

# Community Health Workers in Global Health: Scale and Scalability

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## OUTLINE

### BACKGROUND

**Historical Development of Community Health Worker Programs**  
**Challenges in Community Health Worker Program Design**

### COMMUNITY HEALTH WORKER PROGRAMS AT NATIONAL SCALE

**India's Accredited Social Health Activist System**  
**Pakistan's Lady Health Worker Program**  
**Ethiopia's Health Extension Worker Program**  
**Brazil's Agentes de Saúde**

### CHALLENGES OF COMMUNITY HEALTH WORKER PROGRAMS AT NATIONAL SCALE

### COMMUNITY HEALTH WORKER PROGRAM SCALABILITY

**Bangladesh Rural Advancement Committee: Managing Financial Inputs to Stabilize System Processes**  
**Partners in Health: Strengthening Quality of Care Through Teamwork in Chronic Care Coverage**  
**Millennium Villages Project: Systems Management Innovations**  
**Innovations of Nongovernmental Organization Scalability Efforts**

### RECOMMENDATIONS: COMMUNITY HEALTH WORKER NETWORK MANAGEMENT AND STRONG PRIMARY HEALTHCARE SYSTEM INTEGRATION

### CONCLUSION: THE WAY FORWARD

## ABSTRACT

Community health worker programs have emerged as one of the most effective strategies to address human resources for health shortages while improving access to and quality of primary healthcare. Many developing countries have succeeded in deploying community health worker programs in recognition of the potential of community health workers to identify, refer, and in many cases treat illnesses at the household level. However, challenges in program design and sustainability are expanded when such programs are expanded at scale, particularly with regard to systems management and integration with primary health facilities. Several nongovernmental organizations provide cases of innovation on management of community health worker programs that could support a sustainable system that is capable of being expanded without being stressed in its functionality nor effectiveness—therefore, providing for stronger scalability. This paper explores community health worker programs that have been deployed at national scale, as well as scalable innovations found in successful nongovernmental organization–run community health worker programs. In exploration of strategies to ensure sustainable community health worker programs at scale, we reconcile scaling constraints and scalable innovations by mapping strengths of nongovernmental organizations' community health worker programs to the challenges faced by programs currently deployed at national scale. *Mt Sinai J Med* 78:419–435, 2011. © 2011 Mount Sinai School of Medicine

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Efforts to improve access to primary healthcare (PHC) have taken many forms since the Alma Ata Declaration of 1978 demonstrated a global consensus that PHC improvements are required to achieve a minimum standard quality of life worldwide.<sup>1</sup> Since then, there have been multiple generations of coordinated pushes for PHC program improvement. However, despite these efforts and the passage of

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3 decades, the expansion and adaptation of PHC services to serve poor and vulnerable populations around the world remains an enduring challenge. The Millennium Development Goals (MDGs), which have been widely adopted by the international community, have provided the basis for a new generation of investments in the strengthening of national PHC systems, as well as a concerted focus on the methods of delivering care to the most vulnerable populations. In particular, the MDGs have also created pressure for national-scale deployment of PHC improvement whereby progress toward meeting the MDGs is measured at the country level.

We define PHC per the Alma Ata Declaration as the delivery of essential health services, which are “the first level of contact of individuals, the family, and community with the national health system” and “the first element of a continuing healthcare process.”<sup>1</sup> Such services are met in systems that integrate and encompass care at the local primary clinic level and surrounding community-based healthcare access points such as households. Primary healthcare systems are supplemented through secondary care through hospitals, and beyond to tertiary or specialty care as available for complex care. Much of the global disease burden could be addressed if existing, proven interventions were deployed at a large scale within a PHC system; nearly 50% of all deaths of children aged <5 years are due to pneumonia, diarrhea, malaria, and malnutrition, all preventable and treatable conditions in a primary-care setting.<sup>2-4</sup> However, household coverage of therapeutics for most of these interventions (i.e., antibiotics for pneumonia, antimalarial drugs for malaria, oral rehydration therapy and zinc for diarrhea) is low, <50% in most cases.<sup>5</sup>

Early efforts to address access to PHC for rural populations focused on expanding health facilities and highly skilled health workers. However, these efforts uncovered the difficulty in providing well-managed services in resource-poor areas; a widely recognized shortage of skilled health workers, particularly in sub-Saharan Africa, exacerbated this phenomenon. This “human resources for health” (HRH) crisis continues to be particularly prominent in rural areas, where distances to clinics are excessive and financing for extension workers remains inadequate.<sup>6,7</sup> As a result, much excess mortality occurs at home before a health facility can be reached; for example, data from Bolivia in 1998 showed that 62% of sick children who subsequently died had not been taken to a healthcare provider.<sup>8,9</sup>

To address the HRH crisis, PHC system development shifted toward the deployment of various types of auxiliary health workers and community-based lay health workers, which this paper will capture with the term “community health workers” (CHWs). Community health workers are often touted as a cadre of community-based health workers who deliver low-cost PHC services at the community and household level, representing also the long-standing role of community members in protecting and promoting public health. When managed effectively, a CHW program that is integrated into a well-functioning PHC system can promote care at the

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household level and function as a crucial link between community members and the PHC system, thereby providing a means for continuum of care across multiple points of care.

Many countries have developed national iterations of large-scale CHW programs in recognition of the potential of CHWs to identify, refer, and, in many cases, treat illnesses at the household level. However, they face considerable challenges in the maintenance, improvement, and evaluation of these investments at scale. In this review, we discuss the development of CHW programs at national scale and highlight the challenges presented through selected cases. We subsequently review cases of complementary approaches by organizations that provide operational leadership in improving CHW program scalability through innovations in systems management; such innovations have the opportunity to address the challenges experienced by national programs. When taken together, national initiatives and complementary efforts provide an opportunity for the development of national-scale PHC systems that

feature well-managed CHW programs, providing linkages to high-quality, clinic-based services for the underserved populations.

