

One Million Community Health Workers

TECHNICAL TASK FORCE REPORT



THE EARTH INSTITUTE
COLUMBIA UNIVERSITY

Table of Contents

Forward	2
Acknowledgements	4
List of Acronyms and Abbreviations	5
Executive Summary	6
Community Health Worker Systems at National Scale: Why Now?	9
Primary Health Care Integration: CHWs in Context	19
Operational Design Considerations for CHW Systems at National Scale	25
Estimated Financing Needs	51
National Planning, Deployment and Training	63
Closing the Gap: National Policy Landscape and Next Steps	77
<hr/>	
Appendices	89
Appendix A: Evidence Base for Community Health Interventions in Child, Newborn and Maternal Care	90
Appendix B: Mobile Health Technologies to Support Community Health System Impact	93
Appendix C: Local Implementation Landscape, MVP CHW Program Operational Status	97
<hr/>	
List of Boxes	
Box 1: Brazil Family Health Programme: Large-Scale Success Model for Primary Health Care Integration	22
Box 2: Community Case Management	29
Box 3: The Role of CHWs in Control of HIV	30
Box 4: New Evidence and Policy, Community Case Management of Pneumonia	33
Box 5: Nepal's Community Health Workers: A Successful Mixed Paid and Volunteer Model	42
Box 6: From the Kakamega Community-based health care project to Kenya's Community Health Strategy	46
Box 7: Additional Cost Considerations	60
Box 8: Pakistan's Lady Health Worker Program: Large-Scale Success Model for Selection and Training	66
Box 9: Voluntary Community Health Workers and Community Outreach	85
<hr/>	
List of Figures	
Figure 1: CHW subsystem as part of a Primary Health Care System	21
Figure 2: CHW Operations	27
Figure 3: Community Health Worker Costs	54
<hr/>	
List of Tables	
Table 1: Community-based interventions for MDGs 4 and 5	13
Table 2: Example Operational Design	49
Table 3: Average Yearly Expenditure for Community Health Worker Program at 1 CHW for every 650 Rural Inhabitants	58
Table 4: Modifying Factors for Operational Design, as Compared to Example Model	69
Table 5: National Policy Landscape	79
Table 6: JCHEW and CHEW Community-Based Functions	84
Table 7: VHW Cadre Description	85

Forward

THERE IS AN URGENT NEED TO IMPROVE THE HEALTH of women and children, particularly in areas of Africa, where Millennium Development Goals (MDGs) 4 and 5 are most lagging. This requires strong community engagement and formal investments in national health systems, especially for those least likely to be reached through current national health strategies, such as those in rural communities. Community Health Workers (CHWs) have been internationally recognized for their notable success in reducing morbidity and averting mortality in mothers, newborns and children. CHWs are most effective when supported by a clinically skilled health workforce, particularly for maternal care, and deployed within the context of an appropriately financed primary health care system. However, CHWs have also notably proven crucial in settings where the overall primary health care system is weak, particularly in improving child and neonatal health. They also represent a strategic solution to address the growing realization that shortages of highly skilled health workers will not meet the growing demand of the rural population. As a result, the need to systematically and professionally train lay community members to be a part of the health workforce has emerged not simply as a stop-gap measure, but as a core component of primary health care systems in low-resource settings.

The importance of CHWs is not a new realization, and there are long-standing efforts within communities across sub-Saharan Africa to merge successful community-based efforts with formal health systems strengthening initiatives. This is reflected in national health system planning documents, large-scale deployments of CHW cadres and international interest in and support for CHW expansion. Each generation of CHW initiatives provides new knowledge and insight into their effective use in bridging the Human

Resources for Health (HRH) gap. However, substantial work remains to ensure their reliability, availability, efficacy and organizational sustainability.

The importance of CHWs is not a new realization, and there are long-standing efforts within communities across sub-Saharan Africa to merge successful community-based efforts with formal health systems strengthening initiatives.

Now is the time to align CHWs with broader health system strengthening efforts at the primary care level, improve CHW financing, and broadly disseminate recent advances in technology, diagnostics and treatment to support community-based health workers. The MDGs have provided the impetus for a new generation of investments accompanied by international progress monitoring of progress through the Countdown to 2015 initiative and the UN Commission on Information and Accountability for Women's and Children's Health. Concomitant focus on health systems by the World Health Organization (WHO) and other technical bodies has allowed for a greater emphasis on the operational and supportive considerations required to make any subsystems within a health system perform optimally. Upon this backdrop, advances in community-based diagnostics and treatment modalities, as well as in methods for supervisory support in person and by mobile phones, are placing reliable services for the most vulnerable populations within reach. Scaling up CHW deployment is now a crucial means to leverage advances in human resource strategies and community health to achieve the MDGs and developing primary health care systems.



Much focus on the implementation and design of delivery systems to achieve the MDGs has been provided by the Millennium Villages Project (MVP). The MVP is hosted by 10 low-income sub-Saharan African countries and is broadly supported by UN agencies and championed by the Secretary General to provide leadership on scalable methods to accelerate progress to the MDGs. In the context of an integrated, cost-accounted and measured environment, the MVP's focus on the operational design and implementation of CHW subsystems will continue to provide insights and evidence to support investment into national systems.

This report is not conceived as an operational plan for any one country. The purpose of this report is to provide the broad operational and cost considerations in mobilizing support for a large increase in public sector CHW cadres across Africa. It presents a synthesis

of support for CHW subsystem scaling and highlights important considerations for the international community and national governments to take into account as they embark on a path to providing basic health care services to the women, children, and communities that need it most. We continue to look to the leadership of local, national and international organizations to meet the dual goals of achieving the MDGs and development of health systems that equitably respond to community needs well beyond 2015.

Prabhjot Singh MD, PhD
Chair, CHW Technical Taskforce
Earth Institute

Acknowledgements

In response to widespread recognition of the need to scale up community health workers as a part of primary health systems in sub-Saharan Africa, this technical report was prepared to consolidate scientific and implementation experience in a series of recommendations and guidelines. Development of this report was a collaborative effort with input from scientific experts, led by the Earth Institute at Columbia University in support of the United Nations objectives to achieve the Millennium Development Goals.

Technical Task Force

Prabhjot Singh – Chair, Technical Task Force Earth Institute at Columbia University
Sarah Sullivan – Taskforce Coordinator Earth Institute at Columbia University

Okey Akpala	Nigeria Primary Health Care Development Agency	Simon Lewin	Norwegian Knowledge Centre for the Health Services
Jackline Aridi	Millennium Development Goal Centre, East and Southern Africa	Anne Liu	Millennium Villages Project
Rifat Atun	The Global Fund	David Marsh	Save the Children, USA
Yanis Ben-Amor	Earth Institute at Columbia University	Gordon McCord	Earth Institute at Columbia University
Matt Berg	Earth Institute at Columbia University	Patricia Mechael	Earth Institute at Columbia University
Zulfiqar A. Bhutta	Aga Khan University	Dan Palazuelos	Partners in Health
Francesca Celletti	WHO Human Resources and Health	Raj Panjabi	Massachusetts General Hospital / Harvard University
Mickey Chopra	United Nations Children's Fund	George Pariyo	Global Health Workforce Alliance
Lauren Crigler	Health Care Improvement Project, Initiatives Inc.	Henry Perry	Johns Hopkins University Bloomberg School of Public Health
Gary Darmstadt	Bill and Melinda Gates Foundation	Paul Pronyk	Earth Institute at Columbia University
Manuel Dayrit	WHO Human Resources and Health	Joanna Rubinstein	Earth Institute at Columbia University
Didi Farmer	Partners in Health	Jeffrey Sachs	Earth Institute at Columbia University
Jed Friedman	World Bank	Sonia Sachs	Earth Institute at Columbia University
Claire Glenton	Norwegian Knowledge Centre for the Health Services	Salim Sadruddin	Save the Children, USA
Steve Hodgins	United States Agency for International Development: Maternal and Child Health Integrated Program	Joel Schoppig	Nigeria Primary Health Care Development Agency
Nnenna Ihebuzor	Nigeria Primary Health Care Development Agency	Diana Silimperi	Management Sciences for Health
Troy Jacobs	United States Agency for International Development	Eric Starbuck	Save the Children, USA
Manmeet Kaur	Earth Institute at Columbia University	Eric Swedberg	Save the Children, USA
Zohra Lassi	Aga Khan University	Yombo Tankoano	Millennium Development Goal Centre, West and Central Africa
Karen LeBan	CORE Group	Miriam Were	Global Health Workforce Alliance
Nulvio Lermen, Jr	Brazil National Primary Health Care Department		
Neal Lesh	Dimagi		

Earth Institute Support:

Nadi Kaonga
Krista Mar
James Ossman
Helen Skirrow

The financial and technical support of the Earth Institute at Columbia University is gratefully acknowledged.



LIST OF ACRONYMS AND ABBREVIATIONS

ACTs	Artemisinin-based combination therapies	MLSS	Modified Life-Saving Skills
AIDS	Acquired Immune Deficiency Syndrome	MOH	Ministry of Health
ANC	Antenatal Care	MTCT	Mother to Child Transmission
ARI	Acute Respiratory Infection	MUAC	Mid-Upper Arm Circumference
ARV	Anti-retroviral medication	MVP	Millennium Villages Project
CCM	Community Case Management	NGO	Non-Governmental Organization
CHC	Community Health Center	ORS	Oral Rehydration Solution
CHEW	Community Health Extension Worker	PEPFAR	U.S. President's Emergency Plan for AIDS Relief
CHO	Community Health Officers	PHC	Primary Health Care
CHW	Community Health Worker	PMI	President's Malaria Initiative
DHMT	District Health Management Team	PMTCT	Prevention of Mother to Child Transmission
HIV	Human Immunodeficiency Syndrome	RDT	Rapid Diagnostic Test
HRH	Human Resources for Health	SBA	Skilled Birth Attendant
ICT	Information and Communication Technologies	SMS	Short Message Service
IMCI	Integrated Management of Childhood Illness	TB	Tuberculosis
JCHEW	Junior Community Health Extension Worker	VHVs	Voluntary Village Health Workers
LBW	Low Birth Weight	UNAIDS	Joint United Nations Programme on HIV/AIDS
LLIN	Long-Lasting Insecticide-treated Nets	UNFPA	United Nations Population Fund
M&E	Monitoring and Evaluation	WHO	World Health Organization
MDG	Millennium Development Goal		

Executive Summary

As countries around the globe strive to meet the health-related Millennium Development Goals (MDGs) to improve child and maternal health and reduce mortality, overwhelming evidence has emerged indicating the effectiveness of community-based interventions as a platform to extend health care delivery and improve health outcomes. The crucial role that Community Health Workers (CHWs) can play in delivering these interventions is broadly recognized. CHWs are best positioned to deliver these services in communities engaged in the improvement of their own health, working in partnership with other frontline health workers and anchored in the primary health care system. This is particularly true for communities comprised of the rural poor, for whom the provision of preventive and curative services in the community and at households is the first step to long-term engagement with primary health care systems. Investments in CHW subsystems, as part of coordinated health care system improvement plans, are crucial well beyond the MDG deadline of 2015 as nation-

al health systems continue to evolve to meet the changing epidemiological and demographic needs of rapidly transforming communities.

The recommendations of the report suggest the key ingredients of a locally adaptable CHW subsystem that can scale to 1 million CHWs, at a ratio of 1 CHW per 650 rural inhabitants in Africa, along with the primary health care system by 2015. These findings are based upon observations of the Millennium Villages Project across ten sub-Saharan African countries, a range of NGO-driven international CHW programs; national guidelines for primary health systems, and input and review by a wide array of CHW technical experts, UN agencies including the WHO, and the Nigerian National Primary Health Care Development Agency.

Coordinated deployment of these strategies supported by the global community and national governments can increase equity in access to care and accelerate progress towards the MDGs.

6

This technical taskforce report focuses on providing broad cost guidance, deployment strategy and operational design considerations for CHW subsystems as part of health system strengthening to achieve the MDGs.

These considerations are summarized in the following 5 themes:

- (1) **Tight linkages with appropriately-financed local primary health care systems** are crucial to sustaining scale up of CHW subsystems, particularly with strong supervision from more clinically skilled health cadres.
- (2) **Development of operational designs for national deployment** must be evidence-based, community responsive and context specific.
- (3) **Determining the basic costs associated with the core components of a CHW subsystem** is necessary in order to inform the global community on financing gaps. We provide a cost estimate for a paid, full-time CHW operational design targeting child, newborn and maternal health. The yearly cost for a phased rollout across rural low-income Sub Saharan Africa by 2015 is estimated to be US\$6.56 per person served in rural areas or \$2.62



per capita for a CHW subsystem, with a total CHW program cost of \$3,584 per CHW. This results in a total of approximately US\$2.3 billion per year, which includes existing expenditures from national governments and donors.

- (4) **Coordinated planning of deployment and training** of CHWs at scale that takes into account strategies to support logistics, training, and monitoring and evaluation should result in strong, well-defined and responsive national and sub-national CHW subsystems.
- (5) **An overview of the current national policy and implementation landscape** contextualizes and targets subsequent support for CHW subsystem upgrades in partnership with national governments such as Nigeria, which is featured as a case study and partner in this report.





BIRTH CONTROL METHODS

Aminat Kabung
DSE
Community Health
Worker

GLOVES

Community Health Worker Systems at National Scale: Why Now?

Community Health Worker Systems at National Scale: Why Now?

KEY POINTS

- Progress towards reaching the health-related MDGs is lagging.
- CHWs have demonstrated impact on MDGs 4, 5 and 6.
- Community Health Worker subsystems can function as a well-designed, deployed suite of health workers, supplies, mobile phone infrastructure, point of care diagnostics, management structures embedded in the community and in the primary health care system.
- A combination of political will, new financial resources, advances in mobile phones connectivity and mobile-based technology, new point of care diagnostics to support treatment provide momentum to support national CHW scale-up now.

Achieving the MDGs through Community Health

In sub-Saharan Africa, 10 to 20 percent of children die before turning five, and maternal deaths from pregnancy-related events, rare in most industrialized countries, occur far too frequently. As of 2010, only 19 of the 68 Countdown to 2015 priority countries—which account for more than 90% of maternal and child deaths worldwide—were on track to meet the target on child survival. Maternal mortality continues to remain high with little evidence of progress. As many of the world's poorest countries are making insufficient progress toward achieving MDGs 4 and 5, it is evident that strong political will, civil sector engagement and community awareness continue to be crucial but insufficient to achieving the MDGs.

The poor progress towards improving maternal and child health outcomes is not due to a lack of technical solutions. There is substantial evidence documenting the positive effects of a range of low-cost, community-based interventions for maternal and child health. However, reliable delivery systems for life-saving and sustaining interventions are lacking. For a range of proven low-cost interventions, including vaccinations, oral-rehydration therapy and zinc for diarrhea, insecticide treated bed-nets and anti-malarial drugs for malaria, antibiotics for pneumonia, and skilled birth attendants to improve intrapartum care, coverage is below 50% globally. Low coverage of interventions is often due to an inability to reach a population in need; for example, recent studies and a multi-country evaluation of the Integrated Management of Childhood Illness (IMCI) strategy has indicated difficulty in reaching poor populations due to the absence of robust community-based strategies at



national level. Difficulties in expanding evidence-based interventions such as IMCI to national scale while maintaining intervention quality demonstrate a gap between developing interventions that are needed to reduce mortality and delivering such interventions to those who are most in need. Although private sector services are flourishing, and in some areas comprise the majority of health care access, only national governments are responsible for the systematic provision of primary health care for all citizens, particularly in communities where the MDGs are lagging.

Particularly in rural settings in sub-Saharan Africa—where national primary health care systems experience systematic underfunding, human resource for health gaps, challenges in appropriate supply provision and transport, and other barriers to care—it is not a

surprise that public health system utilization rates are often low. Extending the reach of the public health system through a well-trained and supported community health workforce is a crucial step to meeting the MDGs, strengthening health systems and increasing equity in health care access by extending care to the most vulnerable populations. The community health workforce, more recently termed “frontline health workers,” includes paid CHWs, community health volunteers, skilled birth attendants, nursing staff, emergency response personnel and others. These various cadres spend different proportions of their time in clinical facilities, community-level outreach locations and performing household visits, and have distinct relationships with the public health care system. This report highlights a specific cadre of frontline health



workers, paid full-time public-sector CHWs, whose scope of work is primarily accomplished through community-level availability and household visits and formally recognized as an integral part of the primary health care system.

Interest in CHWs has continued to be strong over the past decade, particularly with the release of new evidence of reduction of morbidity and mortality through community-based interventions. In recent years, this evidence has been summarized in the Cochrane reviews “Lay Health Workers in Primary and Community Health care for Maternal and Child Health and the Management of Infectious Diseases” and “Community-Based Intervention Packages for Reducing Maternal and Neonatal Morbidity and Mortality and Improving Neonatal Outcomes”; Pediatrics’ “Community-based Interventions for Improving Perinatal and Neonatal Health Outcomes in Developing Countries: A Review of the Evidence”; the 2003 Lancet Series on Child Survival, the 2005 Lancet Series on Neonatal Health and the 2008 Lancet review on Maternal and Child Undernutrition; American Public Health Association’s Community-Based Primary Health Care Working Group’s “How Effective is Community-Based Primary Health Care in Improving the Health of Children?,” among many other publications. The impact of household and community-based health care has been demonstrated

with particular clarity in the domain of child and neonatal health in multiple settings over the past decade. The role that CHWs have played in maternal mortality thus far in many programs has been through the promotion of care seeking behavior, institutional delivery and preventive care.

Table 1 provides a list of community-based interventions proven to be effective in improving health, and Appendix A provides a list of major reviews that summarize the evidence base describing the role of CHWs in delivering these services.

The evidence indicates that a well-implemented community health workforce can improve health-seeking behaviors and provide low-cost interventions for common maternal and child health issues, while enabling improvements in the continuum of care.

Table 1: Community-Based Interventions for MDGs 4 and 5

Maternal	Newborn	Child	All
<ul style="list-style-type: none"> ▪ Promotion of mother's ANC visits for micronutrient supplements, tetanus toxoid injection, anthelmintic treatment, immunization ▪ Promotion of birthing plans, including clean, institutional delivery and care seeking for complications of pregnancy and delivery ▪ Promotion of Intermittent preventive treatment of malaria during pregnancy and infancy ▪ Promotion of anti-retroviral (ARV) usage by pregnant women with HIV infections and their newborns to reduce Mother to Child Transmission (MTCT) 	<ul style="list-style-type: none"> ▪ Develop plans for home visits on days 1, 3, 7 and involve key influencers in newborn preparation ▪ Home-based neonatal care including prevention, diagnosis and treatment of neonatal sepsis, promotion of cleanliness, prevention of hypothermia, community case management, and care of low birth weight (LBW) infant ▪ Postnatal counseling to initiate breastfeeding and promote exclusive breastfeeding ▪ Promotion of complementary feeding beginning at 6 months of age ▪ Promotion of care-seeking for sick newborn 	<ul style="list-style-type: none"> ▪ Promotion of immunization and exclusive breastfeeding ▪ Management of acute respiratory infections (including pneumonia), malaria, diarrhea, malnutrition, and severe malnutrition with facility-based support and referrals for advanced care when needed ▪ Complementary feeding promotion in food-secure populations ▪ Provision of food supplements in food-insecure households ▪ Iron supplementation for children in non-malarial populations ▪ Community-based distribution of Vitamin A and deworming tablets ▪ Parental education for care-seeking 	<ul style="list-style-type: none"> ▪ Drug adherence support for HIV and TB ▪ Promotion of sleeping under insecticide-treated bednets for malaria prevention ▪ Hygiene education and provision of soap ▪ Support of neighborhood peer groups for breast-feeding, nutrition, and/or hygiene ▪ Vital events registration ▪ Verbal autopsy

* Note: For references, please see Appendix A

Defining the Community Health Worker

SCOPE OF COMMUNITY HEALTH WORKERS GLOBALLY

Community health worker programs have been deployed broadly in operations research contexts, in non-governmental organization programs, and in national health systems for over 60 years. The phrase CHWs therefore, has a broad spectrum of meaning. Initially, lay health workers and community health workers were used interchangeably, signifying a community member who had received basic training to support health mobilization or community activities. In recognition of multiple generations of CHW programs that have been deployed by national governments, NGOs and international agencies, the Global Health Workforce Alliance provided a systematic review of global experiences of CHW programs in 2010, illuminating the many typologies of CHW programs in operation. Others have classified program models by types of tasks accomplished, function and role in the community, and degree of formal integration in the national health system.

Over the past four decades, the diverse ways CHWs have been defined, deployed and utilized have trended towards more formal training, an increased emphasis on clinical tasks, improved supervision and stronger linkages to the supporting health system. There is a trend towards CHWs functioning as the first point of care for communities, often their own, through structured interactions at the household, in community centers and through regular availability to provide urgent care in their own homes. In each of these community-based locations, CHWs may routinely provide a limited repertoire of primary care services, health education and responses to acute needs. Although CHWs may be a first point of contact, they are also the critical link to more clinically-skilled workers and facility-based services for complicated illness or maternal care. As CHWs' integral role in the continuum of primary health care becomes increasingly recognized and responsibilities increase, questions of regulation, payment and employment status naturally emerge.

COMMUNITY HEALTH WORKER SUBSYSTEM AS AN EXTENSION OF THE PRIMARY HEALTH SYSTEM

This report will focus on describing the coordinated operational considerations involved in ensuring that a national CHW cadre emerges with the support of their communities as a vital extension of the primary health care system. This “CHW subsystem” includes the requisite training, supervision, supplies, incentives, community engagement structures, information and feedback tools. The CHW subsystem is a component of the public primary health care system, with which it should be fully integrated, in order to facilitate strong referral and counter-referrals and to support each of the aforementioned facets of the subsystem.

This subsystem can also be complemented and strengthened by other community health workforce members, including traditional birth attendants and non-formalized community health workforces. These are important strategies and considerations that extend beyond the focus of this report. Further consideration should be given to the interplay between private sector health workers and national systems to meet the obligations of a government to its citizens to provide high quality services.

In addition, the CHW subsystem should be structured according to contextual factors at the national and sub-national level, and must be built upon and integrated with existing community health outreach structures. Formal national definition and recognition of the importance of community and household outreach workers will facilitate planning and allocation of resources to support this vital cadre.

Formalization within the national health system as household and community-based health care providers can allow for opportunities to professionalize health cadres. In professionalizing CHWs via the provision of technical, transferable skills in standardized training, assurance of the stability of employment and continuous income, and clear and fair sets of standards and responsibilities, we can in turn require that CHWs adhere to “professional norms.” Such

norms include maintaining quality of service and meeting of their roles and responsibilities. Avoiding task overload and promoting worker retention is also crucial at this level of the health system. Furthermore, professional norms allow a CHW subsystem to develop an understanding with their community that there will be full-time linkages to primary health care facilities through surveillance, provision of ongoing care and recognition of emergencies. To ensure that this compact is honored, a formal role in the health system must go beyond budgetary line items; CHWs should be perceived by other health workers as an integral part of the process of managing care.

GOALS, SCOPE AND LIMITATIONS OF THIS REPORT

Any effort to provide standard definitions for CHWs and the parameters of the CHW subsystem will fall far short of capturing the diversity of successful, innovative approaches to extending the reach of health systems beyond facilities and into communities. We will use the phrase CHW subsystem to describe the above specifications, while acknowledging that the use of the term CHW in both academic and practical contexts extends well beyond this.

The description of a CHW subsystem that this report reflects is aimed at providing basic cost, operational design and planning guidance to the global community to 1) bring broader recognition to the importance of CHWs in achieving the MDGs as an integral part of an overall health system approach, 2) substantially augmenting financing for national programs, and 3) introducing the key features of CHW subsystems to new audiences who can accelerate innovations in remote service delivery for community engagement and mobilization, information and communication technologies (ICT), and point of care services in the household.

Certainly, while interest in CHWs have allowed for increasingly empowered health workers in comparison to earlier models where CHWs were largely involved in health promotion, it is important to acknowledge the limitations of current CHW programs. The global health community has had to evaluate the virtue of

current strategies where task overload, poor quality of care or the inability to follow-up have emerged as common challenges. Balanced pay or incentive structures, strong management systems, community input and formal linkages to the health care system have not always followed task shifting to CHWs. In addition, as the evidence-based repertoire of community-based interventions has increased, nationally scaled systems have not always kept pace with new research and programmatic innovations demonstrated in low-resource settings. The considerations outlined in this report aim to strengthen the interface between evidence-based innovations and nationally scaled health systems planning.

While CHWs have a role to play in primary health care in urban and metropolitan settings of all national health care systems, including in high-income countries, we focus this report on the roles CHWs may play and the interventions that they can deliver in rural health in low-income sub-Saharan Africa, where progress towards meeting the MDGs in health is most delayed. As such, our costing projections and operational design considerations focus on rural sub-Saharan Africa. National governments, however, will naturally consider a wider array of community health outreach models.

CHW subsystems must be adapted to the context in which they are to be deployed. As such, each national or international initiative to expand the reach of and support for CHW subsystems should consider and contextualize each element of the operational, costing and deployment elements, including the definition of the CHW subsystem. This report provides guidance on some considerations to take into account in the process of defining or revising CHW subsystems at national scale, as well as a costed example design to facilitate investment to support advancement toward the MDGs in low-resource countries.

Why Scale Now?

Community-based interventions to date have been proven effective in research and program contexts, but there has been inconsistent implementation of formal CHW programs at national scale. The first prominent large-scale community health programs were implemented in Latin America, Tanzania, Mozambique, Malawi and China as early as the 1960s, with other community health efforts dating much earlier. However, the integrated community health-driven primary care approach advocated for in the Alma Ata agreement fell out of favor during the 1980s and early 1990s, due to challenges in sustaining programs at scale while maintaining effectiveness. Many programs at scale suffered from unspecified workforce selection, recruitment and training specifications, poor technical and financial support, poor supervision structures and poor initial planning, leading to poor quality of care and system sustainability.

In more recent years, however, investments, innovation and research in organizational management, information technology, deployment strategies, medical technologies and service delivery strategies have emerged that address many of the challenges of past programs at national scale. Conditions that now enable CHW subsystem planning and deployment at national scale include

POLITICAL WILL

The MDGs have provided the impetus for a new generation of investments in the strengthening of national primary health care systems as well as a concerted focus on the methods of delivering care to the most vulnerable populations. Accompanied by international monitoring of progress through rigorous evaluation groups such as the Countdown to 2015 Initiative and the new UN Commission on Information and Accountability for Women's and Children's Health, the UN Secretary General's Global Strategy for Women's and Children's Health is increasing global pressure and accountability to reach the MDGs. The ability to monitor indicators for effective human resource policies has been essential in informing and energizing policymakers behind the renewed emphasis on CHWs. In addition, a revitalized focus on primary care in the past decade has brought increased political attention to the contribution of community health to sustaining a healthy population.

