach and capabilities of smartphones are increasing: 98 percent of the internet connections in Kenya, for example, are via smartphone.³⁹

Figure 18: Mobile cellular penetration

Mobile cellular subscriptions¹
Africa, per 100 inhabitants



Source: © INTERNATIONAL TELECOMMUNICATION UNION, 2011 Printed with permission

¹ Refers to the use of portable telephones subscribing to a public mobile telephone service and provides access to Public Switched Telephone Network (PSTN) using cellular technology. This can include analogue and digital cellular systems

Data on mobile-phone access among CHWs in Africa is scarce, and likely varies from country to country. In Uganda, 80 percent of CHWs own a mobile phone, according to the United Nations Children's Fund (UNICEF), and an additional 10 percent can access a mobile phone through their families.⁴⁰

In 2010, nine out of ten internet users in Sub-Saharan Africa accessed the internet through mobile devices.

Source: ICT Facts and Figures

Multimedia applications can engage CHWs, who often have low levels of literacy.

Whether or not they can read, most people learn better from a combination of visuals and text than from words alone.⁴¹ But multimedia content has special power for CHWs, who often may have low levels of literacy. Low-literate CHWs can easily engage with material presented visually or audibly.

Although there is no data on the literacy rates of CHWs specifically, overall literacy on the continent is 62 percent.⁴² Literacy rates in rural areas, where most CHWs live and work, are lower, implying that the CHW literacy rate is lower than 62 percent. Countries such as Nigeria and Senegal do not require CHWs to be able to read and write.

Animation and other multimedia tools are particularly popular. Firdaus Kharas at Chocolate Moose Media and the iheed Institute have described other benefits of animated videos:

- **Animation tends to resonate with audiences across cultures and contexts, in part because diverse populations can identify with “generic”-looking animated characters**
- **Animation does not necessitate on-site filming, travel, or other costs**
- **Animation allows for greater creativity in illustrating skills and conveying health messages**

- Animated characters can easily be dubbed into many languages and look like they are speaking that language
- Popularity among CHWs

Kharas' animated videos have been translated into 73 languages and shown in 100 countries.



globalhealth
MEDIA PROJECT

The Global Health Media Project
“We develop new media to reach health workers where they are,

with what they need to know, in an understandable and memorable way,” explains Global Health Media Project director Deborah Van Dyke.

The group creates videos that bring to life health care skills and concepts in a way that is both engaging and accessible. They are piloting a series of clinical videos on newborn care that demonstrate best practices for frontline health workers. The videos are filmed in the developing world, shot for the small screens of mobile devices, and voiced over to enable translation in many languages. The videos feature some animation to highlight key teaching points, rely on international standards of care, and are carefully reviewed by global content experts. They are easily scalable, open source, and provide a cost-effective solution for end-to-end training.

Global Health Media Project has also produced an award-winning animated film, *The Story of Cholera*, which was developed in response to the cholera outbreak in Haiti in 2010. This video provides health workers around the world with a teaching aid to help their communities better understand how cholera is spread and the basic steps people can take to prevent it. By making the invisible cholera germs visible, this simple animated narrative brings alive the key teaching points of cholera transmission and prevention. The film has been viewed in 150 countries and is currently being translated into several languages.

Implementers are hungry for multimedia content.

Implementers interviewed for this report expressed a desire for more multimedia content. A survey of eight major training implementers shows that CHWs consider multimedia aids more “fun” and “interactive” than conventional aids.⁴³ One CHW noted, “If you want to hide something, put it in a book.”⁴⁴ The audio and visual content enabled by technology, ranging from images to multimedia animations, can enhance engagement and retention, and gives CHWs access to visuals they could never see outside a hospital.

Multimedia, particularly mobile, provides new platforms for informal training, a vital aspect of continuing education and support.

Audio and SMS on simple phones allow CHWs to ask questions of supervisors and to tap into peer networks easily. This is a critical advantage in rural settings, which are often so isolated from cities that supervisors conduct site visits only once a year. Phones with video capabilities go further, allowing CHWs to engage with photos and videos, to provide more efficient counseling sessions, and to obtain diagnostic information.⁴⁵

In addition, new uses of technology can improve feedback and evaluation of CHWs.

According to Dr. Prabhjot Singh, Director of Systems Design at the Earth Institute and assistant professor at Columbia University's School of International and Public Affairs, mHealth developers for CHWs must improve the integration of their products to bridge the divide between training, operational functions and performance. New applications for training should be linked to CHW performance, which would allow CHWs to receive real-time feedback and adjust training or payment accordingly. Such feedback could also be used in real time to rapidly analyze large amounts of data and make management decisions. Dr. Singh notes these functionalities are actively being developed in the Millennium Villages Projects.

Into the distance: remote learning for CHWs

Under certain circumstances, distance learning can be as effective as live training, according to emerging research by Jhpiego.⁴⁶

In the future, distance learning could play an important role in CHW training for five reasons:

- Implementers could more easily reach CHWs who live in remote, difficult-to-access areas.
- By permitting CHWs to learn within their communities, distance learning could support continuity of care.
- Distance learning would obviate the burdens of travel for CHWs and reduce time spent away from household management or employment.
- CHWs could learn at a flexible pace, to refresh their knowledge in short modules, and to learn continuously.
- By relying on communications technology, it could facilitate supervisor support and peer networks.

The potential of technology to facilitate distance learning is real, but new in the context of CHW training. It faces some obstacles in Sub-Saharan Africa. Low-literate CHWs cannot learn effectively from text messages and other written materials, and smartphones that enable multimedia content are not yet widely available. Volunteer CHWs may resist distance learning because they rely on the per diems and stipends associated with travel as income.

Most implementers maintain that distance learning must be coupled with live, face-to-face training. Live training creates communities and, among CHWs, fosters a sense of integration within health systems.