## BACKGROUND

### **Historical Development of Community Health Worker Programs**

Community health worker programs have had a demonstrated impact on morbidity and mortality and show enormous promise for scale-up.<sup>10</sup> The first prominent, large-scale CHW programs were implemented in Latin America, Tanzania, Mozambique, and China. During the cultural revolution of the 1960s, China deployed thousands of paid “barefoot doctors” to improve the health of the rural poor.<sup>11</sup> However, due to macroeconomic and political forces, the integrated CHW-driven PHC approach fell out of favor in the 1980s and early 1990s.<sup>12</sup> Although some smaller-scale pilots achieved impressive health outcomes, large-scale programs were often unsuccessful due to poor technical and financial support for supervision and refresher trainings.<sup>13</sup> In the last 5 years, however, PHC systems have enjoyed a renaissance, and interest in CHWs is again strong—especially in the capacity of a formal, paid, and professionalized cadre of health workers instead of traditional, often unsustainable, volunteer systems.<sup>14–17</sup>

Experience and rigorous evaluations have supported the use of CHWs to reduce a significant proportion of communities’ disease burden with relatively simple interventions. Community health workers have made measurable impact on health indicators in diverse programmatic areas such as the management of childhood illness<sup>18–20</sup> and directly observed therapy for infectious diseases.<sup>21</sup> Meta-analyses have found that case management of pediatric pneumonia by CHWs is associated with a 24% reduction in all-cause mortality in children aged <5 years.<sup>19</sup> Community health workers can also dramatically increase the uptake of health-care services. In Ghana, 92% of caregivers with sick children sought treatment from community-based agents trained to manage pneumonia and malaria.<sup>22</sup>

The use of CHWs has become an increasingly popular strategy to deliver health services at the community level and to act as a stopgap measure for the HRH crisis in low- and middle-income countries. Although CHWs were first embraced as a temporary measure to address the lack of skilled workers, the current interest in CHW programs is rooted in the

need to deliver PHC at the community level even in a setting where facilities are present. In many ways, CHWs are able to surmount many of the key obstacles that stymie the success and expansion of large-scale, facility-based health programs. In the best cases, CHWs are members of the communities that they serve, which facilitates information and education campaigns through existing social networks and allows for outreach to vulnerable populations of women, children, and the elderly, who often have limited mobility and decision-making power.<sup>10</sup> When well-managed, CHWs are able to move the provision of services to the households that may have limited access to the formal PHC system as well as improve the utilization of existing services via referrals. This, however, requires improvements in PHC clinics and secondary-level hospitals to absorb sustained demand.

### **Challenges in Community Health Worker Program Design**

Community health worker programs are quite common, but little standardization exists among them and intervention designs vary widely. Programs can be roughly classified by disease approach (single or integrated) and the complexity of tasks that CHWs are performing (ie, solely health promotion versus injectable antibiotics for neonatal sepsis).<sup>23</sup> Specifics about CHW program implementation, particularly with respect to human-resources issues, are often not reported in the literature, especially in peer-reviewed scholarship.<sup>10</sup> Moreover, differences in implementation strategies are difficult to evaluate according to the standards used for other health interventions. Although rigorous studies have shown overall program impact on health outcomes, it is usually not possible to attribute these results to a specific aspect of a program, such as improved workload management or reduced commodities stock-outs. Standard evaluation strategies are often unable to view CHW programs as mechanisms within a dynamic PHC system.

Literature on CHW-program management has tended to focus on direct CHW management issues, such as motivation, supervision, incentives, and training, but few have systematically theorized and documented the management of CHW programs at the strategic level, or focused on the relationship between program management and program impact and quality.<sup>10,24</sup> Furthermore, the process of achieving national scale has been explored in international health literature from the perspective

of disease-specific interventions (particularly with human immunodeficiency virus/acquired immune deficiency syndrome [HIV/AIDS]) as well as the concomitant challenges of cost control and logistical constraints.<sup>25,26</sup> We filter our discussion of CHW program scale and scalability through the management of programs as a whole in order to address a gap in the literature on how program management and design may affect a program's ability to be effective and sustainable at national scale.

For the purpose of this paper, a CHW program "at scale" represents the recognition of an outer boundary, such as a national border, as the target area for deployment of human resources and the systems required to support household services. Scalability, in turn, represents the factors that ensure the optimized functionality and sustainability of a program in the process of achieving scale. Scalability ensures that the building blocks of a system are in place to support program-wide continuous improvement, in this case CHW programs, at any scale.

## COMMUNITY HEALTH WORKER PROGRAMS AT NATIONAL SCALE

In 2010, the Global Health Workforce Alliance released a comprehensive review of global CHW programs,<sup>10</sup> many of which were scaled to national level, as in Pakistan, Thailand, Brazil, Ethiopia, Uganda, and Mozambique. These programs, despite their varied programmatic strategies and typology, were all successful at rapidly achieving national scale. A common strength of this generation of national programs was success in rapidly recruiting, training, and deploying a large cadre of lay health workers—often, a cadre selected by the community they served or nominated by village health organizations.<sup>10,17</sup>

In order to reach national scale, many countries have rapidly deployed CHWs in relatively short amounts of time: the Pakistani Lady Health Worker (LHW) program, discussed below, added nearly 90,000 workers in the last decade,<sup>27</sup> the Ethiopian Health Extension Worker (HEW) system deployed 31,000 workers over 4 years, and the India Accredited Social Health Activist (ASHA) system trained 462,000 in the past decade.<sup>10</sup> Although such ability to reach scale is impressive, national programs face challenges

*Although the ability of many national community health worker programs to reach scale is impressive, they face challenges in quality and management while exploding in numbers across rural communities, which in turn raises questions of the strategy required to obtain scale.*

in quality and management while exploding in numbers across rural communities, which in turn raises questions of the strategy required to obtain scale. Weaknesses that are commonly cited in national programs include poor supervision, variable quality of care, and stock-outs of supplies and equipment. These challenges are often due to insufficiency and inconsistencies in program funding, lack of comprehensive program logistics management, high CHW attrition leading to a lack of continuity in the relationship between CHWs and their community, limited CHW knowledge of curative services, and poor integration with local PHC clinics.<sup>10</sup> Many programs also suffer from fractured referral systems, possibly due to rapid integration into a weak national health system.<sup>10</sup> Such weaknesses result from poor planning and lead to problems of sustainability, especially in both quality of care and retention of health workers.<sup>24</sup>

We have selected 4 case studies (Table 1) of scaled, national CHW programs to provide a snapshot of the duality of their successes and challenges at scale. India's ASHA program, Pakistan's LHW program, Ethiopia's HEW program and Brazil's Agentes de Saúde program were all rolled out at scale, substantially increasing the number of CHWs and access to care in their respective countries, and each faces challenges of rapid growth. We selected these programs due to their prominence in the field, and because they represent a range of success in PHC system integration and program management. In addition, these 4 cases had a strong literature base, although outcome measures for all are still preliminary.