Much needed focus on the implementation and design of delivery systems to achieve the MDGs has been provided by the Millennium Villages Project (MVP). The MVP is hosted by 10 low-income SSA countries and is broadly supported by UN agencies and championed by the Secretary General to provide leadership on scalable methods to accelerate progress to the MDGs. In the context of an integrated, cost-accounted and measured environment, focus on the operational design and implementation of CHW subsystems will continue to provide insights and evidence to support investment into national systems.

Increased political will not only enables the expansion of existing CHW subsystems, but also creates conditions conducive to the integration of well-supported community health systems development with national health care planning, funding and coordination, and may also prompt additional private and NGO investment in and support of national programs. Such an environment facilitates improvements in basic health systems functionalities such as supply chain reliability; coordinated selection, training and supervision; workforce motivation initiatives; and strong links to other layers of the health system, all critical and intertwined requisites for success at national scale.

NEW RESOURCES

The average health expenditure level for low-income countries has been approximately US\$27 per capita, despite an increase in public financing for health in developing countries of nearly 100% between 1995 and 2006. An analysis undertaken by the World Health Organization (WHO) for the Taskforce on Innovative Health Financing in 2009 estimated that low-income countries would need to spend an average of \$54 per capita in order to have a fully functioning health system. The global community is currently primed to help fill this gap with new sources of global financing linked to mechanisms like the Global Fund to ensure optimal national ownership, planning and implementation of programs.

Over the past decade there has been an increase in spending from \$5 billion to \$22 billion on global health. New financing mechanism for global health initiatives, including the Global Fund to Fight AIDS, Tuberculosis and Malaria, US President's Emergency Plan for AIDS Relief (PEPFAR), President's Malaria Initiative (PMI), the Bill and Melinda Gates Foundation and others, create funding streams that can rapidly launch innovative global health delivery systems. Between 2003 and 2006 alone, donor assistance for child health increased by 63% and for maternal and newborn health by 66% in the 68 MDG priority countries. There is evidence that external donor support has supplanted national health expenditures, placing a greater emphasis on directly supporting nationally-led initiatives. CHW subsystems represent a clear, evidence-based investment to address immediate MDG priorities while sustainably strengthening national health systems.

NEW DIAGNOSTICS, MEDICINES AND TREATMENT DELIVERY TECHNOLOGIES

Internationally recognized standards for algorithmic diagnosis such as IMCI (Integrated Management of Childhood Illness) and new rapid tests for pregnancy, HIV and malaria have created opportunities for disease assessment at the community and household level. Furthermore, there is evidence that short course therapeutics for the most common maternal and child health conditions can be safely administered at

the household level (caretaker or CHWs' household), including but not limited to: single-dose albendazole for helminthes, low osmolarity oral rehydration therapy and zinc for diarrhea, artemisinin-based combination therapy for malaria, antibiotics for pneumonia and newborn sepsis, nevirapine for HIV, and depo-provera for family planning. Such innovations make household-level extension of health care systems more feasible than in the past, and more impactful.

MOBILE HEALTH AND CONNECTIVITY

There is significant momentum to capitalize upon the rapidly spreading telecommunications infrastructure and mobile phone usage in developing countries, particularly in rural areas. While not a replacement for a functioning supervisory and training system, mobile communication and information transfer via voice, SMS and data provides opportunities for improved remote management and monitoring of service delivery by CHWs. There are preliminary findings supporting low-cost and high-impact mobile health (mHealth) interventions to support treatment compliance, data collection and disease surveillance, health information systems, health promotion and disease prevention, and emergency medical response systems. As mHealth requires telecommunications and electricity infrastructures to enable broad utilization at scale, there continues to be a need for strong partnership with the telecommunications industry through mechanisms such as the UN Broadband Commission for Digital Development to bring coverage to rural areas. Appendix B provides additional details on the potential uses of mHealth technologies to support CHW subsystem functions.

Next Steps

CHWs present an opportunity to accelerate the progress to achieve the MDGs while investing in improving national health system infrastructure. A well-financed CHW subsystem supports extension of the primary health care system to the household level, increasing access to low-cost effective services, increasing community member engagement in their health, and creating long-term interactions with the primary health care system. Although a broad range of clinically

skilled frontline health workers are crucial for optimal health system performance, CHWs require relatively shorter training and can begin providing health services more rapidly than facility-based clinicians. While certainly the needs and optimal delivery models will vary considerably by setting, we now have enormous opportunities to mobilize the information and experiences of the global community to build CHW subsystems as part of national health systems and make significant progress towards achieving the health-related MDGs.

REFERENCES

- Berman, P. A., Gwatkin, D. R., & Burger, S. E. (1987). Community-based health workers: Head start or false start towards health for all? *Social Science & Medicine*, 25(5), 443-459.
- Bhutta, Z. A., Lassi, Z. S., Pariyo, G., & Huicho, L. (2010). Global experience of community health workers for delivery of health related millennium development goals: A systematic review, country case studies, and recommendations for scaling up. *Global Health Workforce Alliance*.
- Bhutta, Z. A., Ahmed, T., Black, R. E., Cousens, S., Dewey, K., Giugliani, E., et al. (2008). What works? interventions for maternal and child undernutrition and survival. *The Lancet*, 371(9610), 417-440.
- Bhutta, Z. A., Chopra, M., Axelson, H., Berman, P., Boerma, T., Bryce, J., et al. (2010). Countdown to 2015 decade report (2000-10): Taking stock of maternal, newborn, and child survival. *The Lancet*, 375(9730), 2032-2044.
- Black, R. E., Morris, S. S., & Bryce, J. (2003). Where and why are 10 million children dying every year? *The Lancet*, 361(9376), 2226-2234.
- Boerma, J., Bryce, J., Kinfu, Y., Axelson, H., & Victora, C. (2008). Mind the gap: Equity and trends in coverage of maternal, newborn, and child health services in 54 countdown countries. *The Lancet*, 371(9620), 1259-1267.
- Bryce, J., Victora, C. G., Habicht, J. P., Black, R. E., & Scherpbier, R. W. (2005). Programmatic pathways to child survival: Results of a multi-country evaluation of integrated management of childhood illness. *PubMed*.
- Darmstadt, G. L., Bhutta, Z. A., Cousens, S., Adam, T., Walker, N., & de Bernis, L. (2005). Evidence-based, cost-effective interventions: How many newborn babies can we save? *The Lancet*, 365(9463), 977-988.
- Ekman, B., Pathmanathan, I., & Liljestrand, J. (2008). Integrating health interventions for women, newborn babies, and children: A framework for action. *The Lancet*, 372(9642), 990-1000.
- Gilson, L., Walt, G., Heggenhougen, K., Owuor-Omondi, L., Perera, M., Ross, D., et al. (1989). National community health worker programs: How can they be strengthened? *Journal of Public Health Policy*.
- Haines, A., Sanders, D., Lehmann, U., Rowe, A. K., Lawn, J. E., Jan, S., et al. (2007). Achieving child survival goals: Potential contribution of community health workers. *The Lancet*, 369(9579), 2121-2131.
- Haws, R. A., Thomas, A. L., Bhutta, Z. A., & Darmstadt, G. L. (2007). Impact of packaged interventions on neonatal health: A review of the evidence. *Health Policy and Planning*, 22(4), 193-215.
- Jones, G., Stekezztee, R. W., Black, R. E., Bhutta, Z. A., & Morris, S. S. (2003). How many child deaths can we prevent this year? *The Lancet*, 362(9377), 65-71.
- Lawn, J. E., Cousens, S., & Zupan, J. (2005). 4 million neonatal deaths: When? where? why? *The Lancet*, 365(9462), 891-900.
- Lawn, J. E., Rohde, J., Rifkin, S., Were, M., Paul, V. K., & Chopra, M. (2008). Alma-ata 30 years on: Revolutionary, relevant, and time to revitalise. *The Lancet*, 372(9642), 917-927.
- Lehmann, U., & Sanders, D. (2007). 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. *World Health Organization*.
- Lewin, S., Munabi-Babigumira, S., Glenton, C., Daniels, K., Bosch-Capblanch, X., van Wyk, B. E., et al. (2010). Countdown to 2015 decade report (2000-10): Taking stock of maternal, newborn, and child survival. *Lancet*, 375, 2032-2044.
- Lewin, S. A., Babigumira, S. M., Bosch-Capblanch, X., Aja, G., van Wyk, B., Glenton, C., et al. (2010). Lay health workers in primary and community health care for maternal and child health and the management of infectious diseases. *Cochrane Database of Systematic Reviews*.
- Lewin, S. (1996). Community-based intervention packages for reducing maternal and neonatal morbidity and mortality and improving neonatal outcomes. *Cochrane Database of Systematic Reviews*.
- Ofori-Amaah, V. (1983). National experience in the use of community health workers. A review of current issues and problems. *WHO Offset Publication*, 1-49.
- Standing, H., & Chowdhury, A. M. R. (2008). Producing effective knowledge agents in a pluralistic environment: What future for community health workers? *Social Science & Medicine*, 66(10), 2096-2107.
- Victora, C. G., Huicho, L., Amaral, J. J., Armstrong-Schellenberg, J., Manzi, F., Mason, E., et al. (2006). Are health interventions implemented where they are most needed? district uptake of the integrated management of childhood illness strategy in Brazil, Peru and the United Republic of Tanzania. *Bulletin of the World Health Organization*, 84(10), 792-801.
- Walt, G. (1988). CHWs: Are national programmes in crisis? *Health Policy and Planning*, 3(1), 1-21.
- Werner, D. *The village health worker lackey or liberator?*. Palo Alto, Calif.: Hesperian Foundation.

Primary Health Care Integration: CHWs in Context

Primary Health Care Integration: CHWs in Context

KEY POINTS

- CHW subsystems are an integral part of primary health care systems and substantially augment service possibilities.
- Multiple linkage points with other parts of the primary health care system, including more clinically-skilled providers, supply chains and data systems, are critical to ensuring that a CHW subsystem is well-supplied, well-managed and well-financed.
- CHW subsystems operate best within primary health care systems that are also well functioning, but when placed in weaker systems, they can catalyze strengthening and development by improving clinic utilization, community engagement and health indicators for specified conditions.
- CHW subsystem improvements at scale should be accomplished in the context of full health systems planning efforts.

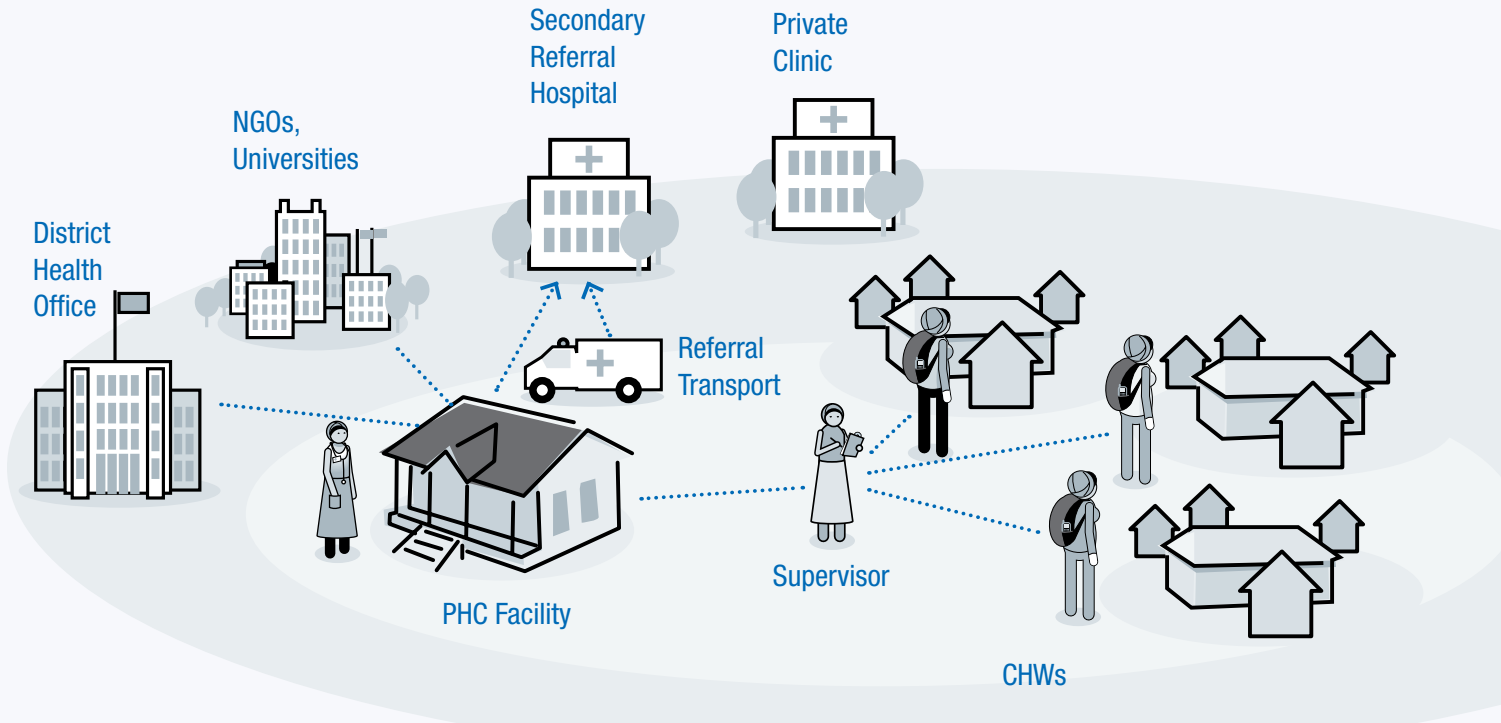
Ensuring that CHWs are Integrated into National PHC Systems

In order to be effective and sustainable at scale, a CHW subsystem should be integrated into a nationwide primary health care (PHC) system through definition and recognition in national health care planning regulation and implementation. CHWs are capable of addressing barriers in access to care, improving continuum of care, linking health care systems and communities, and complementing national data systems even in low-performing primary health care systems. In addition, deploying a well-designed CHW subsystem within a weak primary health system is a viable health systems strengthening strategy. CHWs are most effective when recognized as an integral part of the PHC system they are supporting. Parallel systems for community health that are not integrated with the primary health care system risk weaker referral systems, supervision and support by facility-based care providers, and policymaker buy-in to support supply chain and other systems components.

CHWs can provide effective improvements in child and neonatal health at the household and community levels without strong support from more clinically skilled providers. However, true access to care for the communities served by CHW subsystems is predicated upon the ability of CHWs to have priority linkages to higher-level clinical care as needed. Particularly for improvements in maternal health, CHWs' roles in care and health promotion must be delivered in concert with skilled providers at the community and higher levels of care. A comprehensive human resources for health and health systems improvement strategy includes CHWs, not to the exclusion of other elements of the system. Important elements include skilled birth attendants and supplemental community health cadres as well as primary health care clinicians, data managers and supervisors. Each of these components works best when deployed in tandem with the others through integrated planning.

In addition, CHWs can act as a pivot point between the community and the health system, uniquely acting as part of both. The CHW subsystem also provides the opportunity to engage many

Figure 1: CHW subsystem as part of a Primary Health Care System



local stakeholders in community health, including partnerships with health science universities, NGOs and the corporate/technology sector. These partnerships can be particularly instrumental in developing deployment and training plans, providing links and coordination between the CHW system and other existing community-level care platforms, as well as supporting requisite infrastructure development. To date the optimal relationship between public and private community level workers is not fully defined. Figure 1 reflects several components of an integrated CHW subsystem as part of a national primary health care system.

Developing an Operational Design that Facilitates Linkages to Primary Health Care System

In order to translate national policy on an integrated CHW cadre as part of the PHC system into local-level practice, policies should also be designed to ensure that CHWs are regularly linked to first level

facility-based primary care providers. Some structures for strengthening linkages between CHWs and PHC facility staff include supervision, facilitated peer-support groups and quality of care improvement strategies that are developed in collaboration between household/community and facility-based staff. Supervisory structures should extend from the household to the national level and avoid parallel systems with the existing structures across layers of the health system. National health systems planning should include clear descriptions of this supervisory chain, with allocations for management training to support that functionality. Management linkages may also help to avoid some common pitfalls of community health programs, including irregular supply chain management and irregular contact between health service staff and community health workforces. Box 1 describes Brazil's Community Health Agents and Family Health Teams as an example method to address the need for strong links between levels of primary care.

BOX I:

Brazil Family Health Programme: Large-Scale Success Model for Primary Health Care Integration

REFERENCES:

Barros, F.C., et al. (2010), Recent trends in maternal, newborn, and child health in Brazil: progress toward Millennium Development

Goals 4 and 5. *American Journal of Public Health*. 100(10): p. 1877-89.

Guanais, F.C. and J. Macinko. (2009) The health effects of decentralizing primary care in Brazil. *Health Affairs (Millwood)*, 28(4): p. 1127-35.

Macinko, J., et al. (2006). Evaluation of the impact of the Family Health Program on infant mortality in Brazil, 1990-2002. *Journal of Epidemiology and Community Health*. 60(1): p. 13-9.

Macinko, J., et al. (2007) Going to scale with community-based primary care: an analysis of the family health program and infant mortality in Brazil, 1999-2004. *Social Science and Medicine*. 65(10): p. 2070-2080.

Community Health Worker Title: Agente Comunitário de Saúde
(Community Health Agent)

Number of Community Health Workers: 246,076

Population Served: 120,465,758 (62.88% of national coverage)

Background: Originating in the state of Ceara in 1987 as an emergency action, the Health Agents Initiative employed 6,000 villagers to extend health services to the household under close supervision of nurses. This action was a huge success and in 1991 was adopted by the Brazilian Ministry of Health as the “Community Health Workers Program.” Health Agents are residents of the community that work in and are selected in a public process with strong community engagement. They have a minimum of 8 years of schooling. Each Health Agent is responsible for 750 individuals (150 households) in their locality.

Program Impact: There has been a significant decline in Brazil’s infant mortality rate from 1990 to 2004, and in diarrhea-related mortality by 44%, as well as a significant decline in avoidable hospitalizations among women.

Key Feature: Primary Health Care System Integration

In 1993, the Brazilian Ministry of Health created the Family Health Program, which placed Health Agents into teams of physicians, dentists, nurses, dental assistants and nursing technicians, thus formally integrating the community-based health workers into the primary health system architecture. The Health Agents act under the supervision of nurses and physicians, and are trained by nurses at the nearest public health clinic with assistance from staff at the state health secretariat, thereby strengthening the connection between the Family Health Team and the community. These primary health care teams work together to execute priorities set by their municipality’s administration in accordance with national and state priorities.



While the household extension and community-based care role of CHWs is particularly emphasized here, they should also play a defined, limited role at health facilities, which may support integration with the facility-based PHC workforce as active members of the provider team. The outreach and facility-based care mix will depend on the operational design determined by the specific country planning process, informed by community needs and national priorities.

Cross-System Strengthening

Continuum of care and referral, CHW empowerment and retention, and CHW subsystem maintenance are particularly sensitive to the degree of integration with the public primary health care system. Clear procedures for referral and counter-referral between facilities and CHWs, as well as follow up by CHWs with household visits and patients seeking care, help support

quality of care and the degree of improvements observed as the result of a CHW subsystem. Formal recognition of CHWs can support them in their role as a care provider when operating with other frontline and facility-based providers. However, recognition of CHWs and promotion of career advancement opportunities should be communicated clearly and with early input and buy in from existing health worker cadres, particularly mid-level providers, to head off sensitivities of task shifting. Finally, integration with the national health system is integral to sustaining recruitment, training, logistical, data and supply support for a CHW subsystem at national scale.

Given these requisites, CHW subsystems work best when the PHC system in which they are embedded is also appropriately funded and supported in national health plans. Scale up and formalization of a CHW subsystem integrated in the PHC system will likely add new demands on the facility-based PHC workforces,

both in management of CHW cadres and potentially in increased referral for care from households. PHC facilities may need to expand into currently poorly served areas to accommodate reasonable CHW supervision and continuum of care. Evidence suggests that a well-managed CHW system within a strong PHC system will enable countries to meet the maternal and child health MDGs. Furthermore, there is a clear opportunity to integrate real-time community surveillance and point-of-care consultation information from the CHW subsystem into the national data systems. This will require investments in data management and analysis capacities at the PHC level.

Next Steps

With targeted investments and planning in coordination with health systems strengthening efforts, CHW subsystems are poised to produce strong impacts on maternal and child health in areas with low access to care.

National primary health care planning presents the opportunity to consider the range of ways in which CHW subsystems can provide education, diagnosis, monitoring and care for their fellow community members, while linking them to higher levels of care. The next section will explore some of the key components of operational design decisions, which should maximize integration with primary health care systems, community engagement, and workforce motivation and retention.

REFERENCES

- Bhutta, Z. A., Lassi, Z., Pariyo, G., & Huicho, L. (2010). Global experience of community health workers for delivery of health related millennium development goals: A systematic review, country case studies, and recommendations for integration into national health systems. World Health Organization.
- Bhutta, Z. A., Ahmed, T., Black, R. E., Cousens, S., Dewey, K., Giugliani, E., et al. (2008). What works? interventions for maternal and child undernutrition and survival. *The Lancet*, 371(9610), 417-440.
- Bhutta, Z. A., Chopra, M., Axelson, H., Berman, P., Boerma, T., Bryce, J., et al. (2010). Countdown to 2015 decade report (2000–10): Taking stock of maternal, newborn, and child survival. *The Lancet*, 375(9730), 2032-2044.
- Boerma, J., Bryce, J., Kinfu, Y., Axelson, H., & Victora, C. (2008). Mind the gap: Equity and trends in coverage of maternal, newborn, and child health services in 54 countdown countries. *The Lancet*, 371(9620), 1259-1267.
- Ekman, B., Pathmanathan, I., & Liljestrand, J. (2008). Integrating health interventions for women, newborn babies, and children: A framework for action. *The Lancet*, 372(9642), 990-1000.
- Frenk, J. (2009). Reinventing primary health care: The need for systems integration. *The Lancet*, 374(9684), 170-173.
- Grumbach, K., & Bodenheimer, T. (2004). Can health care teams improve primary care practice? *JAMA: The Journal of the American Medical Association*, 291(10), 1246-1251.
- Haines, A., Sanders, D., Lehmann, U., Rowe, A. K., Lawn, J. E., Jan, S., et al. (2007). Achieving child survival goals: Potential contribution of community health workers. *The Lancet*, 369(9579), 2121-2131.
- Haws, R. A., Thomas, A. L., Bhutta, Z. A., & Darmstadt, G. L. (2007). Impact of packaged interventions on neonatal health: A review of the evidence. *Health Policy and Planning*, 22(4), 193-215.
- Kahssay, H. M., & Oakley, P. (1999). Community involvement in health development: A review of the concept and practice. *World Health Organization: Public Health in Action*, (5), 40.
- Kerber, K. J., de Graft-Johnson, J. E., Bhutta, Z. A., Okong, P., Starrs, A., & Lawn, J. E. (2007). Continuum of care for maternal, newborn, and child health: From slogan to service delivery. *The Lancet*, 370(9595), 1358-1369.
- Lawn, J. E., Rohde, J., Rifkin, S., Were, M., Paul, V. K., & Chopra, M. (2008). Alma-ata 30 years on: Revolutionary, relevant, and time to revitalise. *The Lancet*, 372(9642), 917-927.
- Porter, M. E. (2008). Value-based health care delivery. *Annals of Surgery*, 248(4), 503-509.
- Winch, P., Bhattacharyya, K., Debay, M., Sarriot, E., Bertoli, S., & Morrow, R. (2003). Improving the performance of facility- and community based health workers. *US Aid: State of the Arts Series: Health Worker Performance*,

Operational Design Considerations for CHW Systems at National Scale

Operational Design Considerations for CHW Systems at National Scale

KEY POINTS

- An operational design defines the scope of work of a CHW cadre, as well as its support systems.
- Careful consideration of the CHW subsystems' operational design should take into account each of the WHO health systems building blocks, linking the CHW cadre to the health system, building in strong support elements, and integrating community engagement across each health system component.
- These building blocks are: 1) service delivery; 2) health workforce; 3) information; 4) medical products, point of care diagnostics and technology; 5) financing; and 6) leadership and governance.
- Community engagement should be systematically built into the CHW subsystem operational design.

Careful consideration of a CHW subsystem's operational design is crucial to providing the requisite support for a CHW to excel as a health system representative and to maintain a reputation as a trusted community advocate. While community health programs are active worldwide, there is little standardization across program operational designs for these frontline care providers, who provide one of the first layers of connectivity to the formal primary health care systems in the communities in which they are deployed. Consideration of local baseline health indicators and health system status, existing community-based health programs, national priorities, financing mechanisms, community input and many other factors are essential in developing an appropriate operational design for CHWs. The resulting national CHW subsystem, based on situational analysis and epidemiology, should also be responsive to sub-national variations and community-level input in the implementation process. This section provides guidance on considering many facets of operational design for CHW subsystems.

Backed by a well-designed CHW subsystem, CHWs can be effectively selected, retained and trained in evidence-based and/or innovative competencies, in order to focus on household and community interactions to improve health care access. This subsystem should enable them to provide quality care and health education as supported by strong supervision and peer-support, reliable supply chains and clear processes for referral. The operational design importantly informs expectations for the regular interactions of an individual CHW with household members, community leadership and facility-based staff. It defines who CHWs are, what they do, with what supplies and with what leadership and training.

In developing a design for extending the formal health care system to the household level, each of the above considerations comes into play. The World Health Organization health systems building blocks provide a useful framework for considering each of the operational elements of a comprehensive CHW subsystem. These building blocks, in a slightly modified format, are as follows: 1) service delivery; 2)

Figure 2: CHW Operations



health workforce; 3) information; 4) medical products, point of care diagnostics and technology; 5) financing; and 6) leadership and governance. Because of the primary importance of the household and community-level support, we have also included a brief discussion about community engagement as an underlying feature that should be incorporated at all levels of planning and implementation.

CHW programs at national scale should carefully consider each of these elements to ensure specification for their context, based on in-depth situational analysis and modify based on ongoing process and impact evaluation.

Considerations for CHW Operational Design through Health Systems Building Blocks

To consider what elements make up a CHW system, we will explore each of the elements of the health systems building blocks, which converge to form a strong CHW subsystem. One configuration of the subsystem is illustrated in Figure 2, which will serve as a guide for discussing some of the key considerations and evidence-based functionalities within each building block.



Service Delivery: What Does a CHW Do?

There are many proven household and community-level interventions and service delivery patterns that support maternal, child and overall community health. A core component of a CHW subsystem is extension of the health care system to the community level. This extension can emerge through a combination of: 1) visiting households in their catchment zone on a regular rotation, 2) identifying and visiting vulnerable households with relevant frequency for monitoring and care, 3) availability at the community level for families seeking acute care for a sick family member, and 4) referrals to and from the primary health care system. Community case management (CCM) is one type of service that CHWs can deliver in a community, typically prompted by caretakers seeking out CHWs for care or other means of identifying sick children and conducting a special home visit when a child is ill. The CCM strategy has specific operational design considerations, discussed in box 2. Evidence-based interventions for child, neonatal and maternal care are listed in Table 1 and in Appendix A. In an HIV-endemic area, CHWs also can be pivotal in the control of HIV at a community level (Box 3).