COST-EFFECTIVE

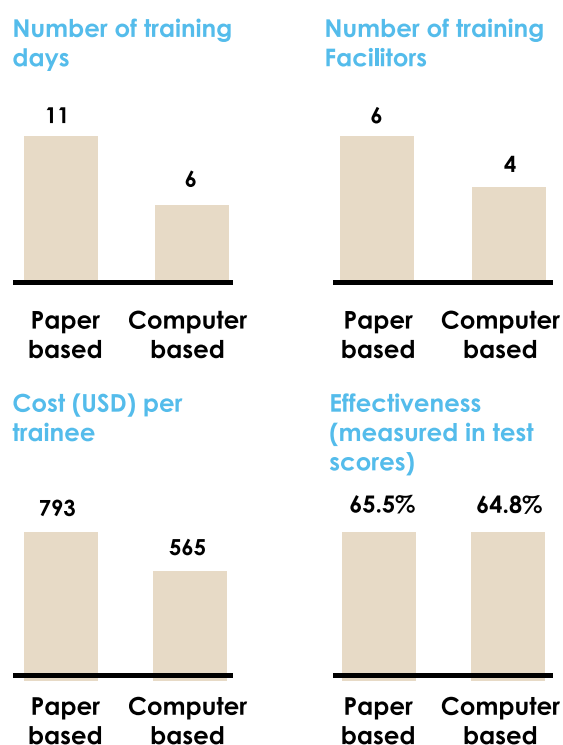
There are three potential cost advantages of using blended approaches in CHW training. First, multimedia can shorten the amount of time required to train CHWs. Second, digital content reduces the number of trainers required to teach CHWs. Third, as noted in Chapter 3, multimedia content is easier and cheaper to standardize and disseminate. Taken together, these advantages imply drastic reductions in the cost of training the one million new CHWs that Sub-Saharan Africa needs. However, further analysis must be conducted to evaluate the cost of infrastructure, equipment and program design on a country-by-country basis.

Blended approaches to training are more cost-effective than conventional approaches because they require less time and personnel.

Multiple studies show technology can reduce the time and number of health professionals needed to convey content to CHWs, thereby invoking lower overhead costs. One particularly relevant study compared the costs of a computer-based training (CBT) program on Integrated Management of Childhood Illness (IMCI) with a paper-based program. It found that CBT required fewer training days (six compared to 11), fewer facilitators (four compared to six), and lower costs than paper-based training (\$565 per trainee compared to \$793), but resulted in equivalent test scores.⁴⁷

Figure 19: Case study – evaluation of a computer-based training program in Kenya

An evaluation of an e-IMCI training proved the cost effectiveness benefits of technology based trainings



Source: Quality Assurance Project, 2006

Multimedia content can be shared widely and customized cost-effectively to local contexts.

Chapter 3 noted the potential for much more standardization and sharing of content for local customization. Multimedia content lends itself to sharing. For example, live-action instructional videos and animation can be dubbed into local languages if the content is appropriate, but creating a new video requires writing a script, writing a story board, securing an appropriate location, and shooting and editing the film—all of which entail significant amounts of time and funds. The iheed Institute argues that there is a need for thousands of training films and animations for CHWs, but just a handful exist today.

SCALABLE

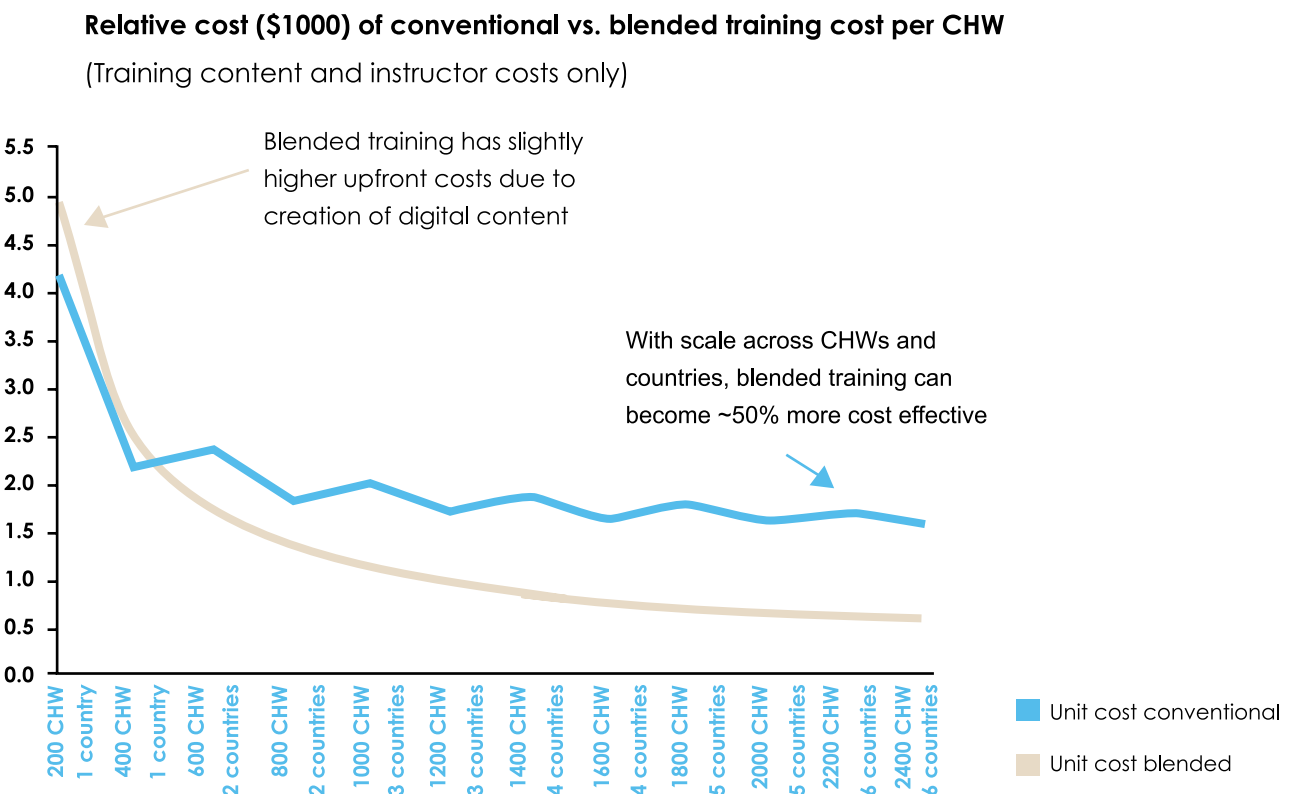
Organizations, institutions and technology experts are eager to leverage multimedia content to scale CHW training.

They cite its usefulness both for actual training and for developing and sharing training content. Organizations report that videos, animations, images and other multimedia applications are popular among CHWs, while implementers appreciate their cost effectiveness. “We use some video and plan to incorporate more. It’s cost-effective and scalable,” says Molly Christiansen, of Living Goods, which trains CHWs in Uganda. “And if there were an open content repository [with multimedia training materials], we would use it.”

Blended approaches could facilitate the achievement of scale.

Demand-driven, digital content used in blended approaches can be widely shared and integrated into pre-service, in-service and informal training. As programs achieve scale, blended learning could permit dramatic savings. The model below, developed for this study, explains how.