Although these programs have succeeded at rapidly achieving scale and thereby expanded the coverage of PHC at a national level, there are threats to their sustainability due to poor scalability in their design and management, particularly for India, Pakistan, and Ethiopia. These programs emphasize the importance of coordinated management of a CHW program that takes into account



supervision, supply chain, and placement of the CHW program within a strong PHC system to effectively provide support and a continuum of care.

### India's Accredited Social Health Activist System

The India ASHA system, deployed in 17 states by the National Rural Health Mission (NRHM) in 2005, cultivated a cadre of community-based female ASHAs to link the poor and vulnerable to PHC. The ASHAs are meant to each cover a population of 1,000 and receive performance- and service-based compensation for facilitating universal immunization, referrals, escort services for institutional deliveries, and general child-health services.<sup>28</sup> The primary goal of the program, as described in the 2005 ASHA Guidelines<sup>28</sup> prepared by the Indian Ministry of Health, was to increase institutional delivery rates in coordination with the PHC facility-based auxiliary nurse midwife (ANM) and facility-based workers (Anganwadi) system. In Rajasthan, ASHAs receive a fixed salary of Rs 500 per month as a part of their financial compensation; in all other states, ASHAs are incentivized according to the activities they perform through payments from the subdistrict-level government. The most common activity for which they receive incentives has been accompanying pregnant women to facilities to promote institutional birth; this financial structure is called *Janani Suraksha Yojana*.<sup>29–32</sup>

The ASHA program was scaled across 18 states to provide greater coverage in a short amount of time. By 2009, a total of 462,466 ASHAs had been selected against a target of 484,599—an achievement of 95% of the target.<sup>32</sup> Evaluation of Janani Suraksha Yojana in 2007–2008 indicated a rise in antenatal care and in-facility births among the program's target population.<sup>33</sup> Studies on the program conducted by the Centre for Operations Research and Training in 3 different states—Madhya Pradesh, Orissa, and Rajasthan—indicated some preliminary success in using a cadre of community-based outreach workers to improve health outputs.<sup>29–31</sup> Across the evaluated states, most mothers reported satisfaction with ASHA work, which subsequently increased demand for services; many mothers reported that the ASHAs were part of the reason behind their willingness to delivery at health facilities.<sup>34</sup> This being said, another study conducted by the Earth Institute at Columbia University in 2010 of Bihar, Uttar Pradesh, Rajasthan, and Chahhatisgarh indicated across 4 states that 3%–12% of women still do not receive any visit

by ASHAs for antenatal care, and home deliveries continue to be high, at 30%.<sup>32</sup>

The successful and rapid deployment of the new national workforce of ASHAs was largely due to its integration with the existing community-based PHC systems, whereby the new ASHAs were built into the network of primary-care providers in the community where they were hired.<sup>35</sup> Evaluations have indicated that, in Orissa and Rajasthan, most ASHAs were able to interact with midwives on a weekly basis, and Anganwadi workers fortnightly, providing much-needed support to the subcenter health workers, while in turn receiving supervision and feedback.<sup>29,31</sup> This ability to integrate into a long-standing community-based PHC network helped to relieve some of the pressures of health-service delivery.

Linkages in supervision and care were reportedly strong at the local PHC level, but referrals for higher levels of care and supervision raise concerns about the program context and management. Many ASHAs reported never having met their district-level block facilitators, as intended in the program design. Instead, studies have highlighted that many ASHAs perceive ANMs to be their supervisors or mentors, and are usually trained by them, despite the fact that the NRHM system does not recognize ANMs as official supervisors or trainers.<sup>32</sup> Missing links to the government level and advanced facility-level workers affect access to the formal NRHM training system, as well as drugs and financing, all of which are to be sourced from the subdistrict or district government.

Studies have indicated that the gaps in these links to the formal government system often resulted in an unclear understanding of one's responsibility as an ASHA, lack of knowledge to perform the job adequately, and decreased motivation due to inconsistent financing.<sup>29–31</sup> Although all block officers knew about all the various financial incentives that were to be provided to the ASHAs, only 57% of the ASHAs shared this knowledge.<sup>32</sup> Though no causal link has necessarily been made in a formal study, both incomplete knowledge and inconsistent financing would subsequently lead to a greater likelihood of ASHAs being unwilling to partake in responsibilities that they were not compensated for. Additionally, without a specific assigned supervisor, there was no formal review process in any state and no record kept of their performance.<sup>32</sup> Such gaps between the robust, well-planned, community-based network of ASHAs and the weaker higher levels of care and district management<sup>36</sup> constitute a risk to this program at scale.

### Pakistan's Lady Health Worker Program

Initiated in 1993 by the government of Pakistan, the National Program for Family and Primary Health Care, more commonly known as the LHW Program, is one of the largest CHW programs in the world. In recognition of the low utilization of existing facility-based health services, the program deploys salaried female CHWs to deliver a bevy of PHC services. The program covers almost all districts in Pakistan, where each LHW is assigned to 1,000 people or 100–200 households within her community, and focuses on recognized, low-cost interventions for maternal and child health, including ORS, immunization, case management of acute respiratory infection, and growth monitoring. The LHWs also act as a referral link to the nearest PHC health facility or Basic Health Unit (BHU). The program is centrally funded and directed, with a clearly delineated management structure that extends from the Ministry of Health to provincial and district levels.<sup>27</sup>

In 2009, there were nearly 100,000 LHWs serving >80 million people.<sup>27</sup> Reaching the targeted scale was delayed several times since 1998, and many of planned capacity-building activities did not occur. Nonetheless, LHWs are now an integral part of Pakistan's primary healthcare system. The overall impact of the LHW program has been generally positive, but progress has been slow. External evaluations using nationally representative household surveys demonstrate that the LHW program has improved key health indicators, including vaccination rates, use of antenatal services, ORS knowledge, use of modern family-planning methods, and skilled attendance at delivery. There has been less success in the areas of health knowledge, sanitation, and key behaviors such as exclusive breastfeeding for the first 6 months of life.<sup>27</sup> Most recently, a pilot program involving LHWs in newborn care achieved a 15% reduction in the neonatal mortality rate.<sup>37</sup>