Box 2:

Community Case Management

Community case management (CCM) is a strategy with broad global endorsement in which a health system trains, supplies and supervises front-line workers in communities to identify and treat children with common, serious infections: mainly diarrhea, pneumonia, and malaria (where it is a public health problem), and sometimes dysentery, newborn sepsis and/or acute malnutrition. It is a simplified Integrated Management of Childhood Illness (IMCI) strategy brought closer to where children live. CCM aims to redress the coverage gap in preventive and curative interventions and to promote equity by targeting geographically remote communities.

CCM is among the more challenging strategies asked of CHWs – regardless of background – because they must strictly apply multi-step, evidence-based case management protocols, deviation from which can result in untoward outcomes for children and even populations. In addition, CHWs must have competence in record keeping, stock management, follow-up visits and more. The challenge is all the more daunting because CCM tends to be most needed in high mortality settings where the overarching primary health care systems are often weakest. As noted above with pneumonia interventions for CCM, there are also at times policy and systems challenges with CHWs delivering curative care in communities.

However, there is convincing research of the effectiveness of CCM delivered by CHWs in improving community health (See Appendix A). Leading CCM agencies (UNICEF, WHO, USAID/MCHIP, TDR, MSH, Save the Children and others) have formed a global CCM Task Force, which has multilaterally produced program benchmarks, indicators, a tool review, an evaluation framework, and an action research agenda. As mentioned in Box 2, there is convincing evidence of substantial impact on all-cause under-five mortality from controlled trials in high mortality settings in which CHWs treated pneumonia, as well as a record of success in scaling up this approach. There is similar evidence for malaria, but from fewer studies. Evidence for the impact of integrated CCM (i.e., of more than one disease) is expected in 2011.

Imparting and sustaining the skills needed to implement CCM has implications on CHW selection and competency-based training, job aids, supervision and monitoring. WHO and UNICEF have produced a “gold standard” 6-day training package to impart core case management skills, but additional time may be needed for related skills. Tools are also available to support supervision of CCM workers, and funds would be needed to support any additional supervisor training needed. Effective, affordable and cost-effective approaches to training and supervision are currently under intense study. .

Box 3:

The Role of CHWs in Control of HIV



There is overwhelming evidence behind the effectiveness of community-based interventions and CHWs in particular, including for HIV care and provision of PMTCT services. The WHO lists for instance 313 specific tasks deemed essential for preventing the transmission of HIV, identifying HIV-positive patients, providing basic HIV-clinical management and initiating and maintaining ARV therapy. Of these 313 tasks, the WHO recommends that 115 can be performed by CHWs. Of these 115, 48 tasks are related to medical skills such as weighing, taking vital signs, filling outpatients registries, determining whether a patient is pregnant. The remaining 67 can be classified as socially oriented, requiring CHWs to counsel, support, advise, educate or give information to patients.

In certain programs, CHW have also been trained to provide HIV Testing and Counseling (HTC) services at the household level. With the commercialization of rapid, handheld CD4 count point-of care diagnostics, HTC could also immediately be followed at the household level by a rapid assessment of the CD4 count and aid in the initiation of ARV prophylaxis or therapy. It will be critical to monitor the CHW program in the early stages of implementation to prevent the challenges faced by several CHW programs in the past: unmanageable workloads, poor supervision, insufficient resources to adequately perform the requested tasks and absence of recognition from other health workers.

Finally, mobile technology presents an unprecedented opportunity to support effective and efficient linkages between CHW programs and Primary Health Care systems, supervisors and national data systems. While paper-based CHW systems have been effective in pilot contexts; mobile telephony / technology presents an unprecedented potential for success at national scale, both by empowering CHWs with new effective tool for provision of services (registering patients, tracking patients), but also for Monitoring and Evaluation (M&E) purposes. Successful mobile phone-based M&E systems (or SMS based systems), for example for management of malaria, have demonstrated the efficacy of such tools to provide close to real-time data for Ministries of Health and policy makers. As an illustrative example, a program entitled “ChildCount+” has been recently undertaken in the Millennium Villages Project (www.millenniumvillages.org) site in Kenya, with a population of about 55 000 people. In the space of several months, over 95% of children under-five were electronically registered and routinely monitored through the reporting system, resulting in improved coverage of routine services, such as immunizations and malnutrition screening, and improvements in related health outcomes. This has since been expanded to include vital events registration (births and deaths), screening for danger signs and follow-up of pregnant women and newborns.

REFERENCES:

WHO (2008). Task Shifting: rational redistribution of tasks among health workforce teams: global recommendations and guidelines. Geneva: WHO Press.



The appropriate mix of activities will depend upon the service delivery definition of the CHW operational model developed. The mix of services provided by the CHW subsystem should reflect an integrated set of community health interventions that feeds naturally in to the rest of the health system, as opposed to vertical deployment, which has been present in many research and program settings. National decisions on the services provided should culminate in a defined minimum package of activities based on the country's epidemiological and community priorities. These can be extended and modified in a modular fashion to address community-specific or region-specific needs. Depending on the suite of core services determined,

the operational design can also guide the balance between routine household visitation, care for acute cases, and monitoring of vulnerable households and pregnancies. Training should reflect not only the skills needed to perform the given suite of interventions, but also prepare CHWs to work at the interface of primary health care and community beliefs and practices, and conduct health education and health care at the community or household level.

The portfolio of what a CHW can do is not fixed. Demonstrations of effective utilization of CHWs and the CHW subsystem for communicable and non-communicable diseases will drive the next wave of



interest in harnessing their time and energy. As a part of regular process improvement and impact evaluation, national CHW subsystems should also take into account emerging evidence and adjust CHWs' scope of work and training accordingly, with corresponding adjustments to all other subsystem elements including supply chains, management and reliable funding. Community case management of pneumonia illustrates an evidence-based approach that has recently gained policy and program traction in high-mortality countries (Box 4). Non-communicable disease and mental health interventions also represent growing areas of interest, with an evidence base in its nascent stages.

While there is a range of activities in which a CHW can be effective, there is a need to consider the mix of specialized knowledge and tasks and the potential for task overload of CHWs can participate in, a common theme of caution for community health programs is the potential for task overload. An excess of tasks may reduce both the quality in primary health care services and the motivation of CHWs. A mix of specialized cadres and generalist cadres could be considered, along with other operational design considerations. However, while specialization may be appealing to avoid task overload, there is also a need to consider the supervisory, funding and training implications of vertical programs, and ensure that CHW cadres are well-integrated and coordinated. Certainly, the interconnected goals of child, maternal and HIV care (MDGs 4, 5 and 6) can all be supplemented through proven CHW service delivery methods. However, the task mix and task load should remain reasonable and consistent, even as new modules are added on to the core CHW subsystem design.



Box 4:

New Evidence and Policy, Community Case Management of Pneumonia



Community-based case management of pneumonia is a recent example of evidence development informing national policy for CHW service delivery. Evidence has revealed that CHWs can effectively manage respiratory illness and prescribe antibiotics appropriately. Specifically, a meta-analysis of seven studies found that community case management (CCM) of pneumonia reduced overall mortality in children 0-4 years by 24% (95% confidence interval, CI: 14-33) and pneumonia-specific mortality in children 0-4 years by 36% (95% CI: 20-49). In 2002, the World Health Organization (WHO) convened experts to review the evidence and field experience of CCM of pneumonia. Their consensus statement called for the national health authorities, WHO, the United Nations Children's Fund (UNICEF) and nongovernmental organizations (NGOs) to support implementation of CCM of pneumonia. A 2005 joint policy recommendation from WHO and UNICEF also recommended that "community-level treatment [of pneumonia] be carried out by well-trained and supervised CHWs." The global health community has since renewed appeals for more action to prevent and treat child pneumonia to reach the MDG 4. Furthermore, recent research by Save the Children, WHO and Boston University demonstrated that CHWs (Lady Health Workers) in Pakistan can effectively, acceptably and economically (i.e., at a savings over facility-based treatment) treat WHO-defined severe child pneumonia with chest indrawing in the community. Additionally, advances in rapid diagnosis of malaria can narrow the number of febrile cases and subsequently increase sensitivity of a pneumonia diagnosis. There is consensus that pneumonia case management with antibiotics remains a central control strategy, both through facilities and in the community.

This robust and well-communicated evidence has in recent years informed revisions of several national policies on CCM and antibiotic distribution through CHWs. According to a UNICEF CCM survey of 40 countries in Africa in 2010, 60% of countries have a policy that would permit CHW treatment of pneumonia. A number of countries on the 68 Countdown to 2015 priority list have amended their national policies to allow for community-based treatment of pneumonia. At least 10 sub-Saharan African countries have had policy change in this area between 2008 and 2010. This highlights the need for a strong relationship between practitioners familiar with emerging evidence and national policymakers to design community health interventions to meet MDGs and improve the functionality of the health system in low-resource settings.

REFERENCES:

- Joint statement: management of pneumonia in community settings. (2004). WHO/UNICEF: Geneva/New York.
- Kelly, J.M., et al. (2001). Community health worker performance in the management of multiple childhood illnesses: Siaya District, Kenya, 1997-2001. *American Journal of Public Health*, 91(10): p. 1617-24.
- Meeting report: Evidence base for community management of pneumonia. (2002). WHO: Geneva.
- Mulholland, K. (2007) Childhood pneumonia mortality—a permanent global emergency. *The Lancet*, 370(9583): p. 285-9.
- Meeting report: Evidence base for community management of pneumonia. (2002). WHO: Geneva.
- Rowe, S.Y., et al. (2007) Effect of multiple interventions on community health workers' adherence to clinical guidelines in Siaya district, Kenya. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 101(2): p. 188-202.
- Sazawal, S. and R.E. Black. (2003). Effect of pneumonia case management on mortality in neonates, infants, and preschool children: a meta-analysis of community-based trials. *The Lancet Infectious Diseases*, 3(9): p. 547-56.
- Wardlaw T, Salama P, Johansson EW, Mason E. (2006). Pneumonia: the leading killer of children. *The Lancet*, 368:1048-50.



Health Workforce: Who is a CHW and Who Supports Them?

A CHW subsystem is made up of the CHWs themselves, as well as their multi-tiered support structure of supervisors and community members. The core of the CHW subsystem is the interaction between the CHW and families in the community. Careful specification by the Ministry of Health of who CHWs are and their role in the community as well as the support that they are provided will facilitate service delivery and health improvements.

Most CHW models promote that CHWs be selected from the communities in which they will provide care. CHWs can be recruited and selected by community members in coordination with the primary health care system. A multi-step selection process and rigorous review can help select for quality and professionalism. One format for selection is that community committees select respected members of the community for candidacy. Then the CHW supervisors at the primary health care facility interview these candidates and make a final selection based on merit. Recruitment standards, which may include gender, literacy, specific education requirements, community standing among others, should be clearly set in the operational model. Standards should be adapted to a local context especially in cases where local candidates are not available for consideration. Females, even if less schooled than male counterparts, often are superior CHWs because of the cultural acceptability for them to conduct household visits, their familiarity with child health, their attachment to the community, and their less common use of alcohol in evenings – a common time for care-seeking for child illness. Furthermore, they are less likely to abandon their posts as CHWs for better opportunities, therefore mitigating the costs of retraining replacement CHWs.



The relationship between CHW cadres and other frontline health workers should be clearly defined. For example, team-based approaches where CHWs are paired with SBAs under the same supervisory structure have clear benefits for maternal care. Meanwhile, collaboration with other frontline workers such as community health volunteers can support household coverage requirements and mitigate problems of high task loads. Clear relationships can also avoid duplicating management systems vertically through the public health system. The relationship of CHWs with private community-level care providers should also be clearly delineated in national planning processes, wherever possible.

Management structures should support continuum of care, referral, training and quality of care, as well as efficient integration within the formal community-based primary health care system. Peer-based and community-based support of CHWs are also recommended. More senior CHWs can provide direct supervision or oversight at the community level, and community-based organizations or health committees can be engaged to provide oversight and review

of CHW performance. This would also provide an opportunity for CHWs to eventually become supervisors, having the experience to be able to effectively assist other CHWs with their work.

Direct supervision of CHWs through facility-based staff would also be crucial to providing a strong linkage to the primary health care system. Team-based care approaches combining community input with CHWs, other community health providers and facility-based clinical providers can improve quality of care, as seen in Box 1 on Brazil's team-based management approach. Supervisory structures can also be a means to create clear career ladders for CHWs, a component of workforce retention and motivation.

CHW subsystem designs should reflect clear expectations for supervision and management of the CHW cadre. Quality of care, retention of workforce, patient follow-up and patient referral are all at risk with inadequate workforce provisions. Workforce considerations also include ensuring appropriate distribution of CHWs according to geography and epidemiological needs.



Information: How do CHWs Provide and Use Data to Improve Health Outcomes?

Developing monitoring and evaluation (M&E) and reporting systems for decentralized monitoring, data collection, and quality improvement (QI) linked with national data systems provides countries the means with which to effectively plan, deploy and improve integrated community health and primary care systems. By capturing the complex and dynamic epidemiological and community shifts at the household level, community health workforces can provide vital information to inform both their own role and performance, but also local and national health system priorities.

Data flows within CHW subsystems can be used for:

- 1) support for CHWs' service delivery, in the form of decision support, health consultations and emergency response;
- 2) monitoring of vital events and disease surveillance;
- 3) process and impact information to inform CHW management, as well as to inform local-to-national policy decisions; and
- 4) information feedback mechanisms to provide CHWs and primary health care facilities with data that they can use to improve performance and quality of care locally.

Because CHWs provide the extension of health services to the community and household level, there is an opportunity for strengthened data collection at the household level. CHW data collection through household screening visits or activity reporting can generate a host of relevant information, including: the registration of vital events such as recent births and deaths (including verbal autopsies to determine cause of death), burden of diseases such as acute malnutrition or malaria, and coverage levels of essential interventions such as immunizations, pregnancy care and skilled delivery of newborns. For example, while not at national scale, NGOs such



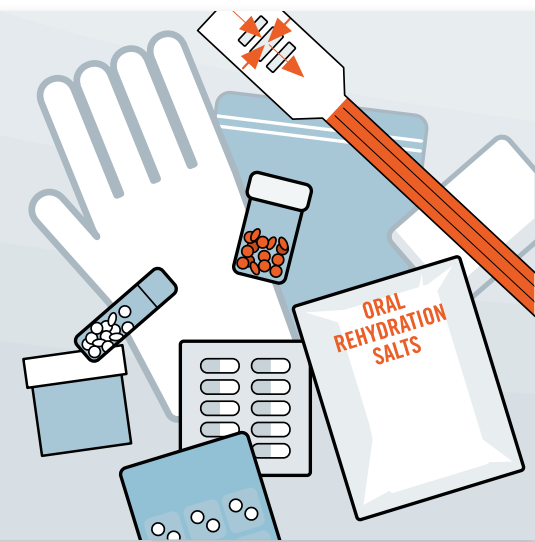
as Partners in Health has various projects that utilize a CHW-completed household chart to collect a variety of health related and public measurements, including but not limited to HIV status, mortality, pregnancies, PMTCT completion rates, site of delivery, bed-net status, water source, latrine status, active case finding for cough/fevers, malnutrition (via Mid-Upper Arm Circumference Strips (MUACs)) with food program completion rates, vaccine completion, family planning rates).

To date, the use of information by managers of community health workforces has been lacking, often due to a dearth of proven methods to collect data on household health status or, where such systems do exist, to an inability to effectively analyze data to inform management strategies and program decisions. In many cases lack of use of information may also stem from poor linkages with national information systems, which often have the capacity to support analysis and information use strategies. Training and human resource allocation should take the need for decentralized data management and utilization into account while ensuring the crucial link to national information systems.

Local CHW managers should be trained to use data and to adapt program strategy to fit shifting operational and epidemiological trends, allowing for continued process improvement and optimization of CHW quality, productivity, competence and motivation. Managers or other data compilation staff may also play a functional role in relaying analyses to governmental bodies in order to guide national policy

adjustment. Ideally, skilled personnel are retained for database development and management, including data aggregation and local-level preliminary analysis that can be transmitted to higher levels of the data and planning system.

Many CHW models use paper-based data tracking systems and computer-based systems for data reporting into national systems. However, emerging innovations in mobile health (mHealth) technologies can add capacity to enable strong CHW communication across each of the key elements above as well as provide point of care decision support. (See Appendix B for additional information on mobile health (mHealth) technologies to support CHW subsystems.) Development of CHW subsystems should take into account the potential of mHealth technologies for CHW subsystems and support linkages to information infrastructure development and support to facilitate adequate coverage.



Medical Products, Point of Care Diagnostics and Technology: What Tools do CHWs Need to Accomplish their Work?

CHWs must be equipped with a steady stock of supplies and commodities needed for their day-to-day operations. Depending on the service delivery package of interventions, this would include supplies such as: MUAC strips to screen for acute malnutrition, rapid diagnostic tests (RDTs) to diagnose malaria, anti-malarial drugs (ACTs) to treat malaria, anthelmintic drugs to treat intestinal parasites, Oral Rehydration Salts (ORS) and zinc to treat diarrhea, antibiotics to treat pneumonia, among many others. CHWs also need materials to support their mobility, with reliable and safe transportation between households (such as an umbrella or bicycles as appropriate in a given context) and backpacks for supplies.

CHW credibility in the community is very sensitive to commodity availability. If CHWs do not have a necessary supply and cannot perform their duties, they lose support from the families they serve and will be less effective over the long-term in reducing maternal and child mortality. CHW training and deployment without immediate, continuous and reliable supplies to accomplish tasks is inefficient, demotivating and damaging to CHW credibility. Therefore, a functional CHW system requires a robust supply management chain, with a keen eye to transport and drug supplies, as well as reliable supply chains for all other equipment required by CHWs to perform their job functions.

Reliable and sustainable supply chain systems are a challenge for large-scale primary health care and community health programs in general. Governments and partner organizations have over the years made substantial investments to improve the supply chain performance for primary health care systems, but in many countries the connections between PHC facilities and community-level workers have not received as much financial and operational support. Efforts to ensure reliability of medicines and supplies for CHWs

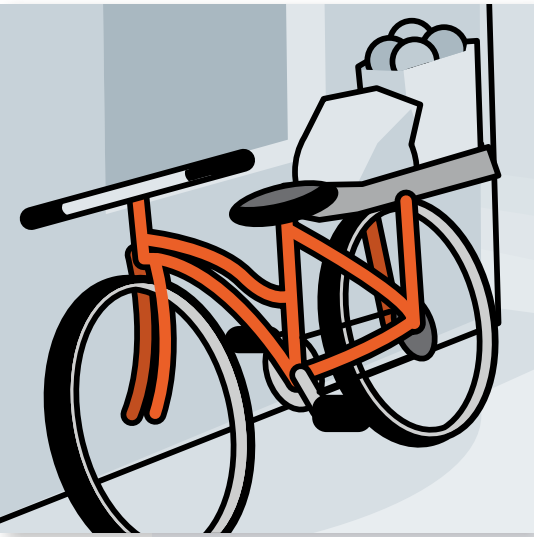


should be sought from donors, government ministry personnel, other health system staff and district-level management staff, and may include logistics management assessment tools as modified to analyze supply chain conditions.

Technological innovations may support supply chain reliability, including frontline knowledge of what supplies are needed and available. This information can be relayed back to supply chains via paper, facility-based communication, voice, SMS, or other applications on mobile phones. CHWs have been used to directly report on supply levels in many contexts. In addition to these technology-based solutions, critical solutions to increasing reliability in supply chains include the decentralization of systems management at the local level alongside primary health care stock management. Critical components to be considered in supply chain management include cold chain maintenance, infrastructure and national procurement.

At a local level, it is critical to also ensure that direct managers of CHWs are equipped with frequent data on supply availability and appropriate tools for forecasting. Specifically, training local managers to forecast supplies, predict shortages and communicate frequently with all providers who share resources, including CHWs and the appropriate primary health clinic staff, can contribute the reliability of supplies in CHW subsystems. Such strategies are explored in detail in other reports and operational guidance documents, including the WHO's Handbook of Supply Chain Management for all First-Level Health Care Facilities (2006), USAID and MSH's Guide for Implementing the Monitoring-Training-Planning (MTP) Approach to Build Skills for Pharmaceutical Management (2009), and USAID and JSI's Logistics Handbook (2009).

While there are several potential methods to address common supply chain challenges, this remains a critical area for improvement in many community health systems.



Financing: How Are CHWs Remunerated and Motivated?

CHW compensation should be appropriate to the context and proportionate to task load and expectations. Lack of appropriate remuneration as balanced with requested task load has been documented to reduce both motivation and quality of work among community health workforces, particularly when there are limited opportunities for career advancement. Consideration of professional expectations, task load, supervision and career advancement are all elements in CHW remuneration. In order to ensure full-time access to services, operational models should also consider deployment of full-time, paid CHWs who operate primarily in the community with limited, specified duties at the primary health care facility. The latter facilitates ongoing supervision, training and connectedness to the national health care system. This type of design is reflected in the operational and costing models described in the next section and in many of the country case studies in this report. Other forms of incentivization may include the supplies needed to perform the duties for service delivery, including backpacks, uniforms, bicycles or per diems for lunch or transport when receiving

training. Remuneration and incentivization of CHW supervisors is essential and should be included when financing a CHW subsystem.

Depending on the country context, a mix of paid community extension workers with community health volunteers could provide the best operational mix, with regard to achieving high coverage, equitable reach and cost-efficiency. Many countries have experience with such a mix, including Nepal, as described in Box 5. Nepal's successful mixed paid/volunteer model indicates that the optimal design may include a mixed full-time paid CHW and volunteer part-time community health workforce. It should be clear that supporting voluntary cadres also has cost implications, which should be formally considered in the process of CHW subsystem planning, design, and budget allocation.

Payment cannot on its own sustain workforce motivation and quality of care. Non-financial incentives, including strong management and feedback, community and professional support and career advancement opportunities play a crucial role in CHW motivation as well.



Leadership and Governance: How are CHWs Monitored and Supported?

Leadership and governance are important to ensure that a health workforce is adequately and effectively managed to deliver quality, needed health services. Gaps in quality of care damage the perception of community health and primary health care systems, lowering demand for care and also reducing the effectiveness of interventions delivered to those who seek care nonetheless. To reduce existing barriers to care and prevent new ones from developing, strong management and governmental leadership should conduct regular and rigorous examination of processes, operations and outcomes and deploy participatory management techniques for quality improvement. This includes careful consideration of community needs and input, health care status, and CHW process measures.

41

Box 5:

Nepal's Community Health Workers: A Successful Mixed Paid and Volunteer Model

Community Health Worker Title: Village Health Workers (VHWs), who are mostly male; Maternal Child Health Workers (MCHWs), who are female; and Female Community Health Volunteers (FCHVs)

Number of Community Health Workers: 3,000 VHWs; 2,500 MCHWs; and 49,000 FCHVs

Population Served: 25,000,000 (the whole rural population of Nepal)

Background: Through the 1980s, the key elements of an effective primary health care system were progressively deployed in rural Nepal. By the early 1990s, all elements were in place. These included Health Posts or Sub-Health Posts (and a much more limited number of Primary Health Care Centers), with catchment populations typically ranging from 5,000 to 10,000, each having a minimum of 1 professional health worker as a health facility in-charge, 1 VHW, 1 MCHW and 9 FCHVs (in many cases there are more than 9).

The VHWs and MCHWs are literate, paid, locally recruited (and non-transferable), and trained after employment (initial training lasting about 3 months). They work full-time. They spend part of their time providing services at the health post/sub-health-post and part of their time providing services from outreach delivery sites. Both cadres are responsible for a range of maternal and child health interventions, family

planning and other services. VHWs provide almost all immunization services in rural areas and do so primarily through outreach sites. VHWs are also responsible for supervising and supporting FCHVs.

FCHVs are volunteers, though they receive a variety of incentives for different aspects of their work. They are a nationally recognized community health cadre. Selection criteria include being married and selected by their communities; literacy is not a requirement. FCHVs typically work between 4-8 hours a week in FCHV duties. Their functions are diverse and include: dosing of children in twice-annual vitamin A and deworming distributions, antenatal counseling and commodity distribution (including iron-folate) and case-management of childhood illness (including antibiotic treatment of pneumonia). FCHVs normally cover 100-150 households. Although they do not systematically visit every household, they are normally able reach virtually all of those eligible for services within their catchment area, for example all pregnant women, or all children under 5 requiring twice annual vitamin A dosing. According to UNICEF, in the State of the World's Children 2011, 95% of 6-to-59-month olds in Nepal received two doses of Vitamin A supplements in 2009. Attrition is low, at ~3-4% per annum.

REFERENCES:

Justice J. (2003) A Study of the Concept of Volunteerism: Focus on Community-Based Health Volunteers in Selected Areas of Nepal.

Glenton et al. (2010) The female community health volunteer programme in Nepal: Decision makers' perceptions of volunteerism, payment and other incentives. *Social Science & Medicine*, 70: 1920-1927

Program Impact: Despite civil war, difficulties in political transition, and sluggish economic growth, Nepal has seen greater reductions in child mortality than all but a handful of countries. This can be attributed in significant measure to its effective primary health care services, which in turn depend largely on the effective work of these three cadres of CHWs

Key Feature: Effective Delivery by Volunteers Supported by Paid CHWs

For some services, the paid community health cadres perform primary functions, with support provided by FCHVs. For example, vaccination is done by VHWs, while FCHVs ensure that all eligible children come for service at outreach sites. For other services, FCHVs play the primary role, with support from the paid cadres, such as vitamin A and deworming distribution, which are done primarily by FCHVs with supervision and logistical support provided by VHWs, MCHWs and other paid health workers.

Many studies have cited the positive impact of adequate supervision and strong information usage in policy decisions on health outcomes. However, many evaluations of existing CHW programs cite a lack of proper supervision as a common barrier to delivery of community health services, often due to poor planning, work overload and poor funding for supervision components. According to a 2008 review on the role of supervision in primary health care by Bosch-Capblanch and Garner, effective supervision is most commonly comprised of problem solving in dialogue with health workers, comparing services delivered against the national or local norms and standards, and examining information against expected outputs. As supervisors may be from different social classes than CHWs, it is crucial to enable CHWs to have an open dialogue with their managers to facilitate these types of communication through management training as well as frequent contact between CHWs and managers in team care settings.

Strong local management can include: data-informed feedback to CHWs, community input and feedback mechanisms on CHW performance in the community, refresher trainings and peer review, morbidity and mortality rounds at the local level, and leadership meetings between the CHW supervisory level and district level health system policy makers in contexts with decentralized health system management.

Community supervisory mechanisms include village health committee review, as discussed below. Some CHW programs use the regular presentation of health care outcome metrics in a common forum to contribute to accountability and community owner-

ship of the CHW subsystem's success. Well-publicized days where local health data are shared and presented to the community has also been a successful and popular way for communities and primary care systems to discuss the progress and challenges faced together. These can be facilitated by CHWs.