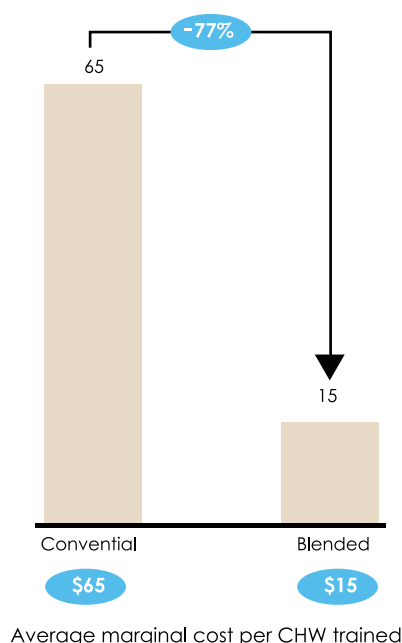
Figure 20: Scaling blended learning is cost effective and can save millions of dollars⁴⁸



Note: Estimates are based on scale across volume of countries and CHWs.”

Figure 21: Scaling blended learning is cost effective and can save millions of dollars⁴⁸

Potential cost (\$M) of training an estimated 1 million additional CHWs needed in Africa
(Training content and instructor costs only)



Blended learning entails higher upfront costs than conventional training, because it requires the creation of digital content. But it costs much less to adapt blended learning materials to new countries. Over time, as training programs reach more CHWs in more countries, the average marginal cost of blended programs decreases dramatically, even when accounting for the costs of local customization. With scale, blended training can be 50 percent more cost-effective than conventional training. Up-front initial costs could be overcome by innovative approaches such as crowd sourcing programs from global digital designers.

Sub-Saharan Africa has an estimated shortage of one million CHWs. The broad deployment of technology-based blended approaches could achieve dramatic savings in training them. The model above suggests that conventional training of the new CHWs would cost \$65 million (excluding the cost of printing and supplies). In comparison, a blended training program would cost \$15 million (excluding the cost of technological equipment, supplies, and ongoing maintenance/repair)—less than a quarter of the cost of conventional content and instruction.

The model relies on a battery of assumptions, derived from research, that are explained in detail in the Annex. It includes only the costs of content development and required trainers, not the costs of equipment, technological devices and printing. Based on interviews and literature research, it posits that the upfront cost of conventional program development is about 20 percent less than the cost of developing a blended learning program; and that the cost of transferring conventional training to other countries is four times the cost of transferring blended training. The model further assumes that conventional curricula are developed from the ground-up 50 percent of the time, and scaled at a low cost 50 percent of the time, while blended curricula is always scaled to other countries.

Multiple costs associated with conventional and blended training are not factored into this model, and should be analyzed on a country-by-country basis. These include:

- **Cost of equipment and repairs**
- **Type and cost of technology used (computers, smartphones, simple phones)**
- **Cost and importance of training trainers**
- **Per diem and stipend for training**
- **Materials, printing, and other variable costs**

To further realize, replicate and scale up the use of mHealth and blended approaches, some challenges must be addressed.

Although technology has spread rapidly throughout Sub-Saharan Africa, countries may not yet have the human resources, funds or broadband infrastructure to support sophisticated mHealth applications, such as those that require smartphones or 3G. Illiteracy may constrain CHWs' ability to use technology with electronic text, as may gender: Some female CHWs have access to cell phones only through their husbands.

Many African countries recognize the great potential of Information and Communication Technology (ICT) for a range of development initiatives, including improving public health. Most have adopted national ICT policies or plans.⁴⁹ Ensuring the security of health data and addressing privacy concerns should also be an area of focus. Countries may have different protocols that make data-sharing difficult.

Businesses and NGOs have a role to play in overcoming these challenges. As the penetration of mobile phones, internet and technology expands in Sub-Saharan Africa, there is a growing opportunity for businesses to tap into this growth. Advocacy and support for better physical and policy infrastructure could enable the deployment of more sophisticated applications. More than 40 percent of the Sub-Saharan African population is still not covered by mobile cellular networks,⁵⁰ and although two billion people around the world use the internet, only 9.6 percent of Africans use the internet.⁵¹

CHAPTER 5:

OPPORTUNITY FOR DISRUPTIVE INNOVATION

Current approaches to CHW training are ripe for disruption.

As this report outlines, a number of strong currents are shaping CHW training in Sub-Saharan Africa. They include increasing focus on CHWs to address child and maternal mortality; expanding use of mobile technology; inefficiencies within current approaches to CHW training; and emerging evidence on the value of blended training that uses multimedia and digital content. These shifts create urgency and opportunity, and could lead to transformative training and teaching that better leverages blended approaches.

Beyond the benefits of effectiveness, appropriateness and cost efficiency, blended approaches to training create an important byproduct: digital content.

While there is limited digital content for training CHWs, there is demand for more of it and for platforms that facilitate sharing.

Both implementers and ICT experts alike are keen on the possibility of content repositories that would allow content to be collaboratively developed and openly shared—and some are already working on them.

“In South Africa, we are building a mobile network library [with electronic text] to be shared,” reports Berhane Gebru, director of programs at FHI 360 SATELLIFE Center. “While localization is important, the system can be used in other countries.” A representative from another NGO agrees: “Across Sub-Saharan Africa, and in other regions, there is a huge opportunity to roll out [new content] broadly. We want our content to be freely accessible.” A non-profit technology provider explains their ambitious goals for the use of ICT in CHW training: “We want to provide CHWs with multimedia training upfront, a phone and decision support, and ongoing training and monitoring—an end-to-end solution.”

Greater access to digital content could fuel innovation and the creation of new models.

There are a number of recent examples of homegrown, African innovations, such as M-PESA, a mobile money platform that transformed financial services and expanded financial inclusion in Kenya, and Ushahidi, an open source tool that can be used to mobilize citizens and drive accountability, as evidenced in post-election Kenya and post-earthquake Haiti. If inspired by the unmet needs of CHWs and the availability of digital content, the same types of innovation and entrepreneurship could fuel further disruption, bringing to market new models to train and support CHWs.

New technology is quickly adopted and appropriated across African countries.

Facebook’s penetration in Africa grew by nearly 50 percent in one year, from 27 million users in March 2011 to 40 million users in March 2012,⁵² and Skype is available in 29 languages and is used in almost every country around the world,⁵³ with annualized growth in the Europe, Middle East, and Africa region of 40 percent from 2007 to 2009.⁵⁴ In addition to these statistics, the power of social networks is being applied to health professionals support and learning in Africa, such as the OneTouch physician-focused network established in Ghana.⁵⁵ The platforms for interaction created by mobile phones and the internet could revolutionize many areas of global health, including the training of CHWs.