The LHW program demonstrates a phased scale-up with a conscious focus on program management. It has succeeded at reaching scale and is integrated into existing public health–system structures through clear policy planning. There is significant political will and some long-term financial support from the federal government for this program, which provides the potential for each layer of management to be coordinated and funded.<sup>38</sup> However, despite the phased roll-out and well-planned management and supervisory structures, management of the LHW program at scale faces several challenges. Frequent turnover

among management and logistics staff precludes the development of expertise among senior staff to guide the evolution of the program and ensure quality of care. This combines with deficiencies in the disbursement of funds and supplies and an unwieldy information management system to result in program inefficiencies and difficulty in process improvement.<sup>27,38</sup> In addition, performance-monitoring reports have revealed limited or uneven integration with BHUs and other health-related programs, depending upon the level of functioning of the preexisting Women's Health Committees and BHUs. In other areas, there is a significant contingent of LHWs that provide low quality of care or do not work.<sup>27</sup> This may in part be due to delays in planned improvements targeted at management and organizational development.<sup>27</sup>

### Ethiopia's Health Extension Worker Program

In 2004, the Ethiopian Federal Ministry of Health launched the Health Extension Program (HEP), developed in coordination with the federal Ministry of Education, which aims to vastly expand preventive and select curative healthcare services at the community level. This plan incorporates the rapid training and mobilization of a paid cadre of female health workers, called Health Extension Workers (HEWs),<sup>39</sup> in coordination with the development of new community-level health posts and the expansion of training and staffing of mid- and high-level healthcare providers.<sup>40</sup> There were <10,000 trained HEWs at the beginning of the project; the HEP has 30,000 trained HEWs in place as of 2009,<sup>41</sup> with a ratio of 1 HEW per 2,500 population. At least 1 HEW is assigned to each *kebele* (village), ideally the one she is from. The HEWs are stationed at local health posts, providing a package of primary-care interventions based on a 1-year course of training. Volunteer HEWs are trained and supervised by HEWs, and provide direct household outreach. To rapidly scale training of HEWs, the HEP utilized a training-of-trainers approach, with 700 faculty members trained by 2008; this was coordinated with existing vocational institutes to allow for rapid growth. Initially, the HEWs reported to a point person in each *woreda* (district), working with the *woreda* health offices (WorHOs) across the country.<sup>41</sup> An additional component of HEP is to scale up training and staffing of WorHOs.<sup>40</sup>

The basic package of services that HEWs are trained to deliver at the local health posts

includes hygiene and environmental sanitation, family-planning services, disease prevention and control, and health education and communication.<sup>40</sup> Plans are in place to add some skills of a skilled birth attendant, such as newborn resuscitation. Although HEWs are intended to provide basic curative care in addition to preventive services, the curative component was not in place in the initial cohort of 17,000 HEWs deployed by 2007.<sup>42</sup>

The HEP has successfully scaled up training and deployment of a cadre of PHC workers in a short time frame since its inception in 2004, and in coordination with an expansion of PHC facilities, personnel, and system supervision. There were 31,000 HEWs deployed as of 2009, and >3,900 WorHOs were undergoing or had completed training between 2005 and 2008 in providing clinical services as well as management and supervision. By 2007, an additional 8,850 health posts at the kebele level had been constructed.<sup>40</sup>

While it is still early to determine the health impact of the program, an initial evaluation<sup>43</sup> indicated that the program increased the proportion of children vaccinated against tuberculosis, polio, diphtheria-pertussis-tetanus, and measles. This impact was dependent upon the number of HEWs in the area, quality of the health posts, and the educational level of mothers in the kebeles. Proportions of children and women using insecticide-treated bed nets were also higher than in kebeles without HEWs. As of 2009, little to no effect was recorded on antenatal and postnatal services, other than time of first contact with a skilled service provider during pregnancy, or on incidence and duration of targeted diseases among children aged <5 years.<sup>43</sup>

A key success factor in the scale-up of the PHC system and of the HEW program has been strong support from the Ministry of Health and the prime minister.<sup>40</sup> Whereas the initial focus has been on rapid, national-scale training and deployment of HEWs, the coordination with expansion of both health post facilities and other cadres of health workers (WorHOs and physicians) is a notable strength of the program. However, initial reports have also revealed that some elements have not kept pace with the expansion of the HEW cadre. The rapid scale-up of the community-level health workforce highlighted a “major gap in terms of human resources for health,” particularly in management capacity and training.<sup>41</sup>

The selection, training curriculum, training facilities, kebele orientation, pay consistency, and employment security of an initial round of 2,700

HEWs trained in 2004 in 11 technical and vocational education institutes/centers was found to be very poor.<sup>44</sup> In addition, the housing facilities associated with health posts where HEWs were assigned were lacking, and infrastructure problems including safe water, toilet facilities, transport, and communication were highlighted as meriting investigation and remedy.<sup>40</sup> The coordinated deployment of the expanded CHW network outpaced the development of the PHC system to support it, despite the high levels of support for a coordinated approach.

### Brazil's Agentes de Saúde

Despite a significant investment in health infrastructure and skilled health personnel, the state of Ceará in northeastern Brazil, with the highest rate of poverty in the country, was experiencing a health crisis in the late 1980s. More than 50% of the children who died in 1986 and 1987 had never visited a health facility. Furthermore, 50% of deaths were caused by diarrhea, and <50% of the children had been completely immunized. When a new state government was elected in 1986, the state introduced reforms in health, education, and social welfare. This included the employment of villagers as auxiliary health agents. Ceará launched a system of nurse-directed CHWs called *Agentes de Saúde* that would serve a population of 5 million people.<sup>45</sup> The *Agentes de Saúde* are paid salaries from the tax revenues of the state government and supervised by local nurses.<sup>45</sup> The award-winning program has been expanded to 8 nearby Brazilian states,<sup>46</sup> and ushered in a PHC system revolution in the country.

Within months, 6,000 village women in Ceará were trained over 2 weeks to promote breastfeeding, oral rehydration, and immunization. Under close supervision, some *Agentes de Saúde* also distributed condoms, promoted cancer screening, encouraged water and sanitation improvement, and screened for chronic diseases.<sup>45</sup> These activities were conducted via household visits, whereby the agents would visit 10–15 homes per day and each family at least monthly. Agents also facilitated the collection of vital statistics in a timely manner.<sup>45</sup> By 1992, surrounding states began to adopt the *Agentes de Saúde* program, and by 1997, agents were providing services to 30 million people. In Ceará, the program was integrated into the Family Health Program, placing health agents in teams with physicians and nurses to cover 2,000 families or 10,000 individuals in a formal integration of the community-based health system into the PHC system architecture.<sup>45,46</sup>