Process information and outcome reports that are linked into national data registries and delivered to national ministries responsible for health should also contribute to regular CHW subsystem policy review as well as to operational research. Communications across the CHW subsystem and with higher levels of policy planning allow the health system to focus on addressing systematic failures and replicating noted successes. This is discussed further in the National Planning, Training and Deployment section.



Community Engagement in CHW Subsystems

Community engagement and supports should be built into each of the above health system building blocks and explicitly addressed in national policy planning for the CHW subsystem operational design. Care at the community level is intimately engaged with the families receiving services, and community members' input can be invaluable in navigating the household and community-level service provision interface.

A focus on community engagement in PHC system design was highlighted in the Alma Ata process, which cited four reasons for community engagement in primary health care:

- a) "People are more likely to use and respond positively to health services if they have been involved in decisions about how these services are delivered, thus helping to make the services sustainable;
- b) People have individual and collective resources (time, money, materials, energy) to contribute to activities for health improvements in the community;
- c) People are more likely to change risky health behaviors when they have been involved in deciding how that change might happen; and
- d) People gain information, skills and experience in community involvement that help them take control over their own lives and challenge social systems that have sustained their deprivation." (Rifkin 2009)

All of these reasons remain valid today, and are further supported by mounting evidence that community mobilization approaches improve both maternal and child health outcomes. Operating at the community level, CHW subsystems are vulnerable to poor support and program outcomes unless they are driven by and firmly embedded in communities. Without involvement in the definition and development of the CHW's role, communities lack interest and expectations, and potentially misunderstand the CHWs role. This

not only leaves CHWs without a support system but also creates resentment and distrust amongst community members. Furthermore, communities are best placed to address equity gaps in health care coverage through identification of their disadvantages and development of appropriate social support systems for the underserved in partnership with trained CHWs who are also members of the community.

Research has suggested that several conditions are essential for establishing effective community approaches to improving health outcomes. These include:

- a) Trust and respect between the community and the health system, and between the CHW and the community members;
- b) A strong outreach system that brings technical expertise, medicines, vaccines and products to the community;
- c) Training and deployment of CHWs who can implement evidence-based interventions and reach patients who need them;
- d) A system for maintaining contact with all households and providing systematic visitation;
- e) A focus on interventions which require behavior change for ingrained cultural beliefs and practices; and
- f) A reliable referral system to provide access to advanced, quality care.

Strong CHW subsystems can address each of these conditions, which in turn provide the framework within which a CHW subsystem can be successful.

CHWs serve as a bridge between facility-based PHC staff and the community and need to be responsive to both different groups. In addition to providing basic preventive and curative services at the household and community levels, CHWs can help communities identify and address their own health needs. They can provide information to health system managers, who subsequently reach policy makers. This allows CHWs to help mobilize community resources, act as advocates for the community, and build local capacity.

To actively engage the community in the CHW subsystem, CHWs must be well-trained to do so. They must have intimate knowledge of the community, a

nuanced understanding of community perspectives on health and well-being and an awareness of community resources and strengths, such as supportive social practices and systems that benefit health. This is facilitated by selecting CHWs from within the community that will act as their catchment area. CHWs must also have planning, communication and collaboration skills to facilitate community dialogue, cross-sectoral collaboration and problem-solving in a culturally competent way.

The community itself must also be mobilized and have a set of skills to actively participate and support the CHW including health knowledge, planning and management skills, leadership, communication skills, and a commitment to collaborate with health services. Mobilized communities can help identify and select CHWs, provide local legitimacy to the CHWs' role, support CHWs' household and community outreach tasks, provide additional intrinsic and extrinsic incentives as motivators, guide health delivery interventions, problem-solve, and hold service providers accountable. When health systems are weak and mortality is high, a fully developed community approach will offer significant contributions to the health system.

Some common and effective mechanisms for community engagement are health center management committees and village health committees, which have helped ensure local leadership, legitimacy, participation and governance in several countries. Community engagement also includes surveying and partnering with existing community-based organizations, non-government organizations, faith-based organizations, leaders and the private sector to support the CHW program. For example, peer support groups have been effective at reducing stigma, supporting home care, and overcoming obstacles to care-seeking and practice of key behaviors. Participatory women's groups, in particular, have been cited for their effect on women's empowerment leading to positive health outcomes, especially when linked to savings and loan programs. Local multi-agency, cross-sectoral coordination committees can address determinants of health, contributing to sustainable cause-specific reductions in mortality.

Box 6:

From the Kakamega Community-based health care project to Kenya's Community Health Strategy

Background: The Kakamega project was carried out from 1976 to 1982 as the National Pilot Project on Organisation and Management of Community-Based Health Care in Kenya.

The national pilot resulted in a clear demonstration that:

- a) It was possible to mobilize communities to engage in coordinated improvement of their health with significant improvement in health outputs.
- b) Communities could select one from among themselves to be trained as their Community Health Worker (CHW), and once trained CHWs were available, people in the communities extensively utilized their services.

- c) Community Health Committees (CHCs) were crucial for maintaining the momentum of community engagement.
- d) Linkages could be established between communities and the national health system.

Scaling up: There was a long period of debate over whether or not CHWs could be a formal cadre in the national health system. A 2004 evaluation showed worsening health indices (such as higher infant and child mortality rates) with a decline in utilization of formal health services, indicating a need to engage communities. The focus of the 2005-2010 Health Sector Strategic Plan was “Reversing the Trends,” presenting the Community Health Strategy (CHS) as the foundation of the health system. The CHS

As with each of the operational design components discussed above, research shows that community participation models are also subject to local contextualization. There is no standard definition of a community or one set model for community participation. As each community is a reflection of its local culture, history, politics and interaction with the health system, each unique local context will present differentiated challenges to standardized health services. These challenges will change over time with demographic and epidemiological shifts. In addition, it is important to recognize that any “community” is not a single entity. Often a community is a variety of groups that are related in some way (most commonly by geogra-

phy), and there will likely be divergences on key common issues. Sub-national variation in community engagement mechanisms with a core common structure is recommended, as with the other operational design components noted above.

Several international health and development organizations have developed expertise in building the capacity of local organizations, which should be embraced by health policy makers in the process of planning CHW subsystems. The Kakamega Community-Based Health Care Project (see Box 6) is one example of how a local organization's community engagement strategies were embraced in national planning of Kenya's Community Health Strategy

has been implemented since 2006 through partnerships involving communities, government and development partners.

Community engagement and mobilization strategies: Community engagement and mobilization starts at the very first meeting called by the area Chief, who has previously been fully briefed, to announce that the CHS is coming to the locality. An 11-member Community Health Committee (CHC) is formed, and all parts of the community and relevant interest groups (e.g., women's groups, youth and faith communities) are represented. Public selection of the several CHWs in a CHC's area is then carried out with participation of the CHC. Both CHCs and CHWs have established training curricula.

After initial CHC development and CHW selection, community mobilization and engagement is maintained through a combination of actions. The CHWs equipped with kits carry out home visits to each household in their catchment area at least once a month and are available daily at known locations during certain hours to provide health services for care-seeking individuals. They also carry out referrals. CHWs keep data on the area of their responsibility displayed on a chalkboard in the community centre. CHCs plan and coordinate monthly Community Dialogue Days when the entire community comes together to discuss health concerns on which action is needed and quarterly Community Action Days to tackle issues like protection of springs, inspection of households for functional latrines, or

fundraising to meet the cost of an identified need. Technical advice and supervisory support is available from a Community Health Extension Worker (CHEW), a mid-level health worker involved in supervising CHWs.

Currently, the CHS is deployed in one-third of communities in Kenya. The system has reduced cholera epidemics and other health burdens. Demand for further expansion is high across the nation.

Sample Operational Design for Cost Considerations

To provide an example configuration of an optimal model across the WHO health systems building blocks as well as to present cost considerations for a CHW subsystem, we provide as an example the operational model below. This provides an opportunity to explore one configuration of a CHW subsystem. This example is used in the next section of the report to provide an Africa-wide macro-cost analysis.

The example model presented in Table 2 represents an operation design for a CHW subsystem that acts as a formal extension of the primary health care system to the household level through paid, full-time CHWs providing a mix of systematic household visits and community case management. These CHWs would provide evidence-based basic community health interventions to improve community health, with a focus on maternal, newborn and child health, and to provide linkages to referral-based care. The example model is based upon the UN-agency and multi-national government-supported Millennium Villages Project, which reflects local implementation of national policies and international best practices in 10 African countries under common implementation constraints, with input from CHW programs deployed by Ministries of Health in multiple countries, international NGO-led CHW programs, and best practices in the scientific literature that have been shown to demonstrate an impact on mortality and morbidity. The example model is summarized as a system of inputs, processes, and expected outputs for each WHO health systems building block in Table 2.



Next Steps

Context-based operational design should aim to extend the health care system to the community level in the most effective way possible. As an integral part of the planning and deployment process, clear operational design decisions at the national level should define a core definition of the CHW subsystem at scale.

The example operational design presented in Table 2 above presents one of the more cost-intensive operational models for deployment in rural settings with poor access to facility-based care. To facilitate discussions of CHW subsystem scaling, we will now present a framework for determining expected macro-costs for the CHW subsystem of a national primary health care by costing the above example design across rural Africa.

Table 2: Example: Operational Design

	INPUTS	PROCESSES	OUTPUTS
Service Delivery	Activities and skills (CCM for malaria, pneumonia, malnutrition, diarrhea; deworming; TB screening; assistance in adherence to drugs for HIV and TB; health promotion and disease prevention)	Household health behavior change and improved access to disease control, health prevention and basic curative health services at the household/ community level	Improved health status of community members through increased coverage of high-impact interventions
	Referral and follow-up system to primary health clinics, availability of emergency transport	Provide connection point to broader health system (advanced care)	Increased use of advanced care and institutional delivery
Health Workforce	CHWs selected through community/facility partnership	Improved geographic and cultural access to health services at the household / community level	Improved health through increased coverage of high-impact interventions
	Senior CHWs (experienced CHWs, selected for supportive supervision)	Quality of care monitored and supportive supervision provided to CHWs	Improved service quality, data reporting and CHW retention
	CHW Managers (facility-based workers with training in management skills)	CHW program monitored, including system performance and links to both facilities and communities	Improved links to referral facilities and community governance structures. Improved quality of CHW subsystem.
Information	Health data reporting, and vital statistics tracking by CHW	Health indicators monitored and discussed at community level	Data used to inform program strategy, engage communities, and improve health status
	Utilization of information by CHW program managers stakeholders (CHWs, supervisors, District Health Management Team [DHMT], facility staff, CHCs)	Health indicators used to inform management	Data used to guide community actions for health and program improvements
	Information feedback mechanisms	Communities informed about epidemiology, health status, service delivery and quality of care; Community feedback prompted.	Data used to identify service delivery weaknesses and track quality improvement results
	Mobile technology suite (cell phone, text messaging, voice)	Real-time data collection, alerts for emergency care and decision support at point of care facilitated	Improved quality of services
Medical Products, POC	Equipments, consumables and tools to assess sickness and commodities for diagnosis and treatment (ORS, Zinc, ACTs, RDTs, sputum containers for TB, deworming drugs [Albendazol, Praziquantel], pneumonia antibiotics)	Delivery of health service, surveillance of danger signs, community-based treatment of specified diseases / conditions made possible.	Improved health status of community members through increased coverage of high-impact interventions
Financing	Remuneration of CHWs	CHWs supported as full-time professionals	Development of a professional, paid workforce with well-defined terms of reference.
	Financing for professionalization (trainings, uniforms, equipment, commodities, professional development/career advancement)	CHWs regularly trained, incentivized for high performance, and retained	Improved CHW motivation and capabilities to provide quality care (with appropriate tools)
Leadership and governance	Community governance structures	Local specification and community-based selection and oversight supported.	CHW workforce efficiently supervised and managed and trained in capabilities necessary for improved maternal and child health indicators; community mobilized and engaged in CHW subsystem.
	Governance structures from ministries of health and partner organizations	CHW program in adherence with government policy	
	Quality improvement processes and organizational culture	Culture of quality improvement developed within the workforce	
	Career ladder, professional training curricula, and national certification	Strong CHW candidates attracted; motivated CHWs execute roles and responsibilities	Improved CHW motivation and increased quality of candidates

REFERENCES

- Aubel, J. (1998). Communication for empowerment: Strengthening partnerships for community health & development". UNICEF, BASICS,
- Bang, A. T., Bang, R. A., Reddy, H. M., Deshmukh, M. D., & Baitule, S. B. (2005). Reduced incidence of neonatal morbidities: Effect of home-based neonatal care in rural gadchiroli, india. *Journal of Perinatology*, 25, S51-S61.
- Bhattacharyya, K., Winch, P., LeBan, K., Tien, M., & BASICS. (2001). Community health worker incentives and disincentives: How they affect motivation, retention, and sustainability. BASICS II.
- Bhutta, Z. A., Lassi, Z., Pariyo, G., & Huicho, L. (2010). Global experience of community health workers for delivery of health-related millennium development goals: A systematic review, country case studies, and recommendations for integration into national health systems. World Health Organization,
- Bhutta, Z. A., Ahmed, T., Black, R. E., Cousens, S., Dewey, K., Giugliani, E., et al. (2008). What works? interventions for maternal and child undernutrition and survival. *The Lancet*, 371(9610), 417-440.
- Bhutta, Z. A., Lassi, Z. S., Blanc, A., & Donnay, F. (2010). Linkages among reproductive health, maternal health, and perinatal outcomes. *Seminars in Perinatology*, 34(6), 434-445.
- Black, R. E., Morris, S. S., & Bryce, J. (2003). Where and why are 10 million children dying every year? *The Lancet*, 361(9376), 2226-2234.
- Bosch-Capblanch, X., & Garner, P. (2008). Primary health care supervision in developing countries supervision of health services in developing countries. *Tropical Medicine & International Health*, 13(3), 369-383.
- Darmstadt, G. L., Bhutta, Z. A., Cousens, S., Adam, T., Walker, N., & de Bernis, L. (2005). Evidence-based, cost-effective interventions: How many newborn babies can we save? *The Lancet*, 365(9463), 977-988.
- Dieleman, M., & Harnmeijer, J. W. Improving health worker performance: In search of promising practices. World Health Organization,
- Ekman, B., Pathmanathan, I., & Liljestrand, J. (2008). Integrating health interventions for women, newborn babies, and children: A framework for action. *The Lancet*, 372(9642), 990-1000.
- Haines, A., Sanders, D., Lehmann, U., Rowe, A. K., Lawn, J. E., Jan, S., et al. (2007). Achieving child survival goals: Potential contribution of community health workers. *The Lancet*, 369(9579), 2121-2131.
- Howard-Grabman, L., & Snetro, G. (2009). How to mobilize communities for health and social change. Johns Hopkins University: The Center for Communications Programs,
- Kutty, V., Taylor-Ide D., & Taylor C.E. (2002). Just and lasting change. when communities own their futures.: Daniel taylor-ide and carl E taylor. baltimore, MD: The johns hopkins university press, 2002, pp. 350, pound13.50. ISBN: 0-8018-6825-4. *International Journal of Epidemiology*, 31(6), 1281-1282.
- Lassi, Z. S., Haider, B. A., & Bhutta, Z. A. (2010). Community-based intervention packages for reducing maternal and neonatal morbidity and mortality and improving neonatal outcomes. *Cochrane Database System Review*, 11
- Lawn, J. E., Cousens, S. N., Darmstadt, G. L., Bhutta, Z. A., Martines, J., Paul, V., et al. (2006). 1 year after the lancet neonatal survival Series—was the call for action heard? *The Lancet*, 367(9521), 1541-1547.
- Lawn, J. E., Cousens, S., & Zupan, J. (2005). 4 million neonatal deaths: When? where? why? *The Lancet*, 365(9462), 891-900.
- Leatherman, S., Ferris, T., Berwick, D., Omaswa, F., & Crisp, N. (2010). The role of quality improvement in strengthening health systems in developing countries. *International Journal for Quality in Health Care*, 22(4), 237-243.
- Lehman, U., & Sanders, D. (2007). Community health workers: What do we know about them? the state of evidence on programs, activities, costs and impact on health outcomes of using community health workers. World Health Organization: Department of Human Resources for Health,
- Lewin, S., Munabi-Babigumira, S., Glenton, C., Daniels, K., Bosch-Capblanch, X., van Wyk, B. E., et al. (2010). Lay health workers in primary and community health care for maternal and child health and the management of infectious diseases. *Cochrane Database of Systematic Reviews*, (3)
- Magnussen, L., Ehiri, J., & Jolly, P. (2004). Comprehensive versus selective primary health care: Lessons for global health policy. *Health Affairs (Millwood, Va.)*, 23(3), 167-176.
- Mathauer, I., & Imhoff, I. (2006). Health worker motivation in africa: The role of non-financial incentives and human resource management tools. *Human Resources for Health*, 4, 24.
- Perry, H., & Freeman, P. (2009). How effective is primary health care in improving the health of children? International Section of the American Public Health Association,
- Prasad, B. M., & Muraleedharan, V. R. (2007). Community health workers: A review of concepts, practice, and policy concerns. United Kingdom Government Department for International Development,
- Rifkin, S. B. (2009). Lessons from community participation in health programmes: A review of the post alma-ata experience. *International Health*, 1(1), 31-36.
- Rosato, M., Laverack, G., Grabman, L. H., Tripathy, P., Nair, N., Mwansambo, C., et al. (2008). Community participation: Lessons for maternal, newborn, and child health. *The Lancet*, 372(9642), 962-971.
- Rowe, A. K., de Savigny, D., Lanata, C. F., & Victora, C. G. (2005). How can we achieve and maintain high-quality performance of health workers in low-resource settings? *The Lancet*, 366(9490), 1026-1035.
- Walt, G. G. (1988). CHWs: Are national programmes in crisis? *Health Policy and Planning*, 3(1), 1-21.
- Walt, G., Perera, M., & Heggenhougen, K. (1989). Are large-scale volunteer community health worker programmes feasible? the case of sri lanka. *Social Science & Medicine*, 29(5), 599-608.
- Winch, P., Bhattacharyya, K., Debay, M., Sarriot, E. G., Bertoli, S. A., & Morrow, R. H. (2003). Improving the performance of facility- and community-based health workers, C.S.a.T.S. Project,
- Winch, P. J., Gilroy, K. E., Wolfheim, C., Starbuck, E. S., Young, M. W., Walker, L. D., et al. (2005). Intervention models for the management of children with signs of pneumonia or malaria by community health workers. *Health Policy and Planning*, 20(4), 199-212.

Estimated Financing Needs



Estimated Financing Needs

KEY POINTS

- We estimate that the average yearly cost of deploying the example operational model to serve the low-income Sub-Saharan African rural population by 2015 would be approximately US\$6.56 per person served in rural areas or US\$2.63 per capita to access the CHW subsystem. This results in a total of approximately US\$2.3 billion per year, which includes existing expenditures from national governments and donors.
- The costs associated with delivering evidence-based community health interventions via CHWs for maternal, neonatal and child health are within estimates of the overall primary health care system cost of \$54 per capita provided by the Commission on Macroeconomics and Health.
- We estimate the cost per trained, deployed CHW is \$3,586; CHW subsystems represent a strong investment in health systems that will allow low-income sub-Saharan African countries to achieve the MDGs.
- The costing algorithms provided below will be tailored in the process of implementing nationally-led deployment to reflect current expenditures and gaps.

Summary of Findings

An important component of policy planning and advocacy is estimating the cost of a fully deployed program. This section gives an approximate cost estimate of fully deployed CHW subsystems across low-income sub-Saharan African countries, and it develops a costing framework for countries to refine and adapt in their own national planning. The costs of the CHW subsystem include: training and salaries, supervision, and the supplies that full-time, paid CHWs would need to provide services to rural households.

The exercise below estimates the average yearly cost of deploying CHWs to service the entire sub-Saharan African rural population by 2015 would be around US\$2.3 billion per year. That cost would be covered both by national governments and donor partners. This sum translates into \$6.56 per year per person covered by the CHW subsystem or \$2.62 per capita (total population in country). It also signifies that \$3,584 would be needed to train, equip and maintain each CHW per year.

The sum of \$2.3 billion for the CHW subsystem is entirely reasonable, indeed modest in view of the crucial services provided by CHWs. Several studies during the past decade, beginning with the Commission on Macroeconomics and Health, the UN Millennium Project, and the International Task Force on Innovative Financing for Health, have concluded that a primary health system in low-income settings should cost on the order of \$50 to \$55 per capita per year in 2011 prices. This means that the CHW subsystem is roughly 10 percent of the total cost of a primary health system, a reasonable outlay given the range of life-saving services that the CHWs will provide.

The details of the financing at the country level are outside of the scope of this report and our costing estimates are only meant to shed light on the reasonable costs that we would expect in each country. The actual financing model will emerge as each country undertakes its own national strategy for deploying CHWs at the national level. As those plans are elaborated, reflecting the various local costs of training and deploying the CHWs, each government will

make clear what its own budget can support, and therefore what financing gap should be addressed by its development partners. A convenient mechanism to fill the funding gap will be national CHW action plans submitted for financing to the Global Fund to Fight AIDS, TB, and Malaria, and to other similar programs. In those action plans, a fully articulated financing strategy will have to be developed and presented.

The total costs of CHW subsystems are modest, well within overall budget constraints and well within the boundaries of donor assistance as pledged and anticipated in future years. This costing envelope should therefore give all partners the confidence to proceed as soon as possible with the scaling up of CHW subsystems, in order to achieve the MDGs as quickly as possible.

ASSUMPTIONS AND CONDITIONS

From the outset, it is important to note that a functioning CHW subsystem will depend on the rest of the health system to be functional. While hospitals, clinics, and non-CHW health staff are not included in the costing model below, they would be vital to provide logistical support to the CHWs, to ensure adequate supplies of medicines, and ensuring that CHWs can effectively refer patients to other parts of the health system. In addition, this exercise excludes interventions that are crucial in a rural African setting but would not be necessarily distributed by CHWs, such as distribution of insecticide-impregnated bed-nets to reduce malaria transmission, provision of antiretroviral therapy for HIV patients, and treatment of tuberculosis.

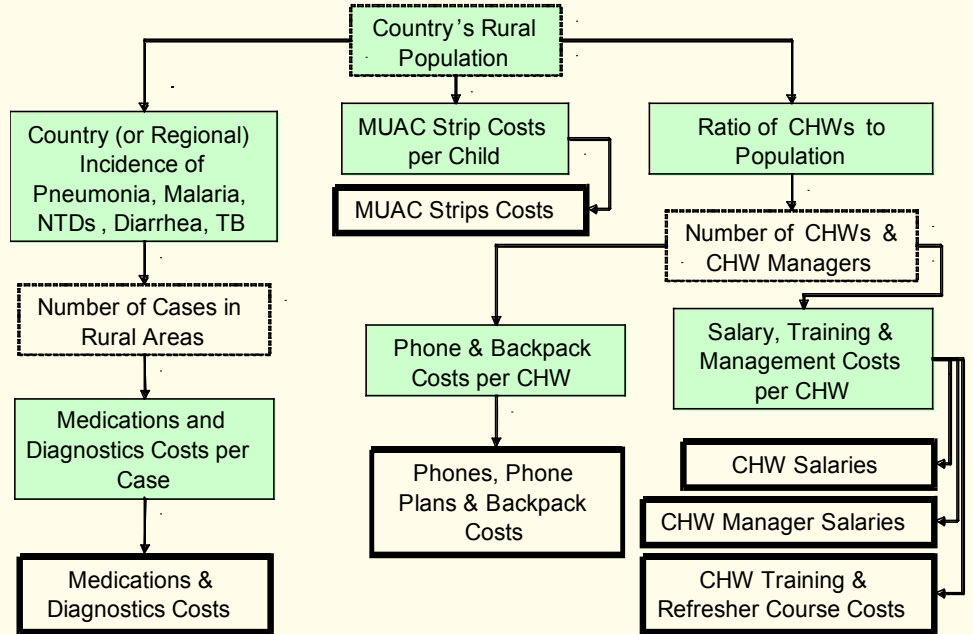
A quarter of the CHWs in this costing model are rolled out starting in 2012, ramping up to full coverage by 2015. The costs are presented as the average yearly costs during the ramp-up phase of 2012 to 2015 and as the average yearly cost per person being serviced by the CHW program. The population serviced by the CHW program ramps up to the entire rural population by 2015.

Countries may choose to have CHWs that have supplemental skills or responsibilities beyond general training, which may vary across countries due to differences in policies or disease prevalence. This costing exercise illustrates one possible configuration where generally trained CHWs are further trained to work closely with skilled birth attendants in teams to enhance maternal health efforts. We therefore provide an overall cost for the CHW subsystem that takes into account the following CHW operational design decisions: the majority of CHWs are trained as a generalist and service all rural households in their catchment area (as in the example operational design above), while supplemental training allows for CHW specialization in team-based care approaches with skilled birth attendants, with these CHWs providing services only to households with pregnant women. Although the latter group is reliant upon a skilled clinical team member for supporting pregnancy and childbirth, we term them “childbirth-specialist” CHWs for the sake of discussion. Regardless, all CHWs are part of the same CHW subsystem and rely upon more clinically skilled providers to establish a continuum of care.

The algorithms below summarize the steps taken in this costing exercise. Beginning with each low-income sub-Saharan African country’s rural population, we proceed to estimate the CHW human resource expenses (training, salaries, management) and supplies (phones, phone plans, backpacks) for both generalist CHWs and childbirth-specialist CHWs. Generalist CHWs will also carry medical supplies to monitor undernutrition (MUAC strips), screen for TB, and treat illnesses (diarrhea, malaria and parasitic infections). In addition to general monitoring and referrals of pregnancies, the childbirth specialists will screen pregnant mothers for HIV in order to know whether PMTCT (Prevention of Mother-to-Child Transmission) protocols apply.