THE DIGITAL LEARNING EXPLOSION

Digital learning has gained great momentum and influential proponents, and as the trend accelerates, it could have great effect in the developing world. President Hennessey of Stanford University believes “online learning can be as revolutionary to education as digital downloads were to the music business.”⁵⁶ This past fall, Stanford introduced three, free online engineering lectures used by students in 190 countries. Organizations such as the Washington Post’s Kaplan University, the New York Times Knowledge Network, and Khan Academy are all leveraging digital content for online learning, and the programs are noticed in the developing world. Khan Academy, which broadcasts basic education videos over YouTube, has more than 2 million users per month in more than 20 countries.⁵⁷

CONCLUSION

The moment is now. **The rapid spread of technology in the developing world has opened up exciting opportunities to help millions of people lead longer, healthier lives.** Deploying technology in the training of community health workers could lead to a dramatic expansion in the numbers and effectiveness of these frontline health providers. Sub-Saharan Africa needs such a dramatic expansion in CHWs to meet its pressing health needs, and technology could truly revolutionize their training.

Harnessing the power of technology for community health workers will require multiple stakeholders to invest their time, attention, and other resources in six broad areas:

- Creation of digital content, in line with CHW needs
- Greater collaboration in content creation and training implementation
- Experimentation with blended learning models and recommended pedagogies
- Evaluation of blending training models
- Innovation that supports continuous learning
- Advocacy and support for enabling environments

Create digital content for training of CHWs:

Training approaches that incorporate elements such as multimedia and animation have proven tremendously popular and effective with CHWs. Implementers and trainees express a great desire for better digital training materials. Digital content must begin with the needs and demands of CHWs and the populations they serve. By building digital training aligned with CHW needs, and building it in a transferable way, stakeholders will improve the efficacy of training content and interventions.

Share and collaborate on content:

The present structure of financing for CHW training programs does not encourage collaboration or sharing, contributing to duplication of efforts and waste. Against this backdrop, content developers and other stakeholders must redouble their efforts to collaborate. They should ensure their platforms facilitate the sharing of knowledge, tools and content. Funders who commission content, meanwhile, should mandate that it is open and sharable.

Recognizing the need for global collaboration in CHW training, the mHealth Alliance is launching a Content Library that will serve as a central platform for CHW mHealth training materials, tools and studies. Implementers will be able to access a wide variety of existing training materials and tools, and to contribute their own to the library. The library will be housed on Health Unbound (HUB) and will launch in May 2012.

iheed will be launching its first crowd-sourced competition in May 2012 for digital, animated content to demonstrate the potential for scalable, effective content. The content will be tailored to the unique needs of CHWs through demand-driven pathways, and geared for global distribution through many channels, including the HUB Content Library.

Experiment with blended learning approaches and recommended pedagogies:

Given the emerging evidence on the use of blended approaches to learning which enable the most effective pedagogies, there is a need for more experimentation in CHW contexts. This could build upon the work being done by many governments, NGO implementers, and mHealth developers to integrate blended learning into their current efforts, and to incorporate greater use of multimedia applications. Leveraging recommended pedagogies, such as interactive learning, more fully in training also presents an opportunity to improve efficacy. All stakeholders should exploit the possibilities of public-private partnerships.

Evaluate blended approaches and the use of technology in training:

Robust evaluation must accompany experimentation, not just to gauge effectiveness and opportunities, but also because hard evidence can convince otherwise reluctant donors and funders to invest in scaling up. There is ample room for improvement in the development of metrics, which should evaluate training programs “end-to-end,” instead of focusing on discrete interventions, such as the effectiveness of SMS reminders. Additionally, as digital content is crowd-sourced via digital designers, this approach should be evaluated to assess its costs, benefits and potential appropriateness for other areas in the development sector.

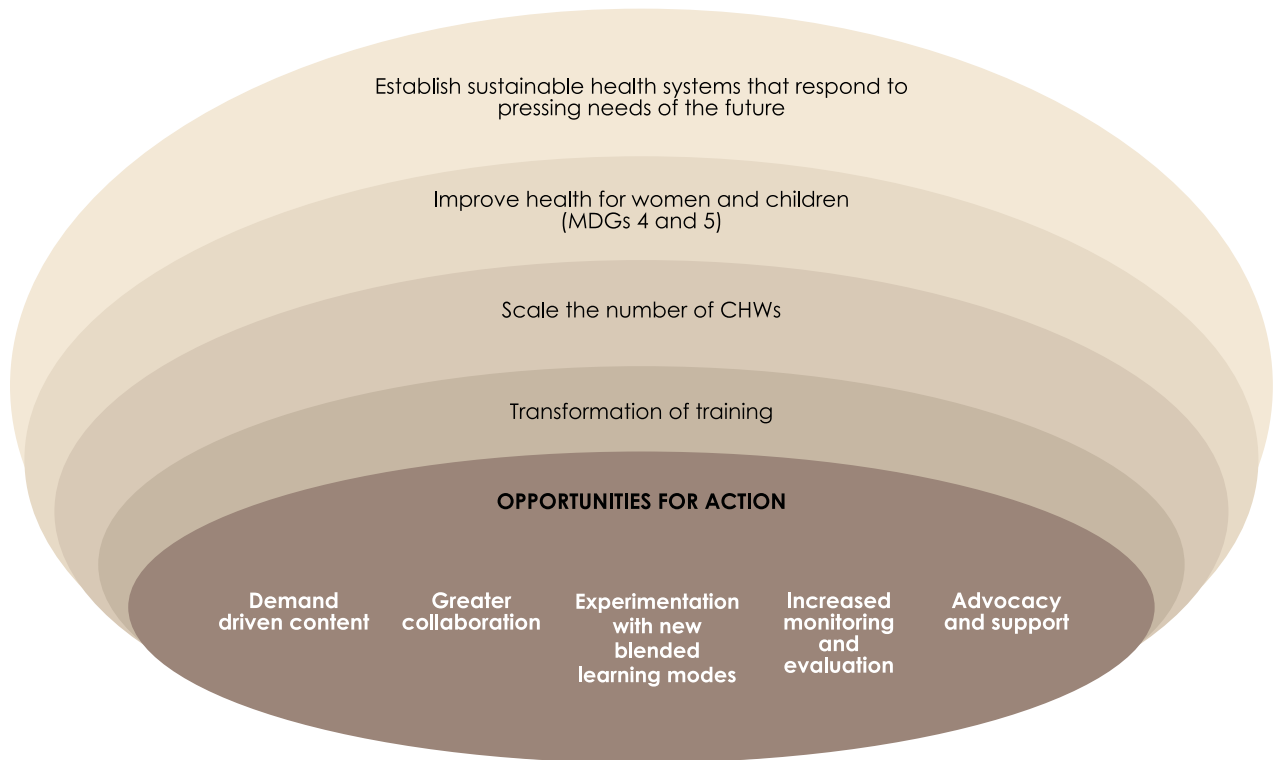
Innovate to support continuous learning:

The widening sweep of mobile technology and increasing volume of digital content should inspire innovators to create new models to support informal CHW learning. Impact investors should work with entrepreneurs to seed novel solutions, which could provide CHWs products and services they need for ongoing learning and skills improvement. For example, cutting-edge applications like gaming, which target CHWs, could be an enormous business opportunity for social entrepreneurs and commercial enterprises, but they have not been significantly explored.

