

# Can the deployment of community health workers for the delivery of HIV services represent an effective and sustainable response to health workforce shortages? Results of a multicountry study

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In countries severely affected by HIV/AIDS, shortages of health workers present a major obstacle to scaling up HIV services. Adopting a task shifting approach for the deployment of community health workers (CHWs) represents one strategy for rapid expansion of the health workforce. This