To date, the Agentes de Saúde program in Ceará, has been associated with a dramatic improvement of maternal and child health indicators since 1987, with malnutrition, infant mortality, and proportion of all infant deaths due to diarrhea declining rapidly.<sup>45,47</sup> Meanwhile, coverage of growth monitoring and ORS more than doubled, and clinic visits for in-facility births rose by 19%. Immunization coverage in Ceará, was highest between 1987 and 1990, moving Ceará, from one of the lowest levels of coverage to the sixth highest in the country.<sup>45</sup> An impact evaluation of the Family Health Program across Brazil, within which the Agentes de Saúde program has been integrated, has indicated a significant decline in infant mortality rate from 1990 to 2002.<sup>48</sup> Furthermore, in the northeast, infant mortality from diarrhea dropped sharply between the early and late 1990s.<sup>47</sup> Between 1999 and 2004, infant mortality continued to decline about 13% across 557 Brazilian microregions. Furthermore, postneonatal mortality decreased by 15% and diarrhea-specific mortality by 44%.<sup>49</sup>

Brazil's CHW program is uniquely successful, overcoming constraints at the household, community, service-delivery, and public-policy levels. The program's rigorous selection criteria of women who reside in the community helped to improve community perception and increase demand for health services. A robust supervision system whereby nurses spend 50% of their time supervising the Agentes de Saúde has been credited as key to the program's success.<sup>50</sup> This strong supervision, supported by timely data to inform the health staff of the major health concerns in the area, allowed for high-quality delivery of services and rapid turnaround time in addressing major community-health concerns, building high quality of care and community buy-in.<sup>45</sup>

A large part of the program's success can also be credited with overcoming common public-policy constraints. The strategic involvement of the local government allowed for both a sustainable source of funding via tax revenues as well as a targeted focus toward local concerns and epidemiology. The local government was thereby empowered to improve maternal and child health.<sup>45,51</sup> The program has thrived due to national regulations strengthening the administrative authority of the local government in program design, financial planning, and human-resource management. The strong integration of the Agentes de Saúde program within the PHC system has allowed great strides to be made in expanding the program from 1 state to many.

## CHALLENGES OF COMMUNITY HEALTH WORKER PROGRAMS AT NATIONAL SCALE

Each of the highlighted national CHW programs was able to successfully achieve scale, deploying large numbers of new health workers in a short period of time to provide basic PHC services at the community level. By increasing access to healthcare and health information through increased health workforce at the household level, these programs have in most cases improved health outcomes despite substantial obstacles. Addressing a crisis in HRH at this scale is an achievement, but as the examples above indicate, the healthcare system must be prepared to receive, manage, and sustain an influx of workers when considering scale-up.

These national program snapshots reveal the prevalence of management and supervisory challenges in scaled CHW programs. Although each was designed to be well-integrated into the PHC system, the variability of system strength and connectivity to the CHW program resulted in varying degrees of success. Laying a CHW program at scale upon an uneven or underdeveloped PHC system increases the risks of program failure across many domains of effective healthcare delivery, including but not

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limited to supervision, infrastructure capacity, supplies, information systems, process improvement, and human-resource capacity of higher-level providers. Services and outreach between levels of care are interdependent; therefore, increasing the quality or quantity of one layer necessitates and parallel improvement in quality and quantity of other levels. Overcoming the challenges inherent in deploying,



training, and sustaining a cadre of CHWs within a PHC system will require innovations in coordinated management.

## COMMUNITY HEALTH WORKER PROGRAM SCALABILITY

Whereas the national programs discussed above focus on rapid expansion of CHW programs, observations of the challenges of growth have led others to focus on improving system mechanics or

*Several ongoing initiatives are underway that approach the scalability of community health worker programs through well-managed networks that are integrated in strong primary healthcare systems.*

“scalability.” Several ongoing initiatives (Table 2) are underway that approach the scalability of CHW programs through well-managed networks that are integrated in strong PHC systems. The determinants of scalability management are being explored through a diverse array of financial and organizational models, including social enterprises, nongovernmental organization (NGO)-led regional collaborations, and international partnerships. Several authors of this paper are affiliated with one such multi-stakeholder partnership, the Millennium Villages Project (MVP). This program, along with Partners in Health and BRAC (formerly known as the Bangladesh Rural Advancement Committee), are provided here as snapshots of innovations on scalability of CHW programs. Such models may be able to inform implementation at national scale, and have even demonstrated scalability beyond national boundaries, as in the case of BRAC in Bangladesh, suggesting that deployment at national scale is not limited to programs driven by governments. These initiatives provide a direct complement to the national programs, innovating on the elements that have been challenging at a national scale.

### **Bangladesh Rural Advancement Committee: Managing Financial Inputs to Stabilize System Processes**

By many accounts, BRAC is the largest NGO in the world. Its vast network of staff provides services to

>110 million people in multiple countries.<sup>52</sup> Despite being independently operated, BRAC has achieved nationwide program expansion more sustainably and with fewer management challenges than many of the government-led programs cited above. This has been possible due to path-breaking strides in the area of financial sustainability; BRAC recovers approximately 40%–60% of all expenditures, and reliance on donor funding is quite limited relative to other NGOs.<sup>53</sup> Much of this financial recovery occurs through several social enterprise mechanisms and microfinancing. Financial sustainability has been a challenge of national programs, as noted above, resulting in interruptions in supply chains, limited management capacity, and delays in PHC-system improvement to support referral linkages from households.

With respect to health, BRAC deploys community health volunteers (CHVs) who are part of BRAC-created “voluntary organizations” and work part-time to serve approximately 250 households each via monthly visits, also linking them to BRAC-run PHC centers. Female CHVs, or *Shasthya Shebikas*, also sell health products such as contraceptives, iodized salt, ORS, safe delivery kits, sanitary napkins, and vegetable seeds with the support of microloan provisions from BRAC.<sup>11</sup> Several other experimental cost-recovery approaches are also being implemented at various BRAC sites that help motivate CHVs to provide high-quality PHC services.<sup>52</sup>

Bangladesh Rural Advancement Committee has demonstrated an ability to expand this innovation to the national level in partnership with the government by using an innovative pay-for-performance mechanism in a highly successful tuberculosis (TB)-control partnership with the government of Bangladesh. The government uses BRAC’s massive cadre of embedded workers to extend directly observed treatment–short course (DOTS) services to the community and at the same time strengthen linkages to PHC facilities. In turn, BRAC benefits from the use of government-run laboratories and leverages the larger purchasing power of the government to buy medicines. Patients deposit \$3 upon starting treatment, which is returned in full upon treatment-course completion. This “activation” cost can be substantial for extremely poor families. The CHVs then receive \$2.25 (supplied by Global Fund grants) for every patient who successfully completes the treatment course. Similar performance-based incentives exist for a number of maternal, neonatal, and child-health services.<sup>54</sup>