Advocate and support enabling environments:

Recognizing that CHWs are part of a complex ecosystem, there is the need for additional advocacy and investment to support factors which contribute to CHW effectiveness, including but not limited to supervision, remuneration, recognition, linkages to facilities, and access to supplies. Similarly, despite the rapid spread of technology throughout Sub-Saharan Africa, poor infrastructure continues to impede progress. Implementers, policymakers, funders, and other stakeholders should continue to advocate for and support environmental enablers. Better physical infrastructure would increase access to technology and speed the deployment of powerful technological applications. Although many countries in Sub-Saharan Africa have ICT policies and plans, there is a need to carefully consider legal and regulatory systems—especially with regards to the security of sensitive health data. Additionally, there is an ongoing need for greater alignment on and adoption of standards to enable greater integration of data and interoperability across mobile applications.

Global opportunity



Deploying technology for CHWs could transform the landscape of health in developing countries. By improving training effectiveness and allowing low-cost scaling of successful programs, technology could dramatically expand the number of CHWs in Sub-Saharan Africa. And innovation could retool the training landscape in ways we can't yet fathom. In turn, more and better-trained CHWs could help countries make dramatic gains in child and maternal health—and lead to the establishment of sustainable health systems that respond to the pressing needs of the future.

ANNEX

Assumptions for Figure 20: Cost effectiveness of scaling blended learning

Assumptions and sources:

- Initial cost
 - Development cost of conventional training is \$0.85M (Expert interviews, 2012)
 - Development cost of blended training is \$1.0M (Expert interviews, 2012)
- Adoption cost (per country)
 - Adaptation cost of conventional training is \$300,000 (Expert interviews, 2012)
 - Adaptation cost of blended training is \$75,000 (Expert interviews, 2012)
- Training cost (per CHW)
 - Conventional training cost of 50 CHWs is \$1,980:**
 - Cost of one trainer per day: \$30 (Singh et al., 2011, Dalberg analysis)
 - Number of days per training: 11 (Quality assurance project, 2006)
 - Number of trainers per training: 6 (Quality assurance project, 2006)
 - Cost of flipcharts, booklets and other materials not included
 - Blended training cost of 50 CHWs is \$600
 - Cost of one trainer per day: \$25 (Singh et al., 2011, Dalberg analysis)
 - Number of days per training: 8 (Quality assurance project, 2006, Dalberg analysis)
 - Number of trainers per training: 3 (Quality assurance project, 2006, Dalberg analysis)
 - Cost of equipment not included as CHWs will leverage existing mobile phones and devices
- Scale up
 - Assume scale to 41 countries with at least 200 CHWs per country (Singh et al., 2011)
 - Conventional training transferred in 50% of countries (Expert interviews, 2012)
 - Blended training transferred in 100% of countries (Expert interviews, 2012)

Expert Interviews, conducted March – April 2012

- Kaosar Afsana, Program Coordinator, BRAC
- Ann Band, Manager and Health coordinator, World Vision International
- Dr. Heli Bathija, Area Manager for the African and Eastern Mediterranean Regions, Department of Reproductive Health and Research, World Health Organization
- Sean Blaschke, Uganda, Alive Program, UNICEF
- Julia Bluestone, Sr. Technical Advisor, Global Learning Office, Jhpiego
- Bob Bollinger, PHD; Henry Perry, Senior Associate, PHD, MD, MPH, Johns Hopkins University International Health Department
- James BonTempo, Thought Leader, ICT4D, Jhpiego
- Peter Breitenbach, Business Development Manager: Africa, mHealth solutions, Vodafone
- Sara Chamberlain, Head of ICT, BBC Media Action
- Francis Chimpangu, Manager and Health coordinator, World Vision
- Molly Christiansen, Director, Research & Development, Living Goods
- Priyanka Dutt, Project Director, Shaping Demand and Practice, BBC Media Action
- Paul Ellingstad, Global Health Director, Hewlett Packard
- Robert Fabricant, Healthcare, Frog Design
- Mary Francia, Head of Marketing, Strategy & Communications, Alcatel Lucent
- Diana Frymus, Health Systems Strengthening Advisor, USAID
- Berhane Gebru, Director of Programs, FHI 360 Satelife Center
- Jill Hackett, Director of Training, Partners in Health
- Martin Harris , Program Director, GSMA
- Zena Herman, Content Development, Hesperian Health Guides
- Jonathan Jackson, CEO and Neal Lesh, Chief of Strategy, Dimagi-CommCare
- Peter Johnson, Director of Global Learning, Jhpiego

- Nadi Kaonga, Research and Evaluation Coordinator for eHealth Program, Millennium Villages Project
- Firdaus Kharas, Founder, Chocolate Moose Media
- Anne Liu, Health Systems Manager for eHealth Program, Millennium Villages Project
- Lesley-Anne Long, Deputy director of the OU's International Development Office, HEAT (Open University)
- David Marsh, Senior Child Survivor Advisor, Save the Children
- Caroline Mbindyo, eLearning Programme Manager, AMREF
- Marc Mitchell, President, D-tree International
- Jacqueline Moller-Larsen, Ghana Country Director, Grameen Foundation
- Ruth Mutua, Ministry of Public Health, Kenya
- Dr. Muhammed Pate, State Minister of Health, Nigerian Government
- Charmaine Pattinson, Director of Human Resources for Health, Clinton Health Access Initiative
- Jonathan Payne, Maternal Concept Lab, Partners in Health
- Estelle Quain, Senior Technical Advisor for Human Resources for Health, US Government (USAID)
- Sandhya Rao, Senior Advisor for Private Sector Partnerships, USAID Bureau of Global Health (Global)
- Melitta Remington, Global Manager, Health Care, Intel
- Sarah Sanders, Vodafone Group, Vodafone
- Benjamin Schwartz, Training and Operations, CARE
- Barbara Stilwell, Director of Technical Leadership, IntraHealth
- Mary Taylor, Senior Program Officer, the Bill & Melinda Gates Foundation
- Margaret Usher, Scientist/IBP Secretariat WHO/RHR (retired June 2011), World Health Organization
- Deborah Van Dyke, Director, Global Health Media Project
- Aliya Walji, Chief Operating Officer, Jacaranda Healthcare