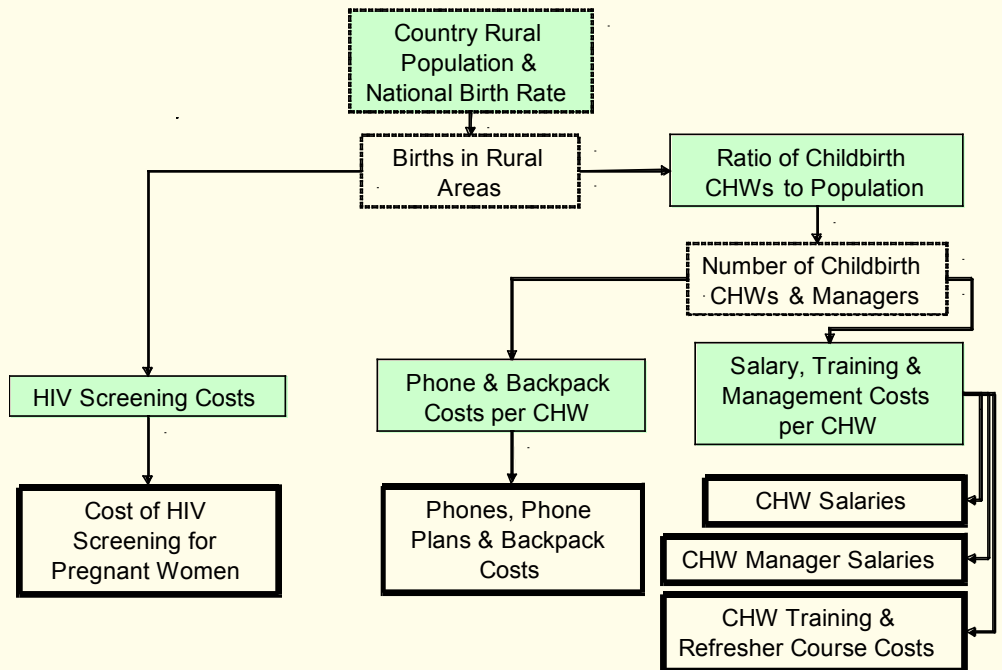
The diagrams illustrate the algorithm for costing, including junctures (represented by green squares) requiring data on population, disease incidence, and costs of supplies and commodities.

Costing Algorithm for Community Health Workers (Generalists)

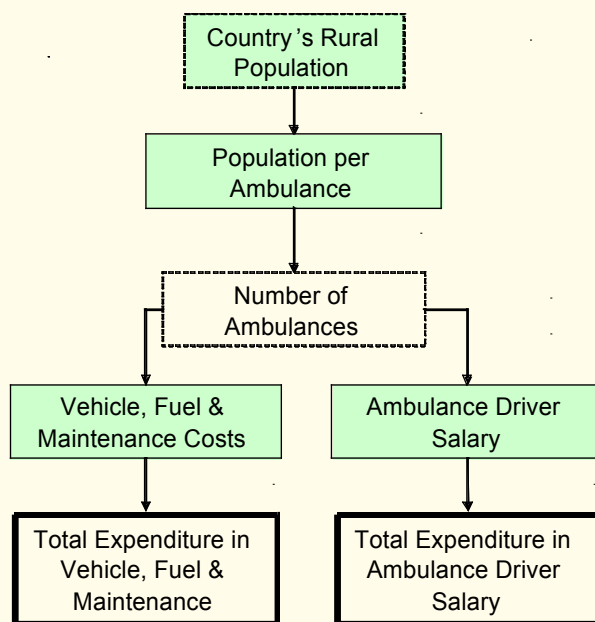


The diagrams illustrate the algorithm for costing, including junctures (represented by green squares) requiring data on population, disease incidence, and costs of supplies and commodities.

Costing Algorithm for Community Health Workers (Childbirth)



Costing Algorithm for CHW Referral System Costs



In addition to the expenses immediately relevant to the CHWs, we include the cost of an ambulance to complete a community-based referral system to the closest adequately equipped health facility:

COST INPUTS

Both generalist and childbirth-specialist CHWs generate the same human resource expenditures, as follows. Unit inputs were derived from the Millennium Villages Project's CHW Program costs.

Backpacks & Mobile Phone: Each CHW is given a mobile phone costing \$35, a voice plan costing \$212.50 per year, and unlimited text messaging for \$180 per year. National CHW programs might establish Closed User Groups – a nationwide network that allows free calls and SMS between identified health staff. Each CHW is also given a backpack costing \$10.

Training: CHWs in this costing model receive a year of training: 3 months in classroom and 9 months in-service with additional supervision and feedback. They also receive a yearly refresher course lasting 20 hours. The UN Millennium Villages Project has found that training 50 CHWs for 80 hours costs \$300, from which an hourly cost was computed and

used for the costing. These costs are very similar to the training costs of Pakistan's national Lady Health Worker program, which are around \$120 per CHW. Following the experience of Pakistan's national Lady Health Worker program, the model assumes 5% attrition of students during the training phase.

Salaries: We assume that each CHW receives a salary of \$80 per month. This figure represents empirical averages across the Millennium Village Project settings across ten countries, which is reflective of local employment conditions. This figure will fluctuate based upon national standards, market rates and rural retention incentives.

Management: Each CHW Manager is assumed to manage 30 CHWs. Managers in this model receive a salary of \$4,000 per year (please see qualification in Salaries on the source of this figure). CHW managers could be primary health-care facility clinicians with supplemental training in management, parlaying some of this cost into existing primary health care system budgets.

Overhead: We add 15% of the cost to account for the overhead costs at the local, national and international level in a global effort to reach full coverage of CHWs across low-income sub-Saharan Africa by 2015. This includes components of the operational design not listed as segregated costs, such as community engagement and information management.

The generalist CHWs are expected to generate the following costs according to their responsibilities:

Monitoring for undernutrition: CHWs will use MUAC (mid-upper arm circumference) strips to monitor children for undernutrition. These require one MUAC strip per child per year, costing \$0.15 each.

Treating diarrheal disease: CHWs will treat diarrheal episodes with Oral Rehydration Salts (ORS) and zinc tablets, which together cost \$0.54. We assume that children under age 5 in North Africa have 4 episodes of diarrhea per year, while those in sub-Saharan Africa have 5 episodes per year. People above age 5 are assumed to have 0.86 episodes in North Africa, while those in sub-Saharan Africa are expected to have 1.28 episodes.¹ This leads to an estimate of around 1.2 billion diarrhea episodes per year in rural Africa.

Testing for and treating malaria:² Given that peripheral levels of the health system, particularly in rural areas, often cannot meet the laboratory requirements for microscopy, a variety of simple Rapid Diagnostic Tests (RDTs) have been developed for accurate and reliable malaria diagnosis by CHWs and health facilities. According to WHO protocol, all fevers in malarious areas should be diagnosed using RDT prior to treatment with antimalarials. We used the UN Population Division's World Population Prospects' demographic breakdown for 2010 to divide our population at risk into groups aged 0-4, 5-9, 10-14, and 14+. The 0-4 age group is expected to experience two fevers per year, the 5-9 and 10-14 age groups are assumed to experience one fever episode per year and the age 14+ group experiences 0.5 fever episodes per year (these are taken as the average number of fevers from all causes, across all malaria endemicity levels). One RDT kit is needed for each of these fever episodes and costs US\$0.61 per kit.

We also calculate costs of treating malaria with Artemisinin-based Combination Therapies (ACTs). We assume that RDT will reveal that around 30% of the fevers are due to malaria and require ACTs. The total number of fever episodes requiring malaria treatment in 2010 is estimated at 200 million, which is within the range of other published estimates. Each case can be treated with either artemether-lumefantrine or artesunate-amodiaquine. Artemether-lumefantrine costs \$0.45 for the 0-4 age group, \$0.90 for the 5-9 age group, \$1.35 for the 10-14 age group, and \$1.80 for the 14+ age group. Artesunate-amodiaquine is estimated to cost \$0.23 for the children under 1, \$0.45 for the 1-6 age group, \$0.80 for the 7-13 age group, and \$1.48 for the 13+ age group. (We used RBM's recommended dosages and averages of prices from Novartis, Sanofi-Aventis, Ipca and Cipla, and adjusted to match age groups in our analysis). We used the average of the cost of artemether-lumefantrine and artesunate-amodiaquine.

Deworming³: Using country-level prevalence data of ascariasis, trichuriasis, and hookworm, we used the following protocol: if the country-level prevalence of any of the three diseases is over 50%, all individuals receive three doses of Albendazole (costing \$0.02 per dose) per year. If the prevalence is above 20% and below 50%, then one dose of Albendazole is given. For schistosomiasis, we use the following protocol: if the prevalence is above 50%, every eligible person (everyone above age 4) is treated with Praziquantel once a year. If the prevalence is above 10% then every eligible person is treated once every two years. If the prevalence is below 10%, then only school-age children are treated twice during their school-aged years (once on entry and once on exit). Praziquantel costs \$0.22 a tablet, and since the number of tablets in the treatment varies from 1-5 depending on body weight, we assume that on average 2.5 tablets are given per treatment.

Pneumonia: Using WHO reported 131.3 million pneumonia episodes in Africa in 2004¹, we calculate number of episodes per person using the total African population in 2004. Then, within each country, we assume a constant incidence to estimate the number of pneumonia episodes in the population covered by CHWs each year. The costs of antibiotics are \$0.27 per case.²

Screening for Tuberculosis: CHWs should collect sputum samples of suspected TB cases. We estimate the number of screenings using each country's TB incidence rate, and assume a positivity rate of 10%. The cost of screening one person involves collecting three sputum samples in containers (one on the first day, and two on the second day). The containers are labeled with a marker and put in a reusable sealable plastic bag. The cost of each container is \$0.054.⁶ Each CHW is given two markers for the year and 3 reusable sealable plastic bags every 3 months. Finally, CHWs use two new pairs of surgical gloves for each screening, since the screening is over two days. Using prices near the Bonsaaso Millennium Village in Ghana, markers are priced at \$10 for a pack of 8, the plastic bags are priced at \$8 for a pack of 25, and the surgical gloves are priced at \$0.60 a pair.

The childbirth specialist Community Health Worker would generate the same human resource expenditures (training, salary, management) as the generalist CHW, but different commodity costs following from a different set of responsibilities:

Screening Pregnant Mothers for HIV: All pregnant women will be provided with at least one HIV test to ascertain her HIV status. Following UNAIDS cost estimates for PMTCT, we estimate a cost of \$3.90 for each HIV serological test. In the case of an HIV-positive pregnant woman, the CHW will also provide a test for her husband and children (assumed to be 2 on average). HIV-positive individuals will be referred to the national AIDS program for counseling and treatment.

Finally, ambulances are included in the costing model as a necessary link between the CHWs and the Primary Care System.

Ambulances: One ambulance is assumed to cover a population of 50,000 people. Based on the experience of the Millennium Villages, an ambulance costs an average of \$36,000. The ambulance driver receives a yearly salary of \$4,782. The ambulance fuel and maintenance costs average \$4,825 per year across the Millennium Villages.

The estimated costs of ramping up the CHW Program as described above between 2012-2015 are reported country-by-country in Table 3 below, assuming coverage of 1 generalist CHW for every 650 rural inhabitants (totaling 1 million CHWs across Africa). The ratio of childbirth specialist CHWs is 1 per 3,500 people, following the ratio of a newborn-focused program in India.⁷ The model ramps up CHW coverage evenly from 2012 to 2015, such that one-quarter of the rural population receives services in 2012, increasing to full service coverage for the entire rural population by 2015. Note that the costing model uses UN Population Division data on rural population and rural population growth rates to take into account population growth. Finally, it is important to mention that the ratio of CHWs to population will likely vary at the country level, especially given different rural population densities across countries. For example, a CHW may be able to visit many more households per day in a densely populated rural area than would be possible in sparsely populated areas. For this reason, Figure 3 shows the breakdown in costs of the program by major category as the ratio of CHW to population varies.

1. These estimates of episodes per person are from Bern, Caryn, "Diarhoeal Diseases" in *Global Epidemiology of Infectious Diseases*.

2. All methods and costs pertaining to malaria are from Teklehaimanot et al (2007).

3. These protocols are from the "Protocol for Deworming" from the Millennium Villages.

4. WHO, *Global Burden of Disease 2004*

5. UNICEF/WHO. *Pneumonia: The Forgotten Killer of Children*. Geneva, 2006.

6. Global Drug Facility / Stop TB Partnership

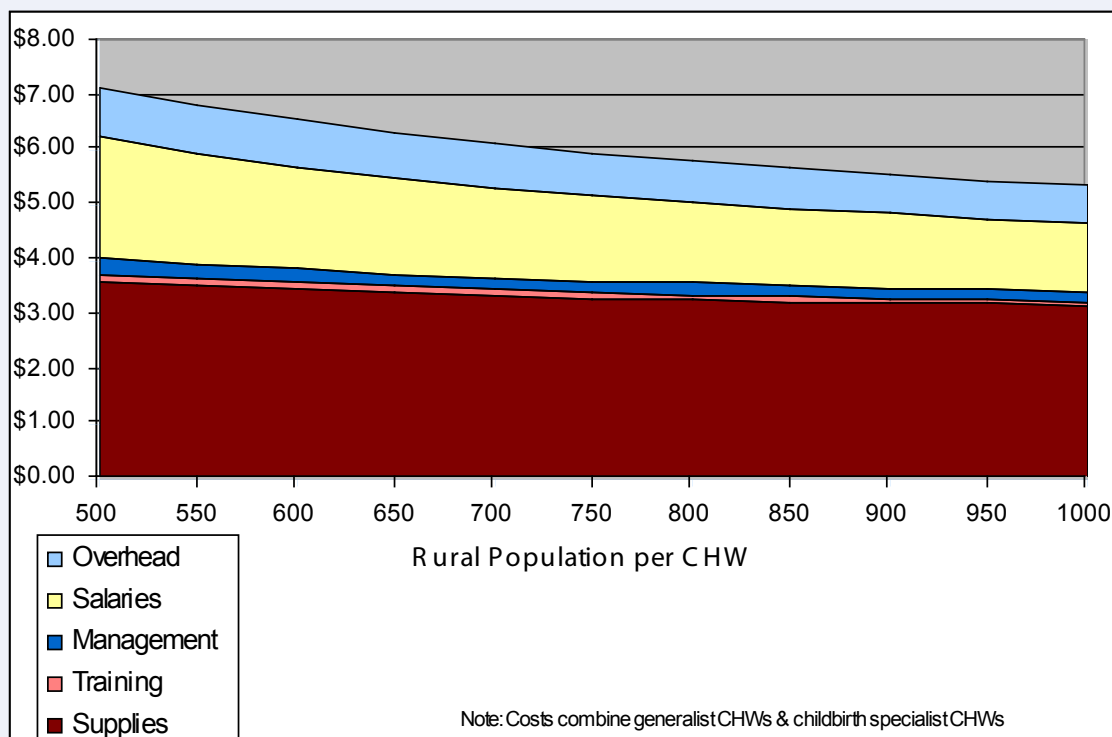
7. Darmstadt G, unpublished.

**Table 3: Average Yearly Expenditure for Community Health Worker Program
at 1 CHW for every 650 Rural Inhabitants**

Country	Number of Community Health Workers in 2015	Average Yearly Expenditure 2012-2015 (millions of \$)						Total per Population Served (\$)	Yearly Expenditure after 2015		
		Supplies	Training	Salaries	Management	Overhead	Total		Total (millions of \$)	per Rural Population (\$)	per Total Population (\$)
Angola	14,794	18.58	0.59	8.88	1.23	4.38	33.66	6.66	45.88	5.67	2.11
Benin	11,018	13.39	0.44	6.61	0.92	3.20	24.56	6.52	33.48	5.56	3.13
Burkina Faso	27,305	34.58	1.09	16.38	2.28	8.13	62.47	6.70	85.15	5.70	4.47
Burundi	15,695	18.44	0.63	9.42	1.31	4.46	34.25	6.39	46.60	5.43	4.93
Cameroon	15,451	19.03	0.62	9.27	1.29	4.52	34.72	6.58	47.30	5.60	2.12
Cape Verde	356	0.29	0.01	0.21	0.03	0.08	0.63	5.21	0.84	4.29	1.51
Central African Republic	5,463	6.64	0.22	3.28	0.46	1.59	12.18	6.52	16.60	5.56	3.35
Chad	16,835	21.00	0.67	10.10	1.40	4.97	38.15	6.63	51.85	5.63	3.94
Comoros	993	0.85	0.04	0.60	0.08	0.23	1.80	5.30	2.37	4.36	3.08
Congo	2,718	3.34	0.11	1.63	0.23	0.79	6.10	6.57	8.34	5.61	1.96
Congo, Democratic Republic	87,751	111.55	3.51	52.65	7.31	26.20	201.22	6.71	274.63	5.72	3.54
Djibouti	178	0.18	0.01	0.11	0.01	0.05	0.36	5.84	0.48	4.90	0.50
Equatorial Guinea	857	0.99	0.03	0.51	0.07	0.24	1.85	6.31	2.50	5.33	3.19
Eritrea	8,422	9.59	0.34	5.05	0.70	2.35	18.02	6.26	24.44	5.31	4.06
Ethiopia	142,945	154.44	5.72	85.77	11.91	38.59	296.44	6.07	398.90	5.10	4.13
Gabon	358	0.42	0.01	0.21	0.03	0.10	0.78	6.41	1.07	5.47	0.65
Gambia	1,393	1.69	0.06	0.84	0.12	0.40	3.10	6.52	4.23	5.55	2.13
Ghana	22,216	28.30	0.89	13.33	1.85	6.64	51.01	6.72	70.09	5.77	2.59
Guinea	13,211	16.27	0.53	7.93	1.10	3.87	29.69	6.58	40.51	5.61	3.41
Guinea-Bissau	2,339	2.85	0.09	1.40	0.19	0.68	5.22	6.53	7.10	5.56	3.83
Ivory Coast	20,722	25.48	0.83	12.43	1.73	6.06	46.52	6.57	63.54	5.61	2.61
Kenya	65,008	79.86	2.60	39.01	5.42	19.00	145.88	6.57	198.47	5.58	4.26
Liberia	3,278	4.04	0.13	1.97	0.27	0.96	7.37	6.58	10.07	5.62	2.15
Madagascar	28,643	37.49	1.15	17.19	2.39	8.71	66.92	6.84	92.20	5.89	4.02
Malawi	25,606	32.01	1.03	15.36	2.13	7.56	58.10	6.64	78.85	5.63	4.36
Mali	17,544	21.68	0.70	10.53	1.46	5.15	39.52	6.59	53.84	5.61	3.59
Mauritania	3,982	4.70	0.16	2.39	0.33	1.14	8.72	6.41	11.89	5.46	3.18
Mozambique	27,762	36.70	1.11	16.66	2.31	8.50	65.28	6.88	89.16	5.88	3.42
Niger	29,188	37.38	1.17	17.51	2.43	8.76	67.26	6.74	91.53	5.74	4.77
Nigeria	152,041	187.36	6.09	91.22	12.67	44.51	341.85	6.58	465.46	5.60	2.64
Rwanda	17,225	20.46	0.69	10.34	1.44	4.93	37.84	6.43	51.33	5.45	4.36
Sao Tome and Principe	112	0.12	0.00	0.07	0.01	0.03	0.24	6.17	0.32	5.22	1.76
Senegal	14,950	18.23	0.60	8.97	1.25	4.35	33.39	6.54	45.57	5.58	3.13
Sierra Leone	7,229	9.59	0.29	4.34	0.60	2.22	17.04	6.90	23.43	5.93	3.57
Somalia	11,581	14.42	0.46	6.95	0.97	3.41	26.21	6.62	35.71	5.64	3.32
Sudan	44,747	52.76	1.79	26.85	3.73	12.74	97.87	6.40	133.55	5.46	2.78
Togo	7,467	9.14	0.30	4.48	0.62	2.18	16.72	6.55	22.86	5.60	2.99
Uganda	62,379	79.14	2.50	37.43	5.20	18.60	142.87	6.70	194.11	5.69	4.87
United Rep. of Tanzania	67,977	89.11	2.72	40.79	5.66	20.70	158.98	6.85	217.52	5.85	4.16
Zambia	17,426	22.18	0.70	10.46	1.45	5.21	39.99	6.72	54.18	5.69	3.60
Zimbabwe	13,999	17.38	0.56	8.40	1.17	4.12	31.63	6.61	43.10	5.63	3.05
Total	1,029,163	\$1,262	\$41	\$617	\$86	\$300	\$2,306		\$3,139		
Cost per Population Served		\$3.59	\$0.12	\$1.76	\$0.24	\$0.85	\$6.56		\$5.52		

As explained above, the model is adjustable for a range of CHW densities. Figure 3 below shows the breakdown of the yearly ramp-up costs by major category at a range of ratios, from 1 CHW for every 500 people down to 1 CHW for every 1,000 people.

Figure 3: Community Health Worker Costs (average per year per population served)



The costs above do not include two potential Community Health Worker services: offering family planning services and providing HIV screening for the general population. Since there is no consensus among public health specialists on whether CHWs should be tasked with these services, we separate them from the costing framework above. They are considered below in Box 7.

Results

Table 3 shows the country-by-country breakdown of the number of CHWs required by 2015, and the average yearly costs for supplies, training, salaries, management and overhead for the combined workforce of generalist and childbirth-specialized CHWs. At a ratio of 1 generalist CHW for every 650 rural Africans, and 1 childbirth-specialist CHW for every 3,500 Africans, we estimate the cost of the CHW system to be \$2.3 billion per year on average, or \$6.56 per person covered by the CHW services. Note that these are the average yearly costs during the ramp-up phase of 2012-2015.

In addition to estimating costs during 2012-2015, it is important for countries to estimate the year-to-year

steady state costs of the program after it has been fully deployed. These costs include the same commodities and human resource costs for CHWs and managers as above (equivalent to the 2015 estimate when the program is fully deployed). In addition, the steady-state cost includes training new CHWs to keep up with rural population growth, and refresher courses for all CHWs in the system. Note that the steady state calculation includes capital costs such as phones, backpacks and ambulances; these are amortized over 3, 3, and 7 years respectively. The last three columns of Table 3 list the total steady-state costs at the country level, both as a total and per capita in terms of rural and total population.

Box 7:

Additional Cost Considerations

Family Planning: Studies have found that the average cost of family planning per user is around \$20 per woman per year, including the cost of contraceptives. Having generalist CHWs extend family planning services at this cost per woman in her reproductive years (ages 15-49) averages \$1.6 billion per year, or \$5.38 per person serviced by the CHW program.

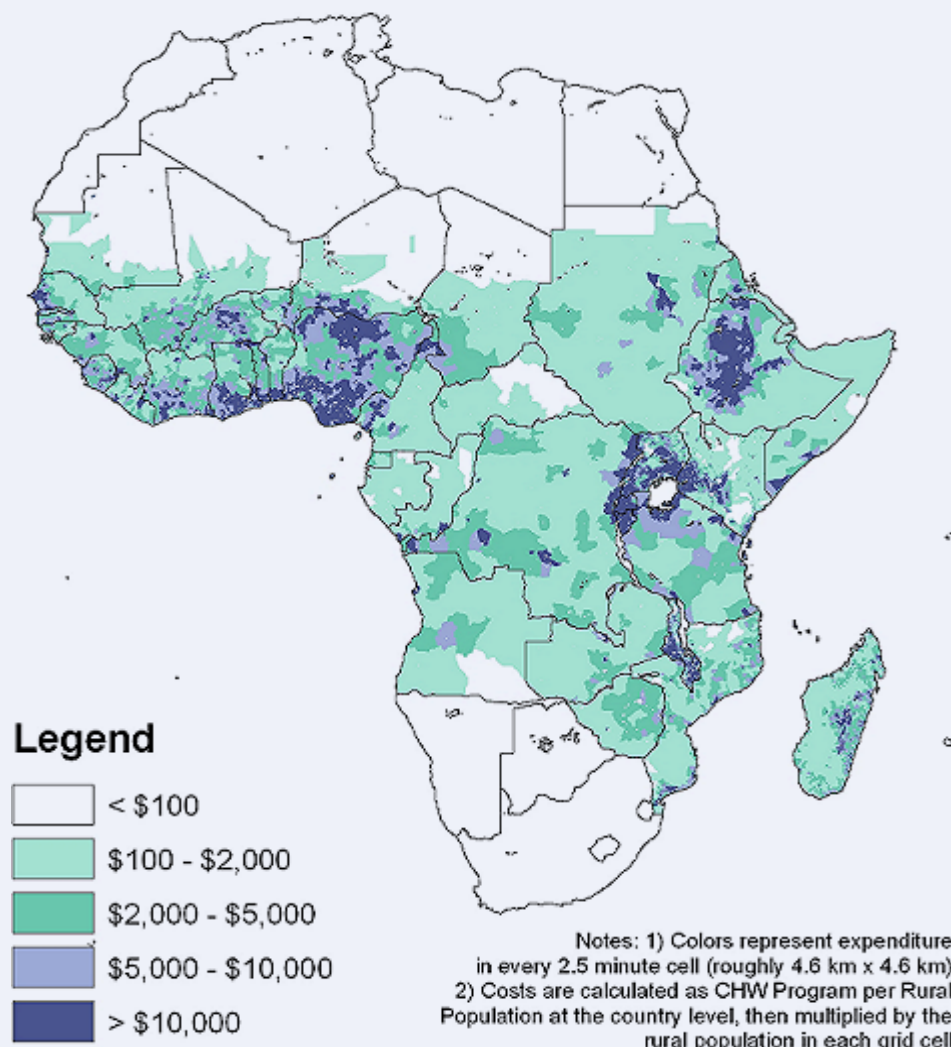
HIV Screening for General Population: Studies have begun documenting the benefits of active case finding and outreach by CHWs.¹ Health service provision is trending towards increased decentralization and at some point CHWs may be tasked with testing the general population for HIV. (Note that in the above costing, pregnant women and their families are already tested through childbirth-specialized CHWs). Although the appropriate frequency of testing remains to be determined, we assume one annual test per person in order to get an idea of costs. Extending HIV testing once a year to all HIV-negative people above the age of 14 averages \$745 million per year, or \$2.44 per person serviced by the CHW program. Similar to family planning, elements of this estimated cost include overhead that is included in the figure for generalist CHWs above, but the costs are difficult to disambiguate at this time.

1. Mukherjee, J.S. & Fr.E. Eustache [2007]

The map below shows the spatial distribution of expenditure, by calculating the costs above per rural African, and using 2.5 arc-minute GIS data on population and urban extents in 2010. We eliminate the urban population, and then multiply the rural population in each grid cell by the country-specific per capita cost of the CHW

program, to produce the average yearly cost per grid cell. The map below allows international and national policy makers to see where the expenditures in ramping up a Community Health Program would be distributed within low-income sub-Saharan African countries.

Annual Cost of Community Health Worker Program





Next Steps

There are a range of potential costs based on modifying factors prevalent in planning and deployment at scale. As with operational design, deployment considerations must also be adapted to the local context, as discussed in the following section. As each CHW subsystem endeavor is started, there would need to be a specific costing effort. However, this model serves to illustrate the cost of an operational design and deployment structure based on a full-time, paid cadre with a specified repertoire of community health responsibilities and commodities. The costs imply that a phased deployment of CHW subsystems through

2015 is a valuable investment for low-income sub-Saharan African countries that fits within previous cost estimates of a primary health care system at \$54 per capita. Detailed analyses of funding gaps and financing mechanisms are out of the scope of this report. Specific funding gaps will emerge during the course of planning and implementation of CHW subsystem improvements and deployment. As national systems expand or improve existing CHW subsystems or deploy new CHW subsystems, coordinated national planning of each phase of design selection, appropriate financing, deployment and maintenance will be crucial. The next section discusses key considerations for comprehensive CHW subsystem planning.