## Partners in Health: Strengthening Quality of Care Through Teamwork in Chronic Care Coverage

In 1983, Partners in Health (PIH) revolutionized community-based care through a model of CHWs designed to expand access to health services in Haiti. The CHWs, referred to as *accompagnateurs*, accompany patients through their illnesses via daily home visits and provide directly observed treatment. As CHWs have the unique ability to both promote adherence to complex regimens and provide social and emotional support in chronic-care situations, PIH's unique community-based approach has been expanded to programs in Rwanda, Lesotho, Malawi, Russia, and the United States.<sup>55</sup> They were among the first to deliver comprehensive prevention and treatment for multidrug-resistant TB (MDR-TB) and HIV via community-based care. Currently, >9,000 HIV patients in Haiti, Rwanda, Lesotho, and Malawi are receiving antiretroviral therapy and experiencing significant clinical progress through the *accompagnateur* model, which emphasizes teams of community members, CHWs, and health facility-based providers.<sup>55</sup>

The PIH CHW program demonstrates an innovative approach to complex diseases and treatments founded upon community-based care strongly integrated with existing PHC systems. The strong links between CHWs and PHC facility-based providers allow for improved CHW supervision. For example, CHWs regularly visit the pharmacy to pick up medications, and interactions with the pharmacist are important points for supervision. Furthermore, CHWs' supervisors meet regularly with health center staff to exchange information. The CHWs all meet monthly with health center staff for training and discussion of outstanding problems or concerns.<sup>55</sup>

In Lima, the PIH DOTS-Plus program uses an integrated team to ensure continuity of care. This team includes CHWs as well as physicians, nurses, pharmacy personnel, laboratory personnel, and administrative personnel. The team is briefed via daily rounds either in person or through e-mails on individualized patient management. Within the team, CHWs either supervise treatment of TB at the household level or conduct community outreach on basic issues related to MDR-TB. Thus far, the program has found success in increasing the numbers of patients enrolled in team-managed TB care, and has also been coordinating with the national tuberculosis program.<sup>56</sup> Grouped staffing into teams of doctors, nurses, and CHWs also constitutes a scalability innovation in that

it requires each level of healthcare provider be scaled in tandem, addressing management challenges frequently found in other programs. The strategy resembles the management and PHC integration approach used in the Brazil *Agentes de Saúde* program, indicating potential for successful national expansion of coverage in developing countries for chronic care.

## Millennium Villages Project: Systems Management Innovations

In response to the Millennium Declaration in September 2000 and based on the recommendations of the 2005 United Nations Millennium Project, the MVP was piloted in Kenya and Ethiopia in 2005, and by 2006 it had reached approximately 400,000 people across 10 countries. The MVP aims to prove that developing regions can reach the Millennium Development Goals through community-based interventions, and includes the deployment in each village of a PHC system focused on scalable innovations. As a consequence of working in multiple agro-ecological regions and within host national ministry frameworks, the MVP CHW strategy has emphasized an adaptable core of operational methodologies that strengthen linkages between households and the formal PHC system. The primary innovation of the MVP CHW program is the focus on building management capacity to support a well-integrated system of paid, professionalized CHWs who form the link between households and health facilities. The MVP initially identified a network of health coordinators, one at each MVP site, who have the capacity to manage PHC systems encompassing both clinic- and community-level health services throughout the village cluster. These health coordinators receive reports and provide feedback to both the nurses in charge of clinics and CHW manager, who is in charge of all CHWs, and further use the data provided in their policy interactions with local district health teams.

This system has undergone multiple cycles of process improvement, and the MVP CHW team was in the process of driving PHC systems capacity and leadership strengthening via enriched management training for CHW managers at the time of writing. This includes solidifying the relations and decision-making processes within one "village unit" comprising not only CHWs, but also the senior CHWs who function in a direct supervisory capacity, village clinic, and village health committee (Figure 1). Furthermore, this work includes strengthening connections

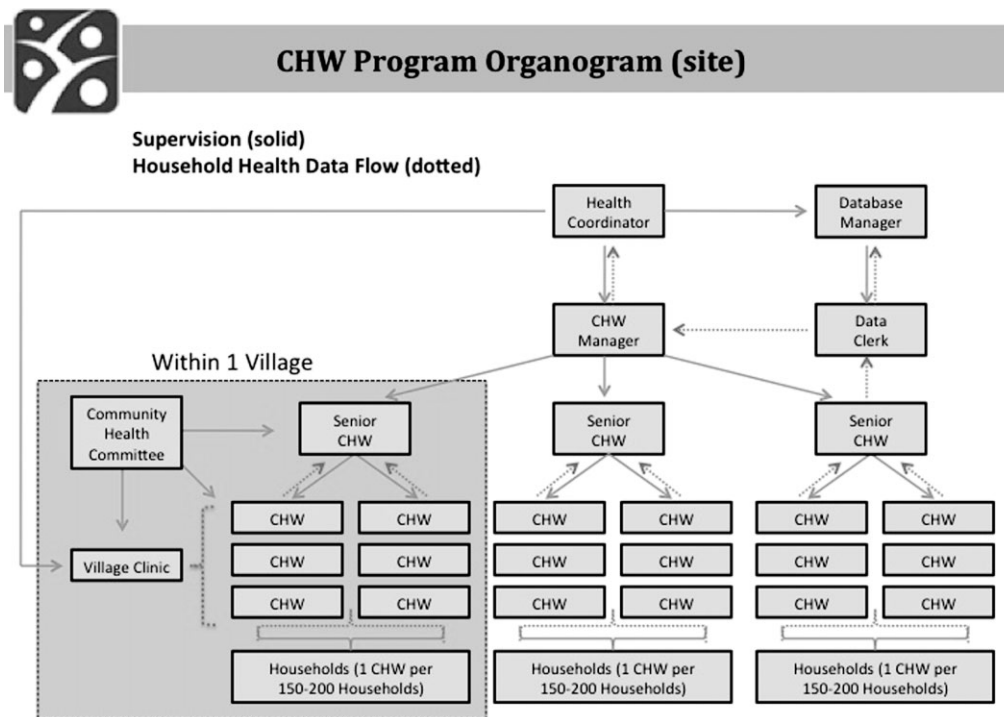


Fig 1. Millennium Villages Project Cluster CHW program organogram. **Abbreviations:** CHW, community health worker. This figure is available in color online at Wiley Online Library (wileyonlinelibrary.com).

between the village unit, central site management, and district-level leaders. Such a network is primed for stronger supervision, process improvement, and program planning using data and communication with other area stakeholders and managers. This team-based approach builds on the PIH team model and Brazil's CHW program.