Bibliography

- Auletta, Ken, "Annals of Higher Education: Get Rich U." The New Yorker, April 30, 2012
- Bernard, Robert M., Abrami, Philip C., Lou, Yiping, Borokhovsk, Evgueni, Wade, Anne, Wozney, Lori, Walset, Peter Andrew, Fiset, Manon, Huang, Binru, "How Does Distance Education Compare with Classroom Instruction? A Meta-Analysis of the Empirical Literature," American Educational Research Association, 2004
- Bhutta, Zulfiqar, Lassi, Zohra, Pariyo George and Huicho, Luis, "Global experience of CHWs for delivery of health related MDGs," GHWA, WHO, 2010
- Bloom, BS, "Effects of continuing medical education on improving physician clinical care and patient health: a review of systematic reviews," International Journal of Technology Assessment in Health Care, 2005
- Bloomfield, J, Roberts J, While A, "The effect of computer-assisted learning versus conventional teaching methods on the acquisition and retention of handwashing theory and skills in prequalification nursing students: a randomized controlled trial," International Journal of Nursing Studies, 2010
- Bruppacher HR, Alam SK, LeBlanc VR, Latter D, Naik VN, Savoldelli GL, Mazer CD, Kurrek MM, Joo HS, "Simulation-based training improves physicians' performance in patient care in high-stakes clinical setting of cardiac surgery", Anesthesiology, 2010
- Chetley, Andrew, "Improving Health, Connecting People: The Role of ICTs in the Health Sector of Developing Countries," InfoDev 2007
- Choa M, Park I, Chung HS, Yoo SK, Shim H, Kim S, "The effectiveness of cardiopulmonary resuscitation instruction: animation versus dispatcher through a cellular phone," Resuscitation, 2008
- Conway, Michael D, Gupta, Srishti, and Khajavi, Kamiar, "Addressing Africa's health workforce crisis," McKinsey Quarterly, November 2007
- "CommCare HQ," Date accessed: April 2012, <http://www.commcarehq.org/plans/>
- Darmstadt, Gary L, Bhutta, Zulfiqar A, Cousens, Simon, Adam, Taghreed, Walker, Neff and De Bernis, Luc, "Evidence-based, cost-effective interventions: how many newborn babies can we save?" The Lancet, 2005
- De Lorenzo, Robert A and Abbott, Cynthia A, "Effectiveness of an adult-learning, self-directed model compared with traditional lecture-based teaching methods in out-of-hospital training', Academic Emergency Medicine, 2004
- Florez-Arango, Jose F, Iyengar, M Sriram, Dunn, Kim, Zhang, Jiajie, "Performance factors of mobile rich media job aids for community health workers," Journal of the American Medical Informatics Association, 2011
- "Frontline health workers coalition," Date accessed: April 2012, <http://frontlinehealthworkers.org/>

- Gilroy, Kate and Winch, Peter, "Management of Sick Children by Community Health Workers: Intervention Models and Programme Examples," UNICEF, WHO, 2006
- Hadi, Abdullahel, "Management of acute respiratory infections by community health volunteers: experience of Bangladesh Rural Advancement Committee (BRAC)," WHO, 2003
- Hadley J, Kulier R, Zamora J, Coppus SF, Weinbrenner S, Meyerrose B, Decsi T, Horvath AR, Nagy E, Emparanza JI, Arvanitis TN, Burls A, Cabello JB, Kaczor M, Zanrei G, Pierer K, Kunz R, Wilkie V, Wall D, Mol BW, Khan KS, "Effectiveness of an e-learning course in evidence-based medicine for foundation (internship) training," Journal of the Royal Society of Medicine, 2010
- Harrington, S.S. and Walker, B.L., "The effects of computer-based training on immediate and residual learning of nursing facility staff," The Journal of Continuing Education in Nursing, 2004
- Hash, "Infographic: Kenya Mobile Subscribers, Penetration & Internet," 2011, <http://whiteafrican.com/2011/09/27/infographic-mobile-subscribers-penetration-internet/>
- Iheed Institute and Dalberg Global Development Advisors, "mHealth Education: Harnessing the Mobile Revolution to Bridge the Health Education and Training Gap in Developing Countries," June 2011
- "iHub Research," Date accessed: April 2012, <http://www.ihub.co.ke/blog/wp-content/uploads/2011/09/R@iHub-Infographic-Converted.png>
- ICT Facts and Figures, "The World in 2010"
- "International Telecommunication Union," Date accessed: April 2012, <http://www.itu.int/ITU-D/icteye/>
- International Telecommunication Union (ITU), "The World in 2010," Telecommunication Development Bureau, International Telecommunication Union, 2010
- Jhpiego, "In-Service Training Techniques, Timing, Setting and Media: Findings from a Systematic Review of the Literature," Jhpiego Corporation, Baltimore, MD: 2012
- Kerfoot BP, "Learning benefits of online spaced education persist for two years," The Journal of Urology, 2009
- Kerfoot BP, DeWolf WC, Masser BA, Church PA, Federman DD, "Spaced education improves the retention of clinical knowledge by medical students: randomized controlled trial," Medical Education, 2007
- Kerfoot BP, Kearney MC, Connelly D, Ritchey ML, "Interactive spaced education to assess and improve knowledge of clinical practice guidelines: a randomized controlled trial," Annals of Surgery, 2009
- Landis Lewis Z, Mello-Thoms C, Gadabu OJ, Gillespie EM, Douglas GP, Crowley RS, "The feasibility of automating audit and feedback for ART guideline adherence in Malawi," Journal of the American Medical Informatics Association, 2011