National Planning, Deployment and Training

National Planning, Deployment and Training

KEY POINTS

- Deployment of CHW subsystems requires coordination and incremental planning at multiple layers of governance.
- CHW subsystems should be designed to meet community health needs based upon situational analysis and epidemiological assessments.
- The resulting CHW subsystem plans should provide a clear definition of the CHW role and the core scope of work, selection, training, supervision, payment or incentives, and relationship to facility-based providers, as well as strategies for community engagement and clear plans for M&E.
- These specifications should define the core functionalities of the CHW subsystem and include requisite systems support and strengthening, but remain flexible enough to adapt to sub-national variations in epidemiology, community input and geography among other factors.
- Integrated M&E systems provide opportunities to revisit operational design and deployment decisions for process improvement as well as impact evaluation, which can contribute to international best practices on CHW program design.

Taking into account health systems and operational design considerations discussed in the previous sections, CHW subsystem expansions at national scale require careful national planning to set a context-appropriate operational design, train and deploy new or adapted CHWs from pre-existing community health cadres and evaluate impact. National planning and coordination should be coupled with locally-led deployment strategies that take into account community input and sub-national variation across a variety of factors. Some of these factors are also reflected in Table 4 below on modifying factors for operational design.

As with operational design, there are several elements of CHW subsystem planning and deployment at scale that should be considered during CHW subsystem scale up. Clear strategies in each of these areas, adequately supported by long-term financial planning, contribute to stability at scale. In this section, we summarize key steps to national deployment of large-scale CHW initiatives using best practices shared across national governments and international organizations. These steps are as follows:

STEP 1: Coordinate planning of the CHW subsystem at multiple government and community levels

STEP 2: Conduct a situational analysis of national community health needs and current programs

STEP 3: Design an operational model appropriate to the country-wide needs

STEP 4: Integrate the operational model into national policy

STEP 5: Select CHWs and related workers (supervisors, trainers, etc.)

STEP 6: Train CHWs and related workers



STEP 7: Monitor and supervise program operations and outputs using decentralized management teams

STEP 8: Conduct program evaluations and impact assessments, particularly during early phases of deployment, to inform process and quality improvement and program iteration over time as well as to inform global community health efforts based on strong M&E design

Deployment of CHW cadres at scale has been achieved around the world, with varying degrees of success and sustainability. CHW cadres will be selected, trained and deployed at scale according to national specifications, so while clear norms on specific methods may not be feasible, clear and defined processes that are responsive to variation and incrementally improved based on M&E results are key elements of success at scale. Pakistan's Lady Health Worker program (Box 8) provides an example of a CHW subsystem deployment strategy at national scale. In this section, we will provide some core considerations and examples to guide deployment planning for CHW subsystems.

Effective Coordination for Planning at Multiple Levels of Government

Expansion of the formal health system to communities and households impacts multiple levels of health care governance. Planning in advance for how these levels of government will interact in the planning, funding and deployment processes may ease the integration of new regulations on CHWs into health plans at each level and facilitate implementation with high fidelity to plans. The process will depend on the degree of federalization in the country and of decentralization of health system planning responsibilities in particular.

Box 8:

Pakistan's Lady Health Worker Program: Large-Scale Success Model for Selection and Training

Community Health Worker Title: Lady Health Worker

Number of Community Health Workers: 100,000

Population Served: National Scale (all 5 provinces)

Background: Deployed as a federal development program in 1994, the Lady Health Worker (LHW) Program was eventually launched as part of the National Program for Family Planning and Primary Health Care in 2000. This program employs local community women to provide services for family planning and primary health care. To date, 17 percent of all those who seek care for an illness have consulted with an LHW first, indicating the important role that LHWs play as the first line of care.

Program Impact: LHWs have been found to have significant impact on the reduction of infant mortality in Pakistan. Additionally, health indicators of populations served by LHWs are slightly better than national figures.

Key Feature: Successful Deployment at Scale

The LHW Program has impressively scaled up over the last 20 years to include 100,000 LHWs nationwide, covering all provinces over the last 20 years. In this process, nearly all LHWs met recruitment criteria of being female, being a permanent resident of the area for which she is recruited, having a minimum of 8 years of schooling, being between the ages of 20 to 50 years, and having a willingness to carry out services in her home as a designated health house. The health house model provides an effective

One way to approach this issue is through the creation of national, regional, district, zonal and community steering committees for community health under the leadership of the national Ministry of Health. The Ministry of Health can lead further cross-ministerial collaboration with education, financing and planning bodies to ensure broad commitments to success. Distinct responsibilities at each level will evolve during the planning, deployment, activity coordination, resource allocation, and ongoing monitoring and program improvement stages. By creating layered committees coordinated overall by the Ministry of Health, a centralized system can be developed and deployed through decentralized implementation planning.

Potential roles and responsibilities for consideration at each level include:

- **National steering committee:** This committee may include priority Ministry of Health technical departments and other major technical and financial partners in the country. The goal is to provide high-level leadership and process ownership of a CHW and primary health care program, as well as policy and country level document development and resource allocation. This level should also monitor implementation of CHW deployment and training across regions. Key roles at this level may include: revising national policies; developing

linkage between the community and the public health care delivery system of which LHWs are a part. Selection committees comprised of a clinician in charge of a primary health care facility, a woman medical officer from that facility, a lady health visitor or female medical technician from the facility, a male technician and dispenser from the facility, a representative nominated by local community, and a councillor identify potential LHWs through community organizations. Selection is approved on the recommendation of the councillor – an elected local representative – and on approval of the executive district officer for health. An LHW is initially employed for one year, though she is likely to continue in the role for life. If LHWs do not perform their duties to the satisfaction of their supervisors, they are expected to return the salaries and equipment that

they received during training under a termination of their contract by the district head of the health department.

Training is conducted over a period of 15 months, which is divided into 3 months of integrated training and 12 months of task-based training using both manuals and facility-based education. All LHWs visit their catchment area's health facilities or training centers for one day per month to receive refresher training; feedback on problems faced in providing services is also received during this time period. Trainers are facility-based staff members who are trained by district trainers for 12 days; they are paid an additional 20 percent of their salary per month during the 15-month training period.

The LHW program has an elaborate and multi-tiered supervisory system. LHWs

are directly supervised by Lady Health Supervisors (LHSs), who are trained for a year. An LHS usually supervises 25 LHWs, and she is supervised by a Field Program Officer (FPO) she also reports to a District Health Officer (DHO).

REFERENCES:

- Bhutta, Z. A., Lassi, Z., Pariyo, G., & Huicho, L. (2010). Global experience of community health workers for delivery of health-related millennium development goals: A systematic review, country case studies, and recommendations for integration into national health systems. World Health Organization
- Bhutta, Z.A., et al. (2011). Improvement of perinatal and newborn care in rural Pakistan through community-based strategies: a cluster-randomised effectiveness trial. *The Lancet*, 377(9763): p. 403-12.

a national community participation policy; creating implementation guides and tools; mobilizing resources; monitoring application of policies and guidelines; ensuring that the national health information system incorporates household-level data collected by CHWs; and considering existing financial incentives at the community level that pre-exist CHW scaling.

- **Regional coordination committee:** Regional leadership in technical and financial support for health districts can support smooth implementation. Roles may include engaging all key partners, including NGO or private-sector partners in implementation or training; coordination of

training, supervision and monitoring of CHWs; supporting training plans; and supply chain management to ensure availability of equipment, drugs, and supplies. In sub-Saharan Africa, just under 50% of health services are provided by the private sector (private for-profit and non-profit entities). Partnership agreements between public and private sectors in service provisions will be crucial to consider during subsystem development stages. The regional level may be appropriate for such considerations.

- **District coordination committee:** Health districts can coordinate the integration of CHW subsystem functions with health facilities and support supervision capacity at the facility level. Engaging district-level stakeholders, including district and municipal authorities, elected leaders, health care professionals and their organizations, and community groups will have significant influence on the effectiveness of CHW deployment and community support.
- **Health Center/Zone Committee:** Engaging health facility staff can increase their commitment to supporting a strong CHW subsystem extending from the health facility to the household. Facility-based staff and mid-level providers have been shown to have a variety of reactions to community health programs and task shifting. Engaging facility-based community health staff and staff at referral centers early in the CHW subsystem planning process can help secure their investment in the success of the program and alleviate potential stress points in the system.
- **Community support such as health, village, governance or multi-sectoral committees:** Community members can be mobilized to provide direct coordination, supervision and support to a CHW subsystem. There are many variations on community engagement with CHW subsystem expansion initiative, but ensuring a strong role for the community increases sustainability, demand for services and worker retention, among other factors.

Situational Analysis

A situational analysis that incorporates an assessment of the PHC system and community mapping of existing human resources, financial resources, and partnerships for a new CHW effort should inform system planning. This analysis provides a core underpinning to how the functions of a CHW are defined. Situational analysis should focus on assessing the needs of the community first and foremost. The output of the situational analysis can be reports, presentations and/or workshops to stimulate resource mobilization, nurture supportive policies and ensure that plans are responsive to system needs. There should be national-

level coordination and funding for situational analyses that focus on revealing needs and resources, including needed interventions, existing resources, gaps in the primary health care system that will need to be developed to support CHW subsystem expansion.

In addition, a review of existing data can support targeted system planning. For example, marginal budgeting for bottlenecks (MBB) planning and budgeting exercises conducted in many countries have provided useful analysis on the key indicators, trends and causes of maternal, newborn and child mortality and morbidity. Such analyses can guide the selection of evidence-based, high-impact interventions that can be delivered by CHWs as well as identify system wide supply and demand bottlenecks. Supplemented with additional field work, such as rapid health services assessments, coordinated situational analyses offer a strong foundation for system planning, roll out and sustainability.

Determination of Operational Design

As discussed in the section of this report on operational design, careful consideration of the CHW profile and support systems is necessary. Costing and operational design will need to be developed based on contextual factors, including relationship to existing formal or volunteer cadres, existing regional pilots or NGO-supported interventions.

There is no one-size-fits all approach to the development of community health programs. While each of the areas discussed in the operational design section should be considered carefully in the system planning process, there are many modifications required from any example operational design to adapt the system to national and local contexts. Table 4, below, presents some examples of how context may impact operational design choices. CHW operational designs must respond to local epidemiology, culture and geography, particularly when determining the core CHW functions, catchment area and selection criteria.

Table 4: Modifying Factors for Operational Design, as Compared to Example Model (Table 2)

	Low	Medium	High
Population density (rural / peri-urban / urban)	Optimal condition for example model	Change CHW to household ratio; account for overload at facilities	Change CHW to household ratio; account for overload at facilities
Facility Density and Accessibility	Optimal condition for example model	Potentially reduce tasks if facilities are easily accessible	Reduce tasks and change CHW to household ratio if much of curative work can rely on facilities
Other health workforce components	Optimal condition for example model	Align roles and responsibilities with other workforce; potentially reduce tasks if other health workforce members perform those functions	Align roles and responsibilities with other workforce; potentially reduce tasks if other health workforce members perform those functions; strengthen management to ensure coordinated patient care in order to promote continuum of care
Specific disease density	Do not consider specialized tasks if prevalence of disease is low	Optimal condition for example model (though consider balancing task load with local epidemiologic needs)	Consider specialized models in order to offset task load. This should be designed under an integrated management team in order to avoid risk of vertical systems
Community education level and literacy	Optimal condition for example model	Optimal condition for example model	Shift tasks according to community need
Gender role specifications prevalent in community for maternal/child health	Optimal condition for example model	Optimal condition for example model	Adjust selection criteria or specialization strategy to ensure focus on female CHW
Financing availability	Reduce and simplify tasks and consider part-time payment model. Supplement reduction of tasks with a strengthened volunteer system	Reduce and simplify tasks and consider part-time payment model. Supplement reduction of tasks with a strengthened volunteer system	Optimal condition for example model
Strength of health system	Develop facility-based system in tandem with community-based system	Develop facility-based system in tandem with community-based system	Optimal condition for example model
Political support	Consider private models	Consider private models	Optimal condition for example model

Sub-national differences at the community level may also impact desired operational design each of the elements discussed above, including the role, profile and structure of CHWs, and strategies for addressing community health needs in a culturally competent way. While a coordinated, standard national policy will lay out principles of operational design and build in community participation principles and a framework for action, it may be helpful to decentralize implementation as much as the national political context allows.

In addition, most sub-Saharan African countries have existing community health cadres, many of which extend to the household level in some manner. Current CHW policies in Africa are explored briefly in the next section. There will need to be careful consideration of how to integrate new CHWs with re-trained or re-purposed community health staff during system planning stages.

In addition, the CHW “site” or “catchment area” should be delineated early in the planning process. The selection of CHW catchment areas can be facilitated through a consultative process between district health leaders and local authorities and informed by community committees and organizations. Health care access is not only impacted by distance to a health facility, but also by terrain, seasonal variations, and natural obstacles as well as socio-cultural and economic factors that community organizations or community committees would know best. Each of these should be considered as the concentration of CHWs is developed.

In developing CHW roles and responsibilities, task load and level of effort required for specific interventions and delivery strategies should be taken into account, along with available resources, epidemiological analysis, likelihood of health impact and feasibility of successfully informing task shifting with consideration of impact on staff at higher levels of care. Remaining needs not addressed by the CHW subsystem should also be taken into account, and models for supplemental community health cadres, including volunteer support, should be considered or incorporated.

Integration of Operational Design into National Health System

Formalization of the operational design into national and local policies and communication of design decisions with all stakeholders is an instrumental step in generating appropriate financial and community support for expanding CHW subsystems at scale.

Particular focus should be paid to any needed systems strengthening beyond the community and household level to support additional supervision, training, data management and supply chain inputs. Before rolling out training for CHW cadres, an assessment of existing training equipment and supplies and the additional human resources required in regional and district health departments for large-scale initial and ongoing refresher trainings can inform other policies. Similarly, procurement and delivery of supplies and equipment requires funding and policy support. As discussed in the operational design section CHW training and deployment without immediate and continuous reliable supplies to accomplish tasks is inefficient, demotivating and damaging to CHW credibility, and supply chain improvements should be planned and budgeted for as well.

Management information systems that provide data for decision making, quantification and planning also need adequate support and planning. Community engagement processes should be regularly and seriously incorporated into national planning processes, particularly at this stage.

Selection of CHWs

Determining the profile and criteria for CHW selection, which may vary according to region, requires strong community engagement. Best practice in community health systems suggests that CHWs should be selected from the communities that they will support; this has been shown to be critical for retention and community support. The Global Health Workforce Alliance’s 2010 Global Systematic Review of CHW Programs reinforces the efficacy of this concept:



All the studies and CHW programs that we reviewed emphasized that CHWs should be chosen from the communities they will serve and that communities should have a say in the selection of their CHWs. As far as the selection of the CHW is concerned, we would recommend that they should be directly chosen by the households that they will work with. Neither health or other officials, nor even community leaders should make this choice alone. CHWs should be accountable to the local neighborhood community that they volunteer to serve, for which they will be trained and supported by the health bureaucracy.

Further considerations for CHW selection include literacy, gender, role in the community and commitment to remaining in the community. Attitudes towards maternal care and family planning and experience caring for sick children may also be relevant considerations that can be integrated formally or informally into selection criteria. Although local candidates who are known to communities are strongly preferred, in some cases eligibility requirements cannot be met. In these cases, consideration of external candidates who are committed to living and working in the target community could be presented to the broader selection committee for their suitability.

Training of CHWs

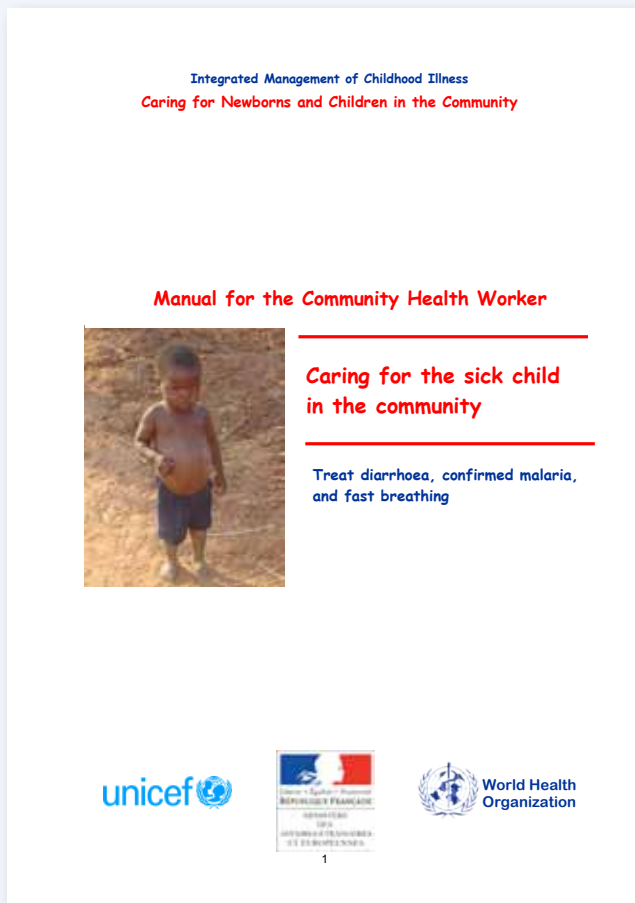
There are many models of training for community health providers, from rapid training to multi-year certification programs. The duration and form of

training will need to take into account the required competencies for the roles and responsibilities of the CHWs. Multi-year certification programs are the more traditional approaches to training CHWs. These usually involve months to years of clinical and/or knowledge-based training prior to deployment producing a significant time delay before workers can start in the field. In contrast, newer rapid training approaches aim to train and deploy on-the-ground, functionally effective CHWs at scale without a large initial time lag between recruitment and deployment. However the efficacy and effectiveness of the rapid training approach still needs further evaluation. Many of the most prominent and established programs (i.e., those with >1,000 CHWs) still invest heavily in ensuring appropriate clinical knowledge, and emphasize in-service training.

CURRICULA CONSIDERATIONS

There are many curricula for training in basic proven community health interventions, including some international consensus curricula pulled from national models.

Standardized curricula within a country can improve fidelity to system plans and guidelines, as well as training support. However, material development should be adapted to locally specific contexts, including language, literacy, and culture. There should be core competencies of all CHWs, with additional training modules based on epidemiological variation within a



The World Health Organization's *Caring for the Sick Child in the Community* is one example of a standardized CHW curriculum developed from international best practices. This curricula, released in 2011, is one of three parts—including *Caring for the Newborn* and *Caring for the Healthy Child*.

country. Core competencies may include skill-based procedures such as the administration of RDTs for malaria, which should be consistently delivered across CHW subsystem. Countries such as Senegal, Uganda and the Democratic Republic of the Congo (DRC) have national community health programs with standardized technical approaches developed by consensus at the national level, resulting in a national commitment to CHW initiatives and champions within technical departments of the Ministry of Health. Content should reflect learning objectives and parallel periodic performance reviews.

It is crucial that CHW supervisors (i.e., managers, clinical staff) are included in national training plans. Appropriate training of supervisors will facilitate this process through the provision of technical guidance, support and motivation to CHWs. They should be able to perform all the tasks a CHW is expected to perform, be familiar with reporting and recording mechanisms, be capable of providing feedback, and be equipped with problem-solving abilities as a core part of their managerial skills. Supervisor training should also emphasize coordination between CHW programs, clinical programs, and health facilities through coordination meetings and integrated work plans. These strategies should be in place in advance of training.

In addition to national-level consensus, multi-country consensus on CHW training modules has promise for improving training strategies. Modules simply comprised of end-user materials such as clinical algorithms and training content are not sufficient to provide for broad scale up of CHW subsystems. Often, each module has its own content, deployment strategy, accompanying technology, and training system. Cross-country collaboration on community care modules could provide several benefits: 1) enable the global health community to better support broad scale up through streamlined regional technical assistance, 2) address the needs of vulnerable or minority populations that are common across a region, 3) coordinate investments into common training systems that can deliver locally tailored content, and 4) ensure that development of Information and Communication Technologies (ICT) is holistic and harmonized with national and international information needs.

Finally, even if CHWs live in the communities where they work, it is still important to provide training on how CHWs can appropriately address health issues and provide health promotion at the community level within cultural norms. Furthermore, in order for CHWs to be agents of change, they must believe in the change they promote.

TRAINING ROLLOUT STRATEGIES

Appropriate training strategies affect quality of care and knowledge retention, and they should be strategically developed. There are several potential strategies for national scale up of CHWs. These include cascade training, with national-level, regional-level and district-level training teams. Training could also be conducted in phases, depending on the broader deployment strategy. Ideally, CHWs will be trained by the same individuals who will then supervise them as on-site mentors and managers. Collaboration with regional science universities may increase rigor and institutional support for CHW subsystems and provide additional certification or accreditation. Furthermore, partnerships with NGOs and private sector actors familiar with the localities can increase feasibility at scale.

A substantial portion of training should be focused on clinical practicum experiences to prepare CHWs to perform their roles after training is complete. Adequate facilitator-to-trainee ratios and the use of participatory adult learning methods (such as group discussion, brainstorming, small group work, demonstrations, visual aids, and roles plays) should be incorporated. Competence-based approaches with ample interactive sessions and role-plays have been found to be more effective in helping less formally educated CHWs reconcile lessons from the classroom with real life. Generally, this also requires that CHW skills and competencies be expanded into standardized procedures. Tools such as household charts and decision-support programs on mobile phones also provide opportunity for practical training, which is often more accessible to trainees than abstract instruction.

Innovative approaches to training such as distance learning, programmable mannequins and other strategies used in high-resource areas for remote training may be applicable, but it is important to utilize methodologies that have been proven to be successful when teaching low-literate adults in resource poor settings. Accreditation and certification should also be considered as part of the course of training for CHWs.

CONTINUING EDUCATION AND REFRESHER TRAININGS

Continuing education should be integrated with regular supervisory processes and individual performance monitoring. Such continuing education when administered correctly is vital for CHWs to keep abreast of best practices and to increase relevant clinical knowledge. Continuing education also serves as a professional development opportunity that can motivate and improve job-related performance. Studies have also found that acquired skills and knowledge are quickly lost if regular refresher training is not available. Thus continuing education and in-service training should be anticipated as integral components of CHW subsystem maintenance and be appropriately funded.

Deployment and Support

Deployment

Deployment strategies should reflect the baseline status of the primary health care system, and they can include national roll out, retraining of existing CHWs, integration of existing informal systems into the formal health care system, and phased roll out strategies or regional pilots.

Communities should be mobilized, potentially through organized community committees, to support CHWs with new responsibilities or roles in the community. Community organizations can also help introduce CHWs and their new capacities to the community.

Once deployed, CHW subsystems will experience a regular rate of turnover; training and integration are not one-time events. Selection, training and integration processes for new CHWs that replace existing CHWs or provide expanded coverage should be accounted for in initial deployment plans.

Supervision and Mentorship

In-service mentoring and supportive follow up is important to ensuring the high quality of skills and knowledge imparted during primary content and skills training. CHWs should be provided with job aides that include training information and can act as reference guides when working with patients in their home. Training content can also be reinforced through decision support tools available via cell phone or paper. Such job aides should correspond with country guidelines. Similarly, a “help line” for direct contact with a supervisor, facility-based worker or fellow CHWs can provide important support for CHWs and promote quality of care and appropriate referral processes

Impact Evaluation and Process Improvement

With any health system expansions, there is a need to incorporate strong evidence into the initial subsystem operational design and deployment plan, conduct systematic monitoring to inform process improvements at each level of the subsystem, and build in monitoring and evaluation structures and strategies to evaluate the impact of the subsystem. Especially in scaling a health system, it is crucial for careful monitoring and evaluation to be available in assessing effectiveness and program functionality at each phase of scale-up. Standard monitoring of CHW subsystem outcomes and design, particularly early in the deployment process, can identify operational design challenges and monitor impact on maternal, child and newborn health indicators, and often determine cost-effectiveness of specific program design elements in the local context.

Process evaluations in particular can explain why interventions may have the effect that they have, and these evaluations can identify what can be done to improve the processes in the subsystem or its structure through analysis of both health indicators as well as the effectiveness of specific program design elements. A number of process evaluation tools exist as a model for measuring and evaluating program design and implementation. In addition, real-time monitoring systems via mobile technology (see Appendix B) can provide more regular feedback to inform active management and adaptation of program design and deployment for optimal outcomes.

One potential tool to be used for process evaluation would be the USAID Health Care Improvement (HCI) Project’s CHW AIM Toolkit, which assists in the assessment, improvement and planning of CHW programs through a deeper understanding of the elements of successful programs and the use of best practices as an evidence-based approach to improvement. The Toolkit is framed around 2 key resources: a program functionality matrix with 15 key components used by participants to assess the current status of their program and a service intervention matrix



to determine how CHW service delivery aligns with national guidelines. The assessment approach encourages consensus on scoring and analysis to develop an action plan that guides improving functionality. In addition to providing a framework for assessment and improvement of current programs, this approach can also aid in policy development and program design as each of the 15 programmatic components represents accepted best practices in areas that include CHW role definition, recruitment, incentive structures, supervision, training, referral, etc., as well as intervention matrices in MNCH, HIV, and TB that list key tasks CHWs might either deliver, counsel, or refer.

To facilitate continuous improvement, it is also imperative for impact evaluation to be utilized in order to determine the effect that the subsystem and its interventions has on end outcomes such as health status and access to care, requires a different process than standard program M&E and process evaluation. It allows a CHW subsystem to generate knowledge about whether a program achieved its basic aims, and

can contribute to the international knowledge base about CHW intervention and operational design effectiveness across contexts. Finally, impact evaluation can assess changes in coverage, access to care and use of key interventions, quality of service, program cost, and lives saved.

A wide range of questions can be addressed by well-designed and well-planned impact evaluations. Planning for well-designed impact evaluation can equip policy makers and implementers with the tools to fully understand the results and link them to best practices around the world. There are research designs available that would allow for the integration of rigorous evaluation to be incorporated into a phased national deployment plan with little additional cost or impact on deployment, if planned in advance, including randomized controlled trials and interrupted time series.

In addition to informing domestic program improvements, rigorous impact evaluation of large-scale role

outs can contribute to global collaborations to build systematic evidence on CHW subsystems at national scale. This is particularly relevant in areas where the research is poorly developed, such as new technologies and interventions, specific intervention combinations for CHWs and integrated community health care packages supported by strong supervision, which have not been studied comprehensively at scale. Examples of successful impact evaluation at scale are available from cases in Mexico, Malawi and Bangladesh.

Impact evaluations, process evaluation and other traditional M&E approaches should be designed to provide and disseminate findings as rapidly as possible to improve program development through feedback to all levels of service provision where information has been gathered. Integration of rigorous impact evaluation and traditional M&E with active management approaches requires further work in systems at scale.

Next Steps

Clear definition of operational design, training and deployment plans and financial allocation for CHW subsystems to meet the MDGs will be built upon pre-existing community health systems. An understanding of the baseline status of community health programs is necessary for CHW subsystem expansion or improvements.