A key innovation of the MVP that allows for fluid communications and data-based decision-making across this team is real-time monitoring and decision support through a mobile health technology called ChildCount+. This system not only functions as a monitoring system for management, but also offers operational support to health providers and can trigger an emergency health response and surveillance for common diseases. As a core support tool for management of a complex network, the ChildCount+ system also prompts household visits via text message and generates health status reports for communities, providers, and managers that provide data and evidence for local management decisions. Thus far, ChildCount+ has begun to show that a mobile technology-based approach can lead to improved maintenance of child-specific anthropometric records to help monitor community health and identify children at risk.<sup>57</sup>

## Innovations of Nongovernmental Organization Scalability Efforts

In combination, MVP, PIH, and BRAC represent innovations that can contribute to promising models of scalable CHW programs. The MVP proposes a model that strengthens linkages between different-level managers and providers, and uses real-time data as the impetus for frequent communication between all levels. The innovative approach of PIH of linking CHWs to a functioning healthcare system through teams of personnel from different levels of the primary care system has the potential to improve not only the continuum of care in health-service delivery, but also supervision of CHWs. And BRAC provides insight into the use of financial mechanisms to sustain high performance among CHWs in tandem with the growth of community-based services.

Using a holistic approach to ensure sustained functionality of inputs, processes, and outputs (IPO), such programs have the opportunity to be expanded without the loss of any quality-required part of the system, whether that is adequate supervision, rigorous input management, timely financing, or proper continuum of care across locations of care. Crucial to such innovations are the robust connections made to overlapping management and

advanced healthcare systems, ensuring that a CHW program does not exist in isolation, and is capable

*Crucial to such innovations are the robust connections made to overlapping management and advanced healthcare systems, ensuring that a community health worker program does not exist in isolation, and is capable of remaining functional in a complex environment of multiple stakeholders.*

of remaining functional in a complex environment of multiple stakeholders. These lessons in scalability can address management challenges found in many of the aforementioned national models.

#### RECOMMENDATIONS: COMMUNITY HEALTH WORKER NETWORK MANAGEMENT AND STRONG PRIMARY HEALTHCARE SYSTEM INTEGRATION

A well-managed CHW network is anchored within a PHC system that supports and is supported by the CHWs. Thus far, CHW program literature has addressed the concept “management” at the system level as monitoring the standard inputs of a system, ie, supply-chain management, human-resources management, supervision, training, and recruitment.<sup>17,23,58,59</sup> Although this component of management is certainly crucial, it is helpful to consider a framework that assesses a comprehensive set of IPO of the entire CHW network “unit” in order to fully capture the nuances of management that are often at play in program improvement. Borrowing from Six Sigma methodology for performance improvement, this IPO framework analyzes each transaction (in this case, the delivery of health services to an individual) as several processes, each requiring a degree of quality or performance standard to complete the chain.<sup>60</sup>

With the goal of improving CHW system performance, we apply a human-resource perspective to map CHW programs on top of the processes in a transaction, between each layer of a PHC system, including households, community, CHWs, health facilities, emergency-care systems, and hospitals. This

framework highlights the need to view management as the integrative component of a CHW system that is inherently complex because of its dynamic interface between the national health system and the informal space of communities and households.<sup>61</sup> Each of the case studies discussed in this paper has provided strong examples of how a complex system identifies and connects the IPO required to maintain the functionality of a CHW program to support PHC.

The management of inputs, or the resources to support a system, requires identification, allocation, and preparation of both human and financial capital. At a minimum, the current generation of national programs has demonstrated a high degree of success in maximizing the input of human resources by populating the system with a large cadre of workers. Successful management of financial resources, however, appears to be a weakness of national programs; in the snapshots presented, CHWs experienced inconsistencies in payment and stock-outs of supplies and drugs. Furthermore, the quality of the human resource inputs can be a weakness in some cases, as seen in Pakistan and Ethiopia, where selection and turnover were found to be areas in need of improvement. The BRAC model, where the inputs of supplies and finances are closely linked to human resources and supported by community buy-in, represents strong and scalable input management.

The utilization of inputs across service levels (ie, a transition from care at the household to care at PHC facilities via referral) can be considered the “process” of the system. This function is weak in areas where a CHW program is built upon variable or poorly coordinated PHC systems. This was seen in the Pakistani and Ethiopian case studies; despite strong planning for integration with the PHC system, the continuum of care was limited by the strength of the PHC facilities themselves. In Brazil, the management of processes was captured well through their system of “provider teams,” wherein various levels of providers including Agentes de Saúde, nurses, and doctors would be in charge of different cases as a team.<sup>50</sup> The PIH model also encourages team management of care.<sup>56</sup> This particular type of management places a focus on day-to-day operations and in-network distribution systems, such as household-visit scheduling, task management, maintenance of referral and follow-up loop, and collection of and response to data.

Finally, management of outputs requires the deliberate and productive use of information on the quality of service delivery. This requires a keen eye to process improvement through data analysis, strong supervision with feedback to CHWs, and results monitoring to inform input or process improvement.<sup>62,63</sup>



Optimizing quality of care through coordinated CHW program management could improve upon some of the deficits found in many national CHW programs. Though each of the national examples included attempts to strengthen supervision, only the Brazil case demonstrated success by utilizing 50% of nurses' time to dedicate toward supervision of the CHWs. In both India and Pakistan, quality of care was a core criticism in evaluations.

Weak supervision and monitoring of quality may be a result of poor management of processes and inputs; high turnover and fragile integration with the health system can create a weakened system that cannot adequately incorporate proper management

*Weak supervision and monitoring of quality may be a result of poor management of processes and inputs; high turnover and fragile integration with the health system can create a weakened system that cannot adequately incorporate proper management or clinical supervision.*

or clinical supervision. The MVP addresses this challenge through a strengthened supervisory role in a CHW manager who can utilize data from all nodes of service to provide supportive supervision and feedback to inform activities. Empowering one individual at the district level to comprehensively manage a CHW program across all IPO could transform a district-level CHW system into a highly scalable unit.