- Lehmann, Uta and Sanders, David, "Community health workers: What do we know about them? The state of the evidence on programmes, activities, costs and impact on health outcomes of using community health workers," WHO, 2007
- Lesh, Neal and Treatman, Derek, "Strengthening community health systems with localized multimedia," Dimagi, 2011
- Leung, Gabriel M, Johnston, Janice M, Tin, Keith Y K, Wong, Irene O L, Ho, Lai-Ming, Lam, Wendy W T and Lam, Tai-Hing, "Randomized controlled trial of clinical decision support tools to improve learning of evidence based medicine in medical students," BMJ, 2003
- Lewin SA, Babigumira SM, Bosch-Capblanch X, Aja G, van Wyk B, Glenton C, Scheel I, Zwarenstein M, Daniels K, "Lay health workers in primary and community health care: A systematic review of trials," NORAD, 2006
- McCann, David, "A Ugandan mHealth Moratorium Is a Good Thing," ICT Works, 2012
- Marinopoulos SS, Dorman T, Ratanawongsa N, Wilson LM, Ashar BH, Magaziner JL, Miller RG, Thomas PA, Prokopowicz GP, Qayyum R, Bass EB, "Effectiveness of Continuing Medical Education. Evidence Report/Technology Assessment" No. 149 (Prepared by the Johns Hopkins Evidence-based Practice Center, under Contract No. 290-02-0018.) AHRQ Publication No. 07-E006. Rockville, MD: Agency for Healthcare Research and Quality. January 2007
- Mayer, Richard, "Applying the science of learning to medical education," Department of Psychology, University of California, Santa Barbara, 2010
- Quality Assurance Project, "Evaluation of an IMCI Computer-based Training Course in Kenya. Operations Research Results', Published for the U.S. Agency for International Development (USAID) by the Quality Assurance Project (QAP), 2006
- Ravishankar, Nirmala, Gubbins, Paul, Cooley, Rebecca J, Leach-Kemon, Katherine, Michaud, Catherine M, Jamison, Dean T, Murray, Christopher JL, "Financing of global health: tracking development assistance for health from 1990 to 2007," The Lancet, 2009
- Rosenberg, Tina, "What Makes Community Health Care Work?" 2011, <http://opinionator.blogs.nytimes.com/2011/02/18/what-makes-community-health-care-work/>
- Rowe, Alexander K., Rowe, Samantha Y., Vujicic, Marko, Ross-Degnan, Dennis, Chalker, John, Holloway, Kathleen A. and Peters, David H., "Review of Strategies to Improve Health Care Provider Performance," World Bank, 2009
- Sharp, Imogen, "Scaling up, saving lives," GHWA, WHO, 2008
- Singh, Prabhjot, "One Million Community Health Workers", New York: The Earth Institute, Columbia University, 2011 Skype Form S-1/A, United States Securities and Exchange Commission, March 2011
- Sylla A, Sarr CS, Gueye EH, Ndiaye D, Sall MG, Kuakuvi N, "Assessment of management training for low-level community health workers providing care for children with acute respiratory infections in four districts of Senegal," Revue d'Épidémiologie et de Santé Publique, 2004

- “The World Bank,” Date accessed: April 2012, <http://data.worldbank.org/indicator>
- Triola M, Feldman H, Kalet AL, Zabar S, Kachur EK, Gillespie C, Anderson M, Griesser C and Lipkin M, “A Randomized Trial of Teaching Clinical Skills Using Virtual and Live Standardized Patients,” *The Journal of General Internal Medicine*, 2006
- U.S. Department of Education, Office of Planning, Evaluation, and Policy Development, “Evaluation of Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies,” Washington, D.C., 2010
- Vujcic, Marko, Weber, Stephanie E, Nikolic, Irina A, Atun, Rifat and Kumar, Ranjana, “GAVI, The Global Fund and World Bank support for human resources for health in developing countries,” *The World Bank*, 2011
- Winch PJ, Bagayoko A, Diawara A, Kané M, Thiéro F, Gilroy K, Daou Z, Berthé Z, Swedberg E, “Increases in Correct Administration of Chloroquine in the Home and Referral of Sick Children to Health Facilities Through a Community-Based Intervention in Bougouni District, Mali,” *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 2003
- World Bank, “The Little Data Book on Information and Communication Technology,” 2011
- World Bank, UNICEF, UNFPA & PMNCH, “Health Systems for the Millennium Development Goals: Country Needs and Financing Gaps: Background document for the Taskforce on Innovative International Financing for Health Systems Working Group 1: Constraints to Scaling Up and Costs,” Final Draft, 2009
- World Vision International, “Who’s counting? 9.2 million children – the cost of inaction on child health,” 2009
- Zurovac D, Rowe AK, Ochola SA, Noor AM, Midia B, English M and Snow RW, “Predictors of the quality of health worker treatment practices for uncomplicated malaria at government health facilities in Kenya,” *International Journal of Epidemiology*, 2004
- Zurovac D, Sudoi RK, Akhwale WS, Ndiritu M, Hamer DH, Rowe AK, Snow RW, “The effect of mobile phone text-message reminders on Kenyan health workers’ adherence to malaria treatment guidelines: a cluster randomized trial,” *Lancet*, 2011