REFERENCES

76

- Azad, K., Barnett, S., Banerjee, B., Shaha, S., Khan, K., Rego, A. R., et al. (2010). Effect of scaling up women's groups on birth outcomes in three rural districts in Bangladesh: A cluster-randomised controlled trial. *The Lancet*, 375(9721), 1193-1202.
- Bhutta, Z. A., Lassi, Z., Pariyo, G., & Huicho, L. (2010). Global experience of community health workers for delivery of health-related millennium development goals: A systematic review, country case studies, and recommendations for integration into national health systems. World Health Organization,
- CORE Group, Save the Children, BASICS & MCHIP. (2010). Community case management essentials: Treating common childhood illnesses in the community. A guide for program managers. www.coregroup.org/storage/documents/.../CCMbook-internet2.pdf
- Lewycka, S., Mwansambo, C., Kazembe, P., Phiri, T., Mganga, A., Rosato, M., et al. A cluster randomised controlled trial of the community effectiveness of two interventions in rural Malawi to improve health care and to reduce maternal, newborn and infant mortality. *Trials*, 11
- Kash, B. A., May, M. L., & Tai-Seale, M. (2007). Community health worker training and certification programs in the United States: Findings from a national survey. *Health Policy*, 80(1), 32-42.
- Kitaw, Y. (2007). Assessment of the training of the first intake of health extension workers. *The Ethiopian Journal of Health Development*, 21(3), 232.
- Manandhar, D. S., Osrin, D., Shrestha, B. P., Mesko, N., Morrison, J., Tumbahangphe, K. M., et al. (2004). Effect of a participatory intervention with women's groups on birth outcomes in Nepal: Cluster-randomised controlled trial. *The Lancet*, 364(9438), 970-979.
- Oxman, A. D., Bjørndal, A., Becerra-Posada, F., Gibson, M., Block, M. A. G., Haines, A., et al. (2010). A framework for mandatory impact evaluation to ensure well informed public policy decisions. *The Lancet*, 375(9712), 427-431.
- Savedoff, W. D., Levine, R., Birdsall, N., & Center for Global Development. (2006). *When will we ever learn? : Improving lives through impact evaluation*. Washington, D.C.: Center for Global Development.
- Ye-Ebiyo, Y. (2008). Study on health extension workers: Access to information, continuing education and reference materials. *The Ethiopian Journal of Health Development*, 21(3)

Closing the Gap: National Policy Landscape And Next Steps

Closing the Gap: National Policy Landscape And Next Steps

KEY POINTS

- Most countries in sub-Saharan Africa have a national community health worker strategy.
- There is variation in the degree of direct national financing and systems integration for CHW programs as well as variation in design configurations at the local level across countries.
- Local implementation is uneven and largely falls short of national CHW policy aims.
- Some nations aim to address the gap between implementation realities and strong national CHW policies, as evidenced in a case study on Nigeria's plans to retrain much of its community health workforce.
- Now is the time to provide strong financial and resource support to promote public sector CHW subsystems.

All over sub-Saharan Africa there are national initiatives to reduce maternal and child mortality at the community level. Multiple countries have been leaders in developing national CHW programs, and the best features of these countries' programs are represented in the discussions and example operational design presented above. Often these existing programs use common terminology, but analyses reveal differences in execution of policy plans, as evidenced by disparate progress towards the health-related MDGs. However, most governments in sub-Saharan Africa have moved or are moving towards delivery of health services at the household and community levels, and some have formalized policy directives on the use of CHWs to extend primary health care to households.

However, many still lack the health system architecture for incrementally upgrading CHW subsystems as new evidence, technologies, management techniques and system strengthening processes emerge. The status quo of national CHW subsystems often represents the available information at the time of program initiation as well as the available financing. In addition, there is varied implementation of national policies within countries due to regional, geographic, capacity and other constraints. The policy and implementation landscape in sub-Saharan Africa regarding human resources for health policies is diverse, both within countries and from country to country.

There is a broad continuum of policy environments regarding CHWs in general, particularly on their role within the national health care system and level of extension from primary health care facilities. Table 5 provides an overview of this continuum in 10 sub-Saharan African countries.

Table 5: National Policy Landscape

Country	CHW terms used	Primary location of work	Services provided	Employed	Employer	Salaried	Part of National system?	Minimum education	Facility / Community % Time
SENEGAL	ASC'/ Matrone	Case de Sante ²	Case management (CM) of diarrhea, malaria, pneumonia, other minor ailments; monitoring of malnutrition & other danger signs; immunization; general health promotion & counseling	Yes, full time	Commune Rurale	No	No	High School	90% Case/ 10% HH*
	Relais ³	Household & Community	CM diarrhea; monitoring of malnutrition & other DS; general health promotion & counseling	Yes, part time	Commune Rurale	No	No	None	100% Community & HH*
NIGERIA	VHW ⁴	Village, settlement	Disease surveillance	No, voluntary	None	No	No	None	100% Community & HH
	CHEW ⁵	PHC & Community	CM diarrhea, malaria, pneumonia, malnutrition, other minor ailments; monitoring of other danger signs; immunization; general health promotion & counseling	Yes	State MoH	yes	yes	High School + 2 yrs training	40% PHC / 60% Community & HH
MALI	Relais	Household & Community	Promotion & counseling; Diarrhea CM; monitoring of malnutrition & other DS; general health promotion & counseling	Yes, part time	ASACO ⁶	No	No	None	10% community / 90% HH*
	ASC [Pilot]	Community & household	CM diarrhea, malaria, pneumonia, malnutrition, other minor ailments; monitoring of other danger signs; immunization; ; general health promotion & counseling	Yes, full time	ASACO	Yes	No	High School or trained Aide Soignant ⁷	80% community/ 20% HH
GHANA	CBSV ⁸	Community	Disease surveillance; growth monitoring	No, voluntary	None	No	No	None	100% Community & HH*
	CHN ⁹	CHPS compounds	CM diarrhea, malaria, pneumonia, other minor ailments; monitoring of malnutrition & other danger signs; FP services; immunization; general health promotion & counseling	Yes, full time	MoH	Yes	Yes	High School + 2 yrs training	20% CHPS compound / 80% HH*

Table 5: National Policy Landscape (continued)

Country	CHW terms used	Primary location of work	Services provided	Employed	Employer	Salaried	Part of National system?	Minimum education	Facility / Community % Time
Kenya	CHW	Community	CM diarrhea, malaria, pneumonia, other minor ailments; monitoring of malnutrition & other danger signs; FP services; immunization; Disease surveillance; general health promotion & counseling	Yes, full time	MoH / NGO's	Yes**	Yes	High School	90% Community /10 % health centres*
Tanzania	VHW	Community	CM diarrhea, malaria; monitoring of malnutrition & other danger signs; immunization; general health promotion & counseling	No, voluntary	None / NGO's	No	No	Primary School	90% Community/ 10 % health centres*
Uganda	VHW	Community	CM diarrhea, malaria; monitoring of malnutrition & other danger signs; FP services[condoms, pills]; immunization; general health promotion & counseling	No Voluntary	None	No	Yes	Primary School	90% Community /10 % health centres
Rwanda	VHW	Community	CM diarrhea, malaria, pneumonia; monitoring of malnutrition & other danger signs; FP services[condoms, pills]; immunizations; disease surveillance; general health promotion & counseling	No, Voluntary	MoH	No	Yes	Primary School	100% Community level
Malawi	HAS ⁰	Community	CM diarrhea, malaria, pneumonia; monitoring of malnutrition & other danger signs; FP services[condoms, pills, injectables]; immunizations; disease surveillance; general health promotion & counseling	Yes, full time	MoH	Yes	Yes	High School + 1 yr training	100% Community
Ethiopia	HEW ¹	Health post within the community	CM diarrhea, malaria, pneumonia, malnutrition; monitoring of other danger signs; FP services[implants, condoms, pills, injectables]; immunizations; disease surveillance; general health promotion & counseling	Yes, Full time	MoH	Yes	Yes	High School + 1 yr training	75% community 25 % health post

*Based on practice only and not formulated in policy

**Only performance-based

Agent de Sante Communautaire (Community Health Agent)

Health Hut

Relay or health extension worker

Village Health Worker

Community Health Extension Worker

Association de Sante Communautaire

Nurse Aid

Community-Based Surveillance Volunteer

Community Health Nurse



While the information in Table 5 is context specific, there are some policy points that are common: each represents an extension of care to the community level through community health worker programs, each has a basic package of content for these CHWs to do at the community level, and each has specific barriers to success in areas that we have touched on during this report.

Implementation of National Policy: Challenges and Opportunities

Appendix C provides snapshots of local implementation across the same 10 countries presented above in Table 5 in the Millennium Village Project (MVP) operational design elements such as pay and full-time or part-time status. The MVP operational status reflects the on-the-ground status of implementation of national CHW subsystem policies, with supplemental local management and pay structures developed in consultation with district and national governments, UN agencies, and technical experts, aimed at solving implementation challenges to

addressing the MDGs. The variation across sites deployed under these favorable operating conditions reveals some of the policy and implementation variety across sub-Saharan Africa.

While international variation is expected based on national contexts, the level of policy and implementation variation across the 10 African countries presented here illustrates to some degree the variable distance found between some national CHW programs at scale and recent evidence in both operational considerations and interventions.

Table 5 and Appendix C reflect varied operational designs and financial commitment for nationally-coordinated CHW subsystems at scale across sub-Saharan Africa. The reality of implementation of set national policies is yet more complex. In many cases, there are major obstacles to implementation of national CHW subsystem policies, particularly in rural areas and more so in the most vulnerable areas where the MDGs are most difficult to achieve. While national deployment plans for CHW subsystems should take into account decentralized implementation and community-engaged operational design modifications at the local level, implementation of core national standards for CHW subsystems at the local level often falls short of national policy guidelines.

Supporting CHW subsystem development should take this implementation gap between national policies and local realities into account, in part through incorporating strong implementation planning, M&E, linkages to PHC systems and supervisory structures.

With forward-thinking ministries of health in the lead, many national governments in sub-Saharan Africa are focused on improving the coverage of the national primary health system, quality of services and degree of community engagement in health system planning and implementation. National plans often take into account the gap between national policies and local implementation, and can be supported in their incremental efforts to improve equity in access

to health care and strengthen their capacity to meet the MDGs. In the next section, we focus upon the efforts of the Nigerian government, led by the Nigerian National Primary Health Care Development Agency (NPHCDA) to incrementally improve the national CHW subsystem in the context of long-standing health system strengthening initiatives.

National Case Study: Community Health Workforce in Nigeria—Continuous Improvements at National Scale

As the national policy landscape and local implementation fidelity are in flux, many nations are poised to make substantial improvements in their primary health care systems through investments and improvements in their CHW subsystems through coordinated primary health care expansion efforts. This section will provide background on the evolution of the Nigerian community health system and briefly introduce current initiatives underway that should be broadly supported, followed for lessons learned and supplemented where appropriate.

Background: Nigeria Primary Health Care System

The Nigerian national primary health care system has undergone a series of iterative changes, with each step geared towards incrementally stronger systems for care at the community level. The National Health Policy states that primary health care is the responsibility of the local governments, and changes have been accomplished through nationally coordinated policy planning rounds. The Nigerian National Primary Health Care Development Agency (NPHCDA) provides leadership on community health as an autonomous parastatal entity aligned with the Federal Ministry of Health, thus has played an active role in recent iterations of the primary health system.



The Basic Health Service Scheme (BHSS) was announced in 1975 as part of the third National Development Plan (1975-1980); the BHSS was a deliberate attempt to address the disproportionate barriers in access to health services faced by rural communities, which made up 75% of the Nigerian population. The values espoused in the Alma-Ata declaration of 1978, with a focus on community participation and ownership as well as social justice and equity, provided further fuel to the goal of reaching the rural communities with basic health services. The BHSS was a comprehensive national health policy, with the ultimate aims of: increasing the proportion of the population receiving healthcare from 25% to 60%; correcting the imbalance in the location and distribution of health institutions and between preventive and curative medicine; providing the infrastructure for all preventive health programmes; and establishing a health care system best adapted to the Nigerian

context. As such, the development of cadres of health workers whose training was oriented towards service in the rural community became a priority.

Basic Health Units were defined at local government areas. Each consisted of one comprehensive health centre (1:150,000 population) with four primary health centres and 20 health clinics. In addition, mobile clinics were expected to spread out from the primary health centres. To provide the health workforce to man the services, 19 Schools of Health Technology (one in each state) were established to train the three categories of community health worker: supervisors, assistants and aides: Community Health officers (CHOs); Community Health Extension workers (CHEWs); and Junior Community Health Extension workers (JCHEWs).

In 2000 the BHSS was modified with the development of the Ward Health System, which positioned

Table 6: JCHEW and CHEW Community-Based Functions

JCHEW Community-Based Functions	CHEW Community-Based Functions
<ul style="list-style-type: none"> • Community mobilization and education about CHEW/JCHEW roles • Health needs assessment, planning and implementation with other health workers and the community • Collect and collate health data for monitoring and evaluation of PHC activities in the community • Supervise VHWs (discussed below) • Visit homes to monitor pregnant and post-natal women and children, and identify “at risk” members of community • Diagnose, treat and/or refer specified conditions • Follow up on referrals to strengthen continuum of care • Health education on: environmental sanitation and prevalent health problems (malnutrition, diarrhea, STIs, etc) 	<ul style="list-style-type: none"> • Community mobilization and education about primary health care system • Initiate the formation and facilitate the effective functioning of community development committees; attend meetings of community development committees. • Familiarization with target population and community needs. • Supervise JCHEWs and VHWs; support their initial contacts with community leaders. • Participate in, and supervise PHC house numbering and placement in home based records, and update as needed.

the ward (smaller than the local government areas that defined the BHSS, and with the same boundaries as the lowest level of governance) as the functional unit for PHC delivery. The NPHCDA and its partners, including the World Health Organization, developed the Ward Minimum Health Care Package (WMHCP). This contains a set of cost-effective health interventions aimed at making a significant impact on morbidity and mortality, taking into account the nation’s burden of disease, current trends in disease prevalence and priority diseases of national importance. The WMHCP consists of the following components: Child Survival; Maternal and Newborn Care; Control of Priority Communicable Diseases (i.e., HIV/AIDS, Tuberculosis and Malaria); Nutrition; Prevention of Non-Communicable Diseases; Health Education and Community Mobilization.

Subsequent iterative developments led to a revision of the National Health Policy in 2004, with PHC still forming a central element; merging of the National Program on Immunization with the NPHCDA and the strengthening or routine immunization; the development of a National Strategic Health Development Plan, National Health Bill, and the National Primary Health Care Development Fund. This Fund is to be financed from the consolidated funds of the Federation, in an amount not less than two per cent of its value and from donor grants.

Challenges in Community Health Outreach Implementation

JCHEWs were designed to act as community outreach workers, participate with community diagnosis, and provide links to facility-based care. They are supposed to spend 80% of their time in the community, with 20% at the health clinic. They serve as the primary link between the community and the health facility for continuation of care. CHEWs are statutorily required to spend 50% of their time in the community and 50% at the facility, and act as managers for JCHEWs and as a liaison for engagement with community-based organizations. Table 6 provides an overview of their primary functions. There are opportunities for career advancement built into CHEW and JCHEW appointments. JCHEWs and CHEWs are trained at one of the 19 Schools of Health Technology (one in each state) established to train CHWs.

However, as discussed above, national policy is not always followed with implementation. Community participation and local implementation of the BHSS structure remained weak through the mid-1980s, and as a result there were limited community health outreach services beyond the facilities. Shortly after the delineation of the roles and responsibilities for JCHEWs and CHEWs, it became clear that only one-third of trained community health / primary

Box 9:

Voluntary Village Health Workers (VHWs) and Community Outreach

A program of trained, VHWs and traditional birth attendants (TBAs) was developed to address the importance of rural outreach services and community involvement in the provision and delivery of health care. VHWs are currently unpaid, based on the budget context in Nigeria at the time of the development of the cadre. As members of the community themselves who are known, accepted and trusted by their communities, the VHW provide a link between facility-based services and the community. VHWs should provide health care services to remote areas where access is difficult and help where there are cultural and other reservations to changes in health behavior. Table 7 provides an overview of the VHW cadre.

Table 7: VHW Cadre Description

Selection	Selection by the community, with guidance from the federal Ministry of Health. Criteria: Resident of the village; Commands respect in the community; Male or female; Means of livelihood
Training	Training of the trainers process; Training by CHOs, public health nurses, CHEWs, or other facility-based providers. Initial: 4 weeks; Drama, pictograms, community-based examples and precepts; Emphasis on health education. Nationally standardized training curricula. Refresher and retraining, ideally at regular intervals.
Service Provision	Treatment of minor ailments; health education emphasizing preventive health practices; Recognition of cases needing referral
Remuneration	Not currently paid, but may expect assistance and support in carrying out duties, may impose charges on drugs provided
Management	Reports to JCHEWs; Works alongside TBAs; Village health committee expected to monitor the activities of the VHWs.

The VHW cadre has also been implemented variously throughout the country. For example, in Nasarawa State in North Central Nigeria, there are active TBAs, with some poor health outcomes, and most VHWs are unemployed, trained JCHEWs and CHEWs, or TBAs who have been nominated for training as VHWs. These trained workers receive a stipend of N4,000-5,000, and spend 70% of their time in the community. They primarily work on case identification, management and referral. WHO Disease Surveillance Notification Officers also work with some of the VHWs and with other unemployed JCHEWs and CHWs to identify, treat and report diseases. They are paid N1,000 for each case reported. Finally, VHWs in the state are also selected by the community to engage in Onchocerciasis drug distribution. Employed JCHEWs and CHEWs in the state also provide community services 30% of the time, and are based in PHC facilities.

health care workers worked in the primary health care system, with the remaining two-thirds working in secondary care facilities and the remaining third unemployed. There were challenges in recruitment for rural areas, tailoring training to rural health care contexts, and selecting appropriate candidates for training. A lack of incentives and weak workforce motivation to work in rural primary health care complicates the situation further.

The Nigerian national health system has established strong operational definitions for the CHW subsystem, with paid and professionalized JCHEW and CHEW systems, but is faced with implementation challenges. There are several efforts underway strengthen deployment of JCHEW and CHEW cadres.

Overcoming Implementation Challenges

One solution referenced above was the development of volunteer Village Health Workers (VHWs) as a supplemental cadre, supervised by JCHEWs and CHEWs and often composed of traditional birth attendants (TBAs) and unemployed, but fully trained, JCHEWs and CHEWs. Box 9 provides a brief overview of the VHWs

Opportunity: National Deployment Scaling for Community Health Workforce

As a longer-term solution to the implementation challenges faced with VHWs, JCHEWs and CHEWs, the NPHCDA is in the midst of planning for the next iterative step in expanding primary health care at the community level. Plans are underway to retrain the existing community health cadres and deploy substantial new members of these cadres nationwide.

Nigeria currently has over 62,700 registered CHWs, including CHEWs, JCHEWs and CHOs, serving

a population of over 150 million. This gives a ratio of $0.5/1000$ population, well below internationally recommended standards. A key determinant of quality of care provided by the available community health workers is regular retraining and supervision. While CHEWs receive 2 to 3 years of training, many CHEWs do not receive continuing professional education for many years after graduation and lack adequate capacity for implementation of new interventions in primary health care.

Given the role of community health in Nigeria, with 65% of the population living in rural areas, where the community health system is often the only access to care, it is necessary to strengthen existing competency-based capacity building programs for CHWs in order to accelerate progress towards achieving MDGs 4 and 5. As part of an initiative to reduce maternal, newborn and child mortality and accelerate progress towards the attainment of the MDGs, the NPHCDA aims to retrain 30,000 community health workers (about half of the registered CHW workforce) across the country, in such a way that would systematically impact on quality of care and access to skilled personnel, towards placing the country on track to achieve MDGs 4 and 5. Community health workers (JCHEWs, CHEWs and CHOs) retrained in this initiative would be trained in maternal and child health interventions, national standing orders for primary care, mobile technology for community-based management of maternal and child health (including c-IMCI and integrated community case management), and early identification of risk factors and emergencies, modified life saving skills (MLSS), counseling and behavior change skills, and strategies to improve linkages between communities and facilities. Training, lasting from 4 to 7 days, would be conducted in collaboration with the federal Ministry of Health, along with many health professional organizations and development partners, in a cascade strategy with collaboration with Schools of Health Technology, which provide the initial training for the formalized community health cadres. Advocacy will take place to ensure that the CHWs

to be retrained are currently working in rural health facilities and would be retained in those facilities.

There are detailed roll out plans for this training, which would reinforce the standing orders and supervisory systems for JCHEWs and CHEWs. This initiative represents coordinated planning toward improving the community health system, which could be expanded upon with targeted planning and investment. Depending on the availability of supplemental financing, there are clear opportunities to ensure that the CHW cadres as designed in Nigeria are reaching the community level to extend health care services where it is most needed. In sum, the CHW subsystem in Nigeria PHC system is poised to greatly improve its reach, effectiveness and serve as an Africa-wide leader in achieving in the MDGs.

Next Steps

The global community should reinforce and support the need for strong, nationally-coordinated CHW subsystem support, scaled as part of the primary health care system where supervision, supplies and further clinical services are based.

In this report, we have presented a call for the extension of the formal primary health care system through the community and to the household level with CHWs that are integrated and formalized in national health plans; an exploration of the key elements to consider in operational design, planning, training and deployment; a brief look at the national contexts upon which systems improvements might be built; as well as the basic costs associated with implementation of a comprehensive, formal CHW program at national scale in sub-Saharan Africa. There is an evident need for extension of health systems to communities, particularly to the household level and for community case management of specific diseases,

with strong management, planning, training, deployment and evaluation. The barriers to progress thus far are operational, financial and policy based.

Support for CHW subsystem scale-up and augmentation must come from multiple stakeholders, such as civil organizations, NGOs, private sector representatives, but be led by national and district planning and implemented by local managers. A comprehensive scale-up plan as recommended in this report will be a synthesis of broader health system strengthening initiatives, comprehensive HRH planning, regular monitoring and evaluation, and strong community engagement mechanisms. The opportunities to learn from ongoing initiatives continues to be immense, particularly in areas of program design, deployment strategies and optimal repertoires of CHW tasks that extends the broader health system in a targeted manner. The Millennium Villages Project is a global touch point in low-income sub-Saharan African countries focusing on solving implementation challenges and developing innovative solutions for host national systems. Further work remains to understand how national strategies should interface with extensive private sector frontline health workers to ensure coordinated expansion of the health sector for sustainable health systems beyond the 2015 MDG targets.

The estimated \$2.3 billion required to ensure that CHWs are an integral feature of rural populations in low-income sub-Saharan Africa will have to be mobilized by joint efforts of national governments and global partners. It is beyond the scope of this paper to delineate this cost sharing, but we can offer some rough guidelines. Low-income countries can deploy around \$15 per person per year, on average, out of domestic budget resources, leaving a financing gap of roughly \$35 per person. If we assume, therefore that the low-income countries cover 30 percent of the to-



tal costs of the CHW system, the donor share would be roughly 70 percent of \$2.3 billion, or \$1.61 billion per year. This sum constitutes roughly 0.005% of donor GDP (currently around \$35 trillion per year), and so is a modest sum that fits easily within the promised levels of donor aid. There should be no barriers, therefore, to the effective deployment of the needed sums, especially if official donor assistance is combined with private donor assistance from pharmaceutical companies, NGOs, and foundations. Of course some of the needed funds should be drawn from the monies committed already for AIDS, TB, malaria, neglected tropical diseases, and maternal and child health, all areas in which CHW deployment has a proven impact.

The 2015 MDG targets represent a crucial opportunity to refocus our collective efforts on the delivery of services to the most vulnerable populations across Africa. National CHW initiatives are a critical leverage point for achieving the MDGs through the delivery of preventive and curative services, particularly in poor, rural areas where alternatives are limited. Efforts to integrate advocacy, financial commitments, international support and national planning that extends to local implementation can have a powerful impact. The goal of the overall 1 Million CHW Campaign is to catalyze this process and this taskforce technical report is a starting point for further elaboration and adaptation. Finally, in support of our common goal, the Earth Institute will host annual consultations on CHW scale-up in Nairobi, Kenya and Bamako, Mali each year until 2015 to provide a forum to highlight the challenges and champions of providing crucial health services to rural communities across sub-Saharan Africa.

Appendices

APPENDIX A: CHW Role in Community Based Interventions Shown to Impact Mortality and Morbidity Reduction

Community-Based Intervention	CHW with health system support	CHW referral to health facility and system	Systematic Reviews of Evidence and References**
CHILD			
Hygiene education and provision of soap	X		Lancet Child Survival Series 2003; Hill 2004, WHO; Lancet Maternal and Child Undernutrition Series 2008; Freeman 2009, Global Public Health; Perry 2009, APHA; Perry 2011 (under review)
Ensure usage of insecticide treated bednets for malaria prevention	X		Lancet Child Survival Series 2003; Hill 2004, WHO; Bhutta 2005, Pediatrics; Lancet Neonatal Survival Series 2005; Lancet Maternal and Child Undernutrition Series 2008; Freeman 2009, Global Public Health; Perry 2009, APHA; Perry 2011 (under review)
Management of fever	X	X	Lancet Child Survival Series 2003; Lewin 2010, Cochrane Review; Gilroy and Winch 2006, WHO/UNICEF; Freeman 2009, Global Public Health; Perry 2009, APHA; Perry 2011 (under review)
Management of diarrhea	X	X	Hill 2004, WHO; Lancet Neonatal Survival Series 2005; Gilroy and Winch 2006, WHO/UNICEF; Freeman 2009, Global Public Health; Perry 2009, APHA, Lewin 2010, Cochrane Review
Management of malnutrition	X	X	Lancet Child Survival Series 2003; Hill 2004, WHO; Bhutta 2005, Pediatrics; Lewin 2010, Cochrane Review; Lancet Neonatal Survival Series 2005; Gilroy and Winch 2006, WHO/UNICEF; Lancet Maternal and Child Undernutrition Series 2008; Perry 2009, APHA; Perry 2011 (under review)
Management of acute respiratory illness	X	X	Lancet Child Survival Series 2003; Winch 2005, Health Policy and Planning; Gilroy and Winch 2006, WHO/UNICEF; Freeman 2009, Global Public Health; Perry 2009, APHA; Lewin 2010, Cochrane Review; Perry 2011 (under review)
Complementary feeding promotion food-secure populations	X		Lancet Child Survival Series 2003; Hill 2004, WHO; Lancet Maternal and Child Undernutrition Series 2008; Bhutta 2008, Lancet
Provision of food supplements in food-insecure households		X	Bhutta 2008, Lancet; Perry 2009, APHA
Iron supplementation for children in non-malarial populations		X	Bhutta 2008, Lancet
Promotion of care-seeking for sick child	X	X	Hill 2004, WHO; Gilroy and Winch 2006, WHO/UNICEF; Lewin 2010, Cochrane Review
Referral to health facility for child morbidities		X	Hill 2004, WHO; Gilroy and Winch 2006, WHO/UNICEF; Lewin 2010, Cochrane Review
EARLY AND LATE NEONATAL			
Promotion of ANC visits for micronutrient supplements, tetanus toxoid injection, anthelmintic treatment, immunoprophylaxis		X	Lancet Child Survival Series 2003; Hill 2004, WHO; Bhutta 2005, Pediatrics; Lancet Neonatal Survival Series 2005; Perry 2009, APHA
Promotion of clean delivery practices		X	Lancet Child Survival Series 2003; Lancet Neonatal Survival Series 2005; Freeman 2009, Global Public Health; Perry 2009, APHA; Perry 2011 (under review)
Promotion of initiation of breastfeeding and of exclusive breast-feeding	X		Lancet Child Survival Series 2003; Hill 2004, WHO; Bhutta 2005, Pediatrics; Lancet Maternal and Child Undernutrition Series 2008; Freeman 2009, Global Public Health; Perry 2009, APHA; Lewin 2010, Cochrane Review; Perry 2011 (under review)
Promotion of appropriate complementary feeding beginning at 6 months of age	X		Freeman 2009, Global Public Health; Perry 2011 (under review)

Promotion of immunization uptake	X	X	Hill 2004, WHO; Perry 2009, APHA; Lewin 2010, Cochrane Review; Perry 2011 (under review)
Promotion of care-seeking for sick newborn	X	X	Hill 2004, WHO; Lewin 2010, Cochrane Review
Promotion and provision of antiretroviral medication to newborns of HIV positive women to prevent MTCT		X	Freeman 2009, Global Public Health; Perry 2009, APHA
Ensure usage of insecticide-treated bed nets for malaria prevention	X		Lancet Child Survival Series 2003; Freeman 2009, Global Public Health; Perry 2009, APHA; Perry 2011 (under review)
Intermittent presumptive treatment for malaria	X	X	Lancet Child Survival Series 2003; Lancet Neonatal Survival Series 2005; Lancet Maternal and Child Undernutrition Review 2008; Freeman 2009, Global Public Health; Perry 2009, APHA; Perry 2011 (under review)
Community-based pneumonia case management	X	X	Lancet Neonatal Survival Series 2005; Bhutta 2008, Lancet
Referral to health facility for neonatal morbidities		X	Hill 2004, WHO; Lassi 2010, Cochrane Review
Home-based neonatal care including diagnosis and treatment of neonatal sepsis, promotion of cleanliness, prevention of hypothermia, and care of LBW infant	X		Bhutta 2008, Lancet; Freeman 2009, Global Public Health; Perry 2009, APHA; Lassi 2010, Cochrane Review; Perry 2011 (under review)
Home-based antenatal and postnatal visitations, with community mobilization	X		Lassi 2010, Cochrane Review
MATERNAL*			
Promotion of ANC visits for micronutrient supplements, anthelmintic treatment		X	Hill 2004, WHO; Bhutta 2005, Pediatrics; Lancet Neonatal Survival Series 2005; Bhutta 2008, Lancet; Lancet Maternal and Child Undernutrition Series 2008; Perry 2011 (under review)
Ensure usage of insecticide-treated bed nets for malaria prevention	X		Lancet Neonatal Survival Series 2005; Bhutta 2008, Lancet
Promotion and provision of antiretroviral medication to HIV positive women to prevent MTCT		X	Freeman 2009, Global Public Health
Home-based antenatal and postnatal visitations	X		Lassi 2010, Cochrane Review
Referral for EmOC	X	X	Lassi 2010, Cochrane Review
Family Planning Promotion and Provision	X	X	No Reviews Available, some trial studies
Promotion of Institutional deliveries	X	X	Lassi 2010, Cochrane Review
Health care seeking for maternal morbidities	X	X	Lassi 2010, Cochrane Review
ADULT			
Support adherence to treatment for adults with smear-positive TB	X		Lewin 2010, Cochrane Review

*Evidence that Community-Based approaches impact maternal morbidity exists. Evidence for mortality reduction is emerging.

** Quality of evidence is variable across these interventions; which is described in detail in the studies mentioned.

FULL CITATIONS

- Bhutta, Z. A., Darmstadt, G. L., Hasan, B. S., & Haws, R. A. (2005). Community-based interventions for improving perinatal and neonatal health outcomes in developing countries: A review of the evidence. *Pediatrics* (Evanston), 115(2), 519.
- Freeman, P., Perry, H., Gupta, S., & Rassekh, B. (2009). Accelerating progress in achieving the millennium development goal for children through community-based approaches. *Global Public Health*, 99999(1), 1-20.
- Gilroy, K., & Winch, P. (2006). Management of sick children by community health workers: Intervention models and programme examples. The United Nations Children's Fund / World Health Organization,
- Hill, Z., Kirkwood, B., & Edmond, K. (2004). Family and community practices that promote child survival, growth and development: A review of evidence. *World Health Organization*,
- Lassi, Z. S., Haider, B. A., & Bhutta, Z. A. (2010). Community-based intervention packages for reducing maternal and neonatal morbidity and mortality and improving neonatal outcomes. *Cochrane Database System Review*, 11
- Lewin, S., Munabi-Babigumira, S., Glenton, C., Daniels, K., Bosch-Capblanch, X., van Wyk, B. E., et al. (2010). Lay health workers in primary and community health care for maternal and child health and the management of infectious diseases. *Cochrane Database of Systematic Reviews*, (3)
- Perry, H., & Freeman, P. (2009). How effective is primary health care in improving the health of children? *International Section of the American Public Health Association*,
- Perry, H., Rassekh, B., Freeman, P., Gupta, S., & Soucat, A. Can community-based services help us reach the MDGs? A review of the evidence on the impact of community-based primary health care programs in improving child health in high-mortality, low-resource settings (Under Review for Publication),
- Winch, P. J., Gilroy, K. E., Wolfheim, C., Starbuck, E. S., Young, M. W., Walker, L. D., et al. (2005). Intervention models for the management of children with signs of pneumonia or malaria by community health workers. *Health Policy and Planning*, 20(4), 199-212.
- Lancet Child Series 2003
- Black, R. E., Morris, S. S., & Bryce, J. (2003). Where and why are 10 million children dying every year? *The Lancet*, 361(9376), 2226-2234.
- Bryce, J., el Arifeen, S., Pariyo, G., Lanata, C. F., Gwatkin, D., & Habicht, J. (2003). Reducing child mortality: Can public health deliver? *The Lancet*, 362(9378), 159-164.
- Jones, G., Steketee, R. W., Black, R. E., Bhutta, Z. A., & Morris, S. S. (2003). How many child deaths can we prevent this year? *The Lancet*, 362(9377), 65-71.
- The Bellagio Study Group on Child Survival. (2003). Knowledge into action for child survival. *The Lancet*, 362(9380), 323-327.
- Victora, C. G., Wagstaff, A., Schellenberg, J. A., Gwatkin, D., Claeson, M., & Habicht, J. (2003). Applying an equity lens to child health and mortality: More of the same is not enough. *The Lancet*, 362(9379), 233-241.
- Lancet Neonatal Survival Series 2005
- Darmstadt, G. L., Bhutta, Z. A., Cousens, S., Adam, T., Walker, N., & de Bernis, L. (2005). Evidence-based, cost-effective interventions: How many newborn babies can we save? *The Lancet*, 365(9463), 977-988.
- Knippenberg, R., Lawn, J. E., Darmstadt, G. L., Begkoyian, G., Fogstad, H., Walelign, N., et al. (2005). Systematic scaling up of neonatal care in countries. *The Lancet*, 365(9464), 1087-1098.
- Lawn, J. E., Cousens, S., & Zupan, J. (2005). 4 million neonatal deaths: When? where? why? *The Lancet*, 365(9462), 891-900.
- Martines, J., Paul, V. K., Bhutta, Z. A., Koblinsky, M., Soucat, A., Walker, N., et al. (2005). Neonatal survival: A call for action. *The Lancet*, 365(9465), 1189-1197.
- Lancet Maternal and Child Undernutrition Series 2008
- Bhutta, Z. A., Ahmed, T., Black, R. E., Cousens, S., Dewey, K., Giugliani, E., et al. (2008). What works? interventions for maternal and child undernutrition and survival. *The Lancet*, 371(9610), 417-440.
- Black, R. E., Allen, L. H., Bhutta, Z. A., Caulfield, L. E., de Onis, M., Ezzati, M., et al. (2008). Maternal and child undernutrition: Global and regional exposures and health consequences. *The Lancet*, 371(9608), 243-260.
- Bryce, J., Coitinho, D., Darnton-Hill, I., Pelletier, D., & Pinstrup-Andersen, P. (2008). Maternal and child undernutrition: Effective action at national level. *The Lancet*, 371(9611), 510-526.
- Morris, S. S., Cogill, B., & Uauy, R. (2008). Effective international action against undernutrition: Why has it proven so difficult and what can be done to accelerate progress? *The Lancet*, 371(9612), 608-621.
- Victora, C. G., Adair, L., Fall, C., Hallal, P. C., Martorell, R., Richter, L., et al. (2008). Maternal and child undernutrition: Consequences for adult health and human capital. *The Lancet*, 371(9609), 340-357.

APPENDIX B:

Mobile Health Technologies to Support Community Health System Impact

In 2000, mobile subscriptions in the developing world were held by just 5.5 per 100 people, a rate too low for mobile phones to have large-scale impact on health systems. Despite this, researchers and development practitioners recognized the potential impact that mobile technology could have on improving health in low-income settings, and began implementing small-scale projects to test and understand mobile phone functionality across the health ecosystem. While these efforts were largely uncoordinated, the result was a substantial global investment in research and development of a wide range of mobile technologies for health care delivery.

By 2009, the environment had shifted, with 90% of the world's population living in areas covered by cellular signal. As of 2010, 67.6 per 100 inhabitants in the developing world had mobile subscriptions, and further growth in the sector is inevitable. The emerging consensus is that mobile phones are primed to play a significant role in empowering decision making for CHWs, and in improving the accuracy and efficiency of health data collection. From simple voice functionalities through SMS-based data and phone-based decision -support tools, to GPS-enabled survey tools, existing mobile technology applications can support CHWs in their primary role as community health providers, while also serving as an integration point to support health systems or specialized information collection.

For example, the Millennium Villages Project (MVP) is demonstrating the potential impact of mobile and other electronic health (mHealth and eHealth) strategies across health systems in 14 sites across 10 countries in Africa. Over the past two years, it has put into place four platforms that have gained traction and shown results, with a fifth and sixth under review. These platforms cover SMS, voice (toll-free emer-

gency lines, closed user groups, and telemedicine in Ghana), Android, and PC-based applications at the household, clinic, and district-level. These include ChildCount+, OpenMRS, Mobile Telemedicine (in Ghana), Mangrove, ODK-clinic and RapidSMS for disease surveillance and reporting, and have been applied to maternal, newborn and child health, as well as special. Special modules also exist, including those for TB, malaria, HIV/AIDS and the 14 reportable WHO Epidemic Diseases. These systems enable unprecedented support for health workers and clients, and they are used for tracking women and children across the continuum of care from households to facilities to referral facilities. The MVP health system has been developed in close collaboration with partners including: Ericsson, Sony Ericsson, MTN, Zain, mHealth Alliance, The Bill and Melinda Gates Foundation, The Merck Company Foundation, Novartis Foundation for Sustainable Development, The John D. and Catherine T. MacArthur Foundation, FIND Foundation for Innovative New Diagnostics, Sight and Life, Nestle, Open Mobile Consortium, the World Health Organization, and others.

Mobile Phones for Empowering Decision Making

Mobile phones have a considerable role to play in supporting CHW's decision-making ability and have proven particularly valuable when used by CHWs at the point of care. Studies conducted in Egypt, Cameroon and Malaysia demonstrate that mobile phones can significantly improve decision making and health outcomes when used by health professionals for teleconsultations with more highly skilled members of the workforce. The Malaysian Ministry of Health implemented the Teleconsultation Network from 2001 to 2002, and "found that the diagnosis between primary care physicians and specialists differed by 42%. The implementation of the teleconsultation system...which allows health care providers to communicate with one another, has led to more appropriate patient care, and thus better health outcomes" (Mechael & et. al., 2010).

Mobile phones linked with electronic medical records (EMR) also have tremendous potential for enhancing



health outcomes and supporting CHWs. This functionality can inform data collection, treatment compliance, and disease management programs, thus enabling CHWs to provide more targeted care for their communities.

There are also “increasing numbers of support tools and mobile phone-based systems...being used to enable access to static and algorithm-driven health information for health professionals” (Mechael & et. al., 2010). In the Millennium Villages Project, Child-Count+ allows CHWs to enter health reports linked to patient’s EMR by SMS and receive automated treatment recommendations related to malnutrition, malaria and mother to child transmission of HIV (www.Childcount+.org).

94

Additionally, mobile phones can be used for training health workers and the communities that they serve, thereby addressing one of the core challenges to developing a professional, educated CHW workforce. Projects in Guatemala and other countries have demonstrated mobile phone’s utility of mobile phones in providing CHWs with basic refresher trainings and short courses on the emerging epidemics and health trends. In Ghana, they are being used within communities to show videos with modules to increase awareness and knowledge around specific health issues.

Beyond telemedicine, diagnostic and treatment decision support, and training, mobile phones have been shown to have significant potential in the areas such as standardization of care, referral and patient regis-

tration, prioritization of patient needs, mBanking, and as behavior change tools.

Mobile Phones for Data Collection

Mobile phones support health system building by allowing data collection and reporting on patients, and by enabling the tracking and management of work for CHWs and other health cadres. They can streamline and add value to varying key operational components of CHW systems, particularly when applied with an awareness of minimizing the reporting burden on health providers. The potential benefit increases when reporting systems are linked with national health systems, particularly in the areas of supply chain management, disease surveillance and identification of seasonal priorities and epidemics. A number of studies have demonstrated that data collection on mobile phones can both reduce the number of errors and omissions compared to paper-based data collection, and reduce the amount of time required for preparing data for analysis (Mechael & et. al., 2010). Upgrades to national CHW subsystems should include mHealth options and aim to enable real-time monitoring and surveillance, ideally linked with national health information systems.

mHealth in Support of CHW Subsystems at Scale

mHealth technologies ready for scaling up include: SMS and mobile-phone -based facility reporting to digital health information systems (DHIS), which are already in place in many countries; patient registries for vital events tracking, including birth and death registries and immunization tracking; patient registration and decision support tools for community health workers CHWs; and direct -to -client awareness campaigns and treatment adherence messaging. Each of these, when leveraged by a well-managed and supported CHW program, have the opportunity to directly improve community health.

Beyond capitalizing on a mobile phone's core utility of voice and SMS, more complex functionalities hold promise for supporting community health systems. For example, general packet radio service (GPRS), Third and Fourth Generation Wireless (3G and 4G), global position system (GPS), bluetooth, data creation and management, and imaging and video are now available on mobile devices. While mobile broadband subscriptions in the developing world were at 13.6 per 100 inhabitants in 2010, the trend is towards continued growth. As more advanced ICTs become increasingly accessible and affordable, their applications for community health systems improvements will increase (World Telecommunication/ICT Indicators Database, 2010).

As mentioned above, there are currently several governments in sub-Saharan Africa and in Asia that are implementing CHW programs and investing in mobile phones as essential support tool for CHWs. These include:

India: India's National Rural Health Mission is a national effort to provide primary health care to more than 700 million rural poor people and has been a leader in integrating mobile phones into the health system and CHW program. mHealth programs have been established on a state-by-state basis, with promising examples in Rajasthan and Assam. In Rajasthan, with a population of more than 68 million people, community-based health workers are focused on maternal and child health at the village level. They have been equipped with mobile phones to be used for an SMS-based reporting system to

track pregnancies and encourage facility-based delivery. In the north eastern state of Assam, these community-based health workers have also been provided with mobile phones that offer free calls and SMS between a closed user group to enable information reporting between the community, the primary health care center, and higher levels of the health system.

Ghana: The Mobile Technology for Community Health (MOTECHE) initiative in the upper east region of Ghana has an application that uses text messages to provide alerts and reminders, actionable information and advice, and educational information directly to pregnant women to help ensure proper prenatal and neonatal care. It also includes an application that helping CHWs to record and track the care delivered to women and newborns in their area. It directly links data from the patient taken at the clinic-level to Ghana Health Service-recommended treatments.

Nigeria: In Nigeria, a program is currently underway to conduct comprehensive surveys using smart phones to capture photographs and the registration of GPS coordinates. The government is using this program to do a facility-based census of all the schools, clinics and water points in Nigeria. The same tools can be used to conduct intensive household surveys that attempt to collect both important socioeconomic and health data. In turn, rapid feedback mechanisms to end-users allow for on-the-fly exchanges of information with community members.

Kenya: In Western Kenya the NGO LifeStraw has undertaken the Carbon for Water campaign, which has trained 4,000 CHWs on a mobile phone application to help enable a safe drinking water program. The CHWs use an application for OpenDataKit-enabled smartphones in order to collectively gathering approximately 40,000 records per day with the aim to have one million records by June 1, 2011. The records will be analyzed remotely and will directly support Carbon for Water's distribution of four million water treatment units in the region (OpenDataKit, 2011).

Tanzania: CommCare, an SMS-based community

health mobile platform initiated by Dimagi, Inc., and D-Tree international, is working in rural Tanzania with a number of local institutions including Millennium Villages Project, BRAC, Catholic Relief Services and PATH. The project aims to equip 1,400 community health volunteers (covering one million individuals) with CommCare, and in doing so reduce the number of deaths related to tuberculosis, malaria, HIV/AIDS, and maternal and child health. The program helps support efficiency, supervision, and coordination of CHWs and other home-based care providers. CommCare has also partnered with BRAC Tanzania to develop a series of health education videos that can be played by the community health volunteers on their mobile phones during their home visits.

As the field has matured through expansive pilot testing of a wide array of mobile technologies for health, the mHealth community has begun to coalesce around common technologies that can support many different strategies for health communications and data collection and transfer. There is an emerging understanding that the most important aspect of the mHealth field is a sophisticated understanding of the roles and functions it should play in a health system, and not the particular underlying technology that powers a particular solution. As a result, health organizations have been increasingly interested in collaborating with mHealth technology providers around a common set of health system functions; at the same time, mHealth software providers are increasingly consolidating their technology platforms as the complexity of the software demands for mobile health progresses as well. As a result, mHealth is no longer theoretical; it is being

implemented in the field and is technically ready for scale.

On a policy level, pilot programs have helped to educate governments and NGO partners about the potential opportunities and barriers of mHealth. They have shown the importance of close collaboration between government and providers to develop models where public and private sector interests are both served. There has also been a great deal of evidence pointing towards the importance of establishing global policies for data and interoperability standards, as well as the need for open-source approaches to reduce duplication of efforts and maximize on lessons learned. These policy-level findings have prepared governments to begin to take an educated and necessary leadership role in mHealth scale-up. Beyond pilots, mHealth will need to be increasingly adopted into national health care plans to be sustained. Facilitating this transition, mHealth is well suited to adaptation to national scale and government leadership.

At the global policy level, UNESCO and the International Telecommunication Union's Broadband Commission for Digital Development has brought together the world's leading private and public sector experts in ICT and broadband to promote policies and practices that enable the entire world to benefit from broadband. Its Working Group on Health is identifying the most effective ways of scaling up CHW programs by enabling them with broadband and mobile technology.

REFERENCES

- World Telecommunication/ICT Indicators Database. (2010). Retrieved May 15, 2011, from <http://www.itu.int/ITU-D/ict/statistics/>
- Mobile Technology for Community Health in Ghana: What it is and what Grameen Foundation has learned so far. (2011). Washington, DC: Grameen Foundation.
- The Communication Initiative Network. (2011). Retrieved May 16, 2011, from <http://www.comminit.com/en/node/320774>
- The Communication Initiative Network. (2011). Retrieved May 16, 2011, from <http://www.comminit.com/en/node/320595/38>
- Assam, G. o. (n.d.). The Way Forward Through Innovations in Healthcare- Assam. Retrieved May 16, 2011, from http://docs.google.com/viewer?a=v&q=cache:Gv2vqqfFuvGJ:mohfw.nic.in/nrhm/Documents/Innovations_Assam_NRHM_Best_Practices_Brochure.pdf+ASHAs+NRHM+mobile+phones&hl=en&gl=us&pid=bl&scid=ADGEEsj8BUoi2R7cro2WTKPjFvgpMqONQOZGMBAPDPGud2Q42DKuQ8lr_i7kMORUcrCLS72
- Bajpai, N., Sachs, J. D., & Dholakia, R. H. (2009). Improving access, service delivery and efficiency of the public health system in rural India: Midterm evaluation of the NRHM. New York: Earth Institute, Columbia University.
- Michael, P., & et. al. (2010). Barriers and Gaps Affecting mHealth in Low Income Settings. The mHealth Alliance.
- OpenDataKit. (n.d.). Retrieved May 15, 2011, from <http://opendatakit.org/2011/05/carbon-for-water-collects-40000-forms-per-day-with-odk-and-monitors-results-from-international-space-station/>
- Childcount+.org. (n.d.). Retrieved May 15th, 2011, from <http://www.childcount.org/>

APPENDIX C: Local Implementation Landscape, MVP CHW Program Operational Status

CHW PROG PERFORMANCE INDICATOR	Potou, Senegal	Tiby, Mali	Toya, Mali	Pampaida, Nigeria	Ikaram, Nigeria	Bonsaaso, Ghana
Cluster population	32,818	74,314	7,625	29,700	23,330	34,780
Number of HHs	3,268	5,626	956	4,520	5,340	6,960
Number of CHWs	27	116	12	25	24	45
Number of SnCHWs	3	4	0	3	4	6
Average number of HHs per CHW	108.9	48.5	79.7	180.8	222.5	154.7
Monthly pay amount for a CHW	\$54	\$25	\$30	\$33	\$33	\$135
Amount paid by MVP	\$54	\$25	\$30	\$33	\$33	\$50
Amount paid by District/Govt	\$0	\$0	\$0	\$0	\$0	\$85
Employment status (Full/part time)	FT	PT	PT	PT	PT	FT
Screening for diarrhea, & treatment with ORS + Zinc	✓	✓	✓(screen only)	✓	✓	✓
Screening for malaria with RDTs & treatment with ACT/Coartem	✓	✓	✓(RDT only)	✓	✓	✓
Screening for malnutrition with MUAC	✓	✓	✓	✓	✓	✓
Screening for URI/ pneumonia danger signs	✓	✓	✓	✓	✓	✓
Treatment of URI/pneumonia danger signs with antibiotics (Cotri, Amoxicilin)	✗	✗	✗	✗	✗	✗
Collection of sputum/administration or refill of DOTs meds to TB patients	✓	✗	✗	✗	✗	✓(Sput, Meds)
Identification of pregnancies & screening for related danger signs	✓	✓	✓	✓	✓	✓
Supply of Condoms and/or pills to households as needed	✗	✓	✓	✓	✓	✓
Provide home-based Vit. A supplementation to NB and PW	✗	✗	✗	✗	✗	✓
Provision of FP services (injectables)	✗	✗	✗	✗	✗	✗
Support to new mothers in newborn care	✓	✓	✓	✓	✓	✓
Preventive/promotive counseling on BN, WASH, NUT, ANC, PNC, NN care, FP	✓	✓	✓	✓	✓	✓
Referral of all other danger signs to the clinic	✓	✓	✓	✓	✓	✓
Follow up of all cases with danger signs	✓	✓	✓	✓	✓	✓
Registration of all deaths	✓	✓	✓	✓	✓	✓
Identification & registration of newborn & pregnant women	✓	✓	✓	✓	✓	✓
HH health data collection using CC+ forms	✓	✓	✓	✓	✓	✓
HH health data collection/transmission using mobile phones (ChildCount+)	✓	✓Minimal	✗	✗	✗	✓Partial

APPENDIX C

CHW PROG PERFORMANCE INDICATOR	Sauri, Kenya	Ruhiira, Uganda	Mbola, Tanzania	Koraro, Ethiopia	Koraro, Ethiopia (HEWS)	Dertu, Kenya	Mayange, Rwanda	Mwandama, Malawi	Gumilira, Malawi
Cluster population	64,960	51,710	38,740	84,610	84,610	6,150	22,900	34,260	6,700
Number of HHs	13,530	10,270	6,470	16,750	16,750	990	4,990	8,580	1,203
Number of CHWs	108	48	40	350	350	5	140	45	6
Number of SnCHWs	11	6	6	11	11	1	10	8	1
Average number of HHs per CHW	125	213	161	47	47	198	35	190	200
Monthly pay amount for a CHW	\$50	\$25	\$30	\$30	\$40	\$100	\$0	\$79	\$79
Amount paid by MVP	\$50	\$25	\$30	\$30	\$40	\$100	\$0	\$79	\$79
Amount paid by District/Govt	\$0	\$0	\$0	\$0	\$0	\$0	\$0***	\$0	\$0
Employment status (Full/part time)	FT	FT	FT	FT	FT	FT	FT	FT	FT
Screening for diarrhea, & treatment with ORS + Zinc	✓	✓	✓	✓	✓	✓	✓	✓	✓
Screening for malaria with RDTs & treatment with ACT/Coartem	✓	✓	✓	✓	✓	✓	✓	✓	✓
Screening for malnutrition with MUAC	✓	✓	✓	✓	✓	✓	✓	✓	✓
Screening for URI/pneumonia danger signs	✓	✓	✓	✓	✓	✓	✓	✓	✓
Treatment of URI/pneumonia danger signs with antibiotics (Cotri, Amoxicilin)	X	X	X	X	X	X	✓	X	X
Collection of sputum/administration or refill of DOTs meds to TB patients	X	✓	X	X	X	✓	✓	✓	✓
Identification of pregnancies & screening for related danger signs	✓	✓	✓	✓	✓	✓	✓	✓	✓
Supply of Condoms and/or pills to households as needed	✓	✓	✓	✓	✓	X	✓	✓	✓
Provide home-based Vit. A supplementation to NB and PW	X	✓	X	X	✓	X	✓	✓	✓
Provision of FP services (injectables)	X	✓	X	X	X	X	X	✓	X
Support to new mothers in newborn care	✓	✓	✓	✓	✓	✓	✓	✓	✓
Preventive/promotive counseling on BN, wASH, NUT, ANC, PNC, NN care, FP	✓	✓	✓	✓	✓	✓	✓	✓	✓
Referral of all other danger signs to the clinic	✓	✓	✓	✓	✓	✓	✓	✓	✓
Follow up of all cases with danger signs	✓	✓	✓	✓	✓	✓	✓	✓	✓
Registration of all deaths	✓	✓	✓	✓	✓	✓	✓	✓	✓
Identification & registration of newborn & pregnant women	✓	✓	✓	✓	✓	✓	✓	✓	✓
HH health data collection using CC+ forms	✓	✓	✓	X	X	✓	✓	X	X
HH health data collection/transmission using mobile phones	✓	✓	X	X	X	X	X	X	X

X Not occurring

✓ Occuring

*** Compensated thru the cooperative system