## CONCLUSION: THE WAY FORWARD

As we study cases of national initiatives and NGO innovations in the deployment and management of CHWs, 5 common operating principles that underlie successful efforts are beginning to emerge: (1) a formal plan for rapid deployment of CHWs, (2) tight linkages with the local PHC system, (3) continuous improvement through active organizational management, (4) incorporation of innovations to support remote case management, and (5) sustainable financing to support further investments. These operating principles could unite the currently widely varied efforts to deploy CHWs at scale into more unified approaches with PHC system development in low-resource settings. Doing so would require

significantly more collaboration and communication between the champions of scale and scalability. Relationships between national ministries and multiple complementary programs should continue to be developed in order to bridge innovative programming with national funding and support.<sup>56,64,65</sup> We should support this natural synergy through institutions like the Global Fund, which have health system–strengthening initiatives that are well-funded for execution of integrated systems, as proposed in this article. In turn, the assurance of broad-based support for CHWs will facilitate the creation of higher-quality operating strategies, support tools, and technological innovations to assist community-based health systems.

At a subnational level, the World Health Organization, US Agency for International Development, and Management Sciences for Health, among other organizations, have made calls for professionalization of trained managers that would promote local autonomy to face challenges, achieve results, and create a positive environment for meeting program goals. Such managers must be able to mobilize a team and optimize a CHW network unit to achieve program goals.<sup>66</sup> District-level health-system managers who are guided by common sets of operating principles for identifying innovations in scalability are well-positioned to use local, reliable community-health data to drive decisions at higher levels. Engaging district-level managers would be crucial to allowing scalability innovations to interface with national scale-up initiatives.

Community health worker programs grow and evolve in phases of continuous learning, improvement, and expansion of coverage. Evaluation strategies should take this evolution into account. A static view of a CHW program may be appropriate when programmatic goals have achieved the desired scale (ie, national coverage) and the primary goal is to assess continuing effectiveness in achieving optimal population-level health outcomes. Especially during the early phases of program expansion, however, when assuring and improving scalability is of paramount importance, evaluation should resemble operations research, wherein the primary goal is to assess the dynamic performance of program components rather than a sole focus on health outcomes. Taken in concert, the life cycle of a national CHW program should naturally grow from an emphasis on scalability management to a focus on health outcomes. As national programs move into maintenance mode, it is crucial to both reward targeted responses to program deficiencies and foster mechanisms to incorporate innovations in scalability.

**Table 1.** *National CHW Program Case Study Summary.*

	India ASHA Program	Pakistan LHW Program	Ethiopia HEW Program	Brazil Agentes de Saúde
Context				
Start date	2001	1994	2004	1987
Population served	18 (out of 28 states)	All (4 provinces)	All (9 states)	All (5,564 municipalities)
Institutional context	Deployed by the National Rural Health Mission of India to link the poor and vulnerable to accountable, affordable, effective, and reliable PHC	Deployed by the National Program for Family and Primary Health Care in recognition of low utilization of existing facility-based health services	Deployed by the Ethiopian Federal Ministry of Health as part of the national Health Sector Development Program aiming to achieve the health-related MDGs	Integrated into the Family Health Program, placing agents with teams of physicians and nurses in a formal integration of the community-based health system into the PHC system architecture
Responsibilities				
Household level	Treatment of coughs and colds, surveillance and referral for danger signs, early detection of TB and cancer, first aid in accidents, distribution of common healthcare commodities	Family-planning counseling, health promotion, treatment of a variety of illnesses, ORS, immunization, case management of ARI, and growth monitoring	Supervise volunteer HEWs who provide household-level services	Breastfeeding counseling, ORS, immunization, family planning, water and sanitation improvement screening, screening for chronic diseases such as cancer
System level	Increase institutional deliveries through household encouragement of facility-based births Function as first port of call for health-related demands. Mobilize community towards local health planning and increased utilization and accountability of existing health services	Referral link to the nearest health facility or BHU	Hygiene and environmental sanitation, family health services, disease prevention and control, and health education and communication	Referral link to nearest health facility
Approximate no. of CHWs deployed	462,000	100,000	31,000	240,000
Key Challenges Management	NA	Frequent turnover precludes the development of expertise among senior staff to guide the evolution of the program	Understaffing of supervisors at district level creates poor management	NA
System integration	Poor integration with government and secondary care facilities	Limited or uneven integration with BHUs and other health-related programs	Focus on facility-based activities rather than home-based care	Some delayed response to referrals to health centers and hospitals

**Abbreviations:** ARI, acute respiratory infection; ASHA, Accredited Social Health Activist; BHU, Basic Health Unit; HEW, Health Extension Worker; LHW, Lady Health Worker; MDGs, Millennium Development Goals; NA, not applicable; ORT, oral rehydration therapy; PHC, primary healthcare; TB, tuberculosis.

**Table 2.** NGO CHW Program Case Study Summary.

	MVP CHWs	PIH <i>Accompagnateurs</i>	BRAC <i>Shasthya Shebikas</i>
Context			
Start date	2008	1983	1972
Estimated no. of CHWs	900	7,000	88,000
Population served	400,000	Unknown	100 million
Location	10 countries	6 countries	8 countries
Responsibilities			
Household level	IMCI, maternal care, CCM for malaria, malnutrition, diarrhea, newborn care	DOTS for HIV, TB, MDR-TB	MNCH, TB DOTS, malaria, WASH, family planning, immunization, ARI, basic curative care for common illness
System level	Referrals to health facilities for advanced care	Working in a team with doctors and nurses to follow-up on HAART and DOTS patients	Referrals to health facilities for advanced care
Innovation Point			
Innovation	Integration into the formal health system via strong management and information/communications linkages	Success in quality of resource-intensive chronic care by CHWs, through provider teams	Using financial mechanisms to improve performance, including strengthening links to health centers

**Abbreviations:** ARI, acute respiratory infection; BRAC, Bangladesh Rural Advancement Committee; CHWs, community health workers; DOTS, direct observation treatment–short course; HAART, highly active antiretroviral therapy; HIV, human immunodeficiency virus; IMCI, integrated management of childhood illness; MDR-TB, multidrug-resistant tuberculosis; MNCH, maternal, newborn, and child health; MVP, Millennium Villages Program; NGO, nongovernmental organization; PIH, Partners in Health; TB, tuberculosis; WASH, water, sanitation and hygiene.

The lessons learned from scaled national initiatives and scalable NGO programs are crucial to understanding best practices in paving the way forward for paid, professionalized CHWs who are united by common goals and approaches to meet local health challenges. By integrating the lessons from country programs with the scalability principles of CHW programs such as those from the MVP, PIH, and BRAC, we can design well-managed, sustainable national CHW programs that are integral to PHC systems.

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## DISCLOSURES

*Potential conflict of interest:* Nothing to report.

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