Endnotes

- ¹ Excludes United States Government's (USGs) PEPFAR which has supported multiple interviewed organizations in training
- ² World Health Organization, 2010
- ³ WHO, 2010, Global Health Workforce Alliance
- ⁴ Michael D. Conway, Srishti Gupta, and Kamiar Khajavi, "Addressing Africa's health workforce crisis," McKinsey Quarterly, 2007
- ⁵ Earth Institute, 2011
- ⁶ WHO Human Resources for Health
- ⁷ Action for Global Health, 2010
- ⁸ World Bank, UNICEF, UNFPA & PMNCH, Health Systems for the Millennium Development Goals: Country Needs and Financing Gaps: Background document for the Taskforce on Innovative International Financing for Health Systems Working Group 1: Constraints to Scaling Up and Costs, Final Draft (Oct. 2009), at 70-71
- ⁹ Based on the number of CHWs per capita in Ethiopia, Malawi, Nigeria, and Rwanda, there are approximately 500,000 CHWs in Sub Saharan Africa today. Estimations from expert interviews confirm this estimation
- ¹⁰ Singh, Prabhjot, "One Million Community Health Workers", New York: The Earth Institute, Columbia University, 2011
- ¹¹ Iheed Institute, 2012
- ¹² <http://frontlinehealthworkers.org/>
- ¹³ <http://opinionator.blogs.nytimes.com/2011/02/18/what-makes-community-health-care-work/>
- ¹⁴ Alexander K. Rowe, Samantha Y. Rowe, Marko, Vujicic, Dennis Ross-Degnan, John Chalker, Kathleen A. Holloway, and David H. Peters, Review of Strategies to Improve Health Care Provider Performance, World Bank, 2009
- ¹⁵ Uta Lehmann and David Sanders, "Community health workers: What do we know about them? The state of the evidence on programmes, activities, costs and impact on health outcomes of using community health workers", WHO, 2007. (Citing Ashwell & Freeman 1995)
- ¹⁶ Live interview, April 2012. Robert Fabricant, FrogDesign
- ¹⁷ Singh, Prabhjot, "One Million Community Health Workers", New York: The Earth Institute, Columbia University, 2011; Bhutta, Lassi, Pariyo and Huicho, "Global Experience of Community Health Workers for Delivery of Health Related Millennium Development Goals", GHWA, 2010
- ¹⁸ The Lancet, Vol. 373 Issue 9681. "Financing of global health: tracking development assistance for health from 1990 to 2007." June 2009
- ¹⁹ World Vision International, "Who's counting? 9.2 million children – the cost of inaction on child health," 2009. Figure over one year time span in 2006
- ²⁰ World Vision "Health Care Workers," Dec. 2011
- ²¹ Expert interview, April 2012
- ²² Marko Vujicic, Stephanie E. Weber, Irina A. Nikolic, Rifat Atun and Ranjana Kumar, "GAVI, The Global Fund and World Bank support for human resources for health in developing countries", The World Bank, 2011
- ²³ "Zambia's National Community Health Worker Strategy", <http://www.who.int/workforcealliance/forum/2011/hrhawardscs29/en/index.html>, Date accessed: April, 2012
- ²⁴ Jhpiego. "In-Service Training Techniques, Timing, Setting and Media: Findings from a Systematic Review of the Literature", Jhpiego Corporation, Baltimore, MD: 2012
- ²⁵ Jhpiego's literature review covered 69 studies published in the English language between 2010 and 2011 and focused on health worker education
- ²⁶ Jhpiego. "In-Service Training Techniques, Timing, Setting and Media: Findings from a Systematic Review of the Literature", Jhpiego Corporation, Baltimore, MD: 2012
- ²⁷ Expert interviews, March – April 2012
- ²⁸ Expert interviews, March – April 2012
- ²⁹ Expert interviews, March – April 2012
- ³⁰ Expert interviews, March – April 2012
- ³¹ Expert interviews, conducted March – April 2012. Includes translation, other cultural adaptation, revising images, layout, printing (for paper based) and distribution
- ³² <http://www.commcarehq.org/plans/>
- ³³ Jhpiego, "In-Service Training Techniques, Timing, Setting and Media: Findings from a Systematic Review of the Literature", Jhpiego Corporation, Baltimore, MD: 2012

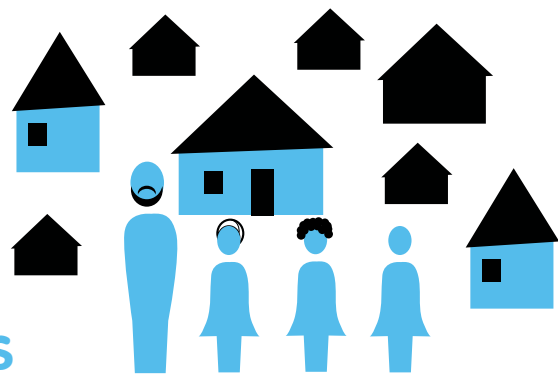
- ³⁴ Triola M, Feldman H, Kalet AL, Zabar S, Kachur EK, Gillespie C, Anderson M, Griesser C and Lipkin M, "A Randomized Trial of Teaching Clinical Skills Using Virtual and Live Standardized Patients," *The Journal of General Internal Medicine*, 2006
- ³⁵ Bloomfield J, Roberts J, While A, "The effect of computer-assisted learning versus conventional teaching methods on the acquisition and retention of handwashing theory and skills in pre-qualification nursing students: a randomized controlled trial", *International Journal of nursing studies*, 2010
- ³⁶ Marinopoulos SS, Dorman T, Ratanawongsa N, Wilson LM, Ashar BH, Magaziner JL, Miller RG, Thomas PA, Prokopowicz GP, Qayyum R, Bass EB, "Effectiveness of Continuing Medical Education. Evidence Report/Technology Assessment" No. 149 (Prepared by the Johns Hopkins Evidence-based Practice Center, under Contract No. 290-02-0018.) AHRQ Publication No. 07-E006. Rockville, MD: Agency for Healthcare Research and Quality. January 2007
- ³⁷ Lesh, Neal and Treatman, Derek, "Strengthening community health systems with localized multimedia", Dimagi, 2011
- ³⁸ Wireless intelligence dashboard, Q1, 2012
- ³⁹ iHub Mobile. <http://www.ihub.co.ke/blog/wp-content/uploads/2011/09/R@iHub-Infographic-Converted.png>
- ⁴⁰ Sean Blaschke, UNICEF, Uganda Alive Program. Live Interview March 2012
- ⁴¹ Mayer, Richard, "Applying the science of learning to medical education", Department of Psychology, University of California, Santa Barbara, 2010
- ⁴² World Bank, 2009 Data. <http://data.worldbank.org/indicator>
- ⁴³ Lesh, Neal and Treatman, Derek, "Strengthening community health systems with localized multimedia", Dimagi, 2011
- ⁴⁴ Focus group in Rural Rwanda, 2010. Provided by iheed Institute
- ⁴⁵ Lesh, Neal and Treatman, Derek, "Strengthening community health systems with localized multimedia", Dimagi, 2011
- ⁴⁶ Jhpiego. "In-Service Training Techniques, Timing, Setting and Media: Findings from a Systematic Review of the Literature", Jhpiego Corporation, Baltimore, MD: 2012
- ⁴⁷ Quality Assurance Project, "Evaluation of an IMCI Computer-based Training Course in Kenya. Operations Research Results", Published for the U.S. Agency for International Development (USAID) by the Quality Assurance Project (QAP), 2006
- ⁴⁸ Figure based on literature review, expert interviews and Dalberg analysis
- ⁴⁹ <http://www.itu.int/ITU-D/icteye/>; ITU World Telecommunication Regulatory Database. Exceptions are Benin, Cape Verde, DRC, Equatorial Guinea, Lesotho, Mali, Seychelles, Swaziland, Togo, Zambia
- ⁵⁰ World Bank, The Little Data Book on Information and Communication Technology 2011
- ⁵¹ ICT Facts and Figures, "The World in 2010"
- ⁵² Internet World Usage and Population Statistics, "Facebook Usage and Facebook Growth Statistics By World Geographic Regions." March 31, 2012
- ⁵³ Malik, Om, "Skype By the Numbers," April 2010
- ⁵⁴ Skype website, 2011
- ⁵⁵ When a Doctor is Just a Cell Phone Call Away. www.mobileactive.org, accessed May 7, 2012.
- ⁵⁶ Auletta, Ken. "Annals of Higher Education: Get Rich U." *The New Yorker*, April 30, 2012
- ⁵⁷ KhanAcademy.org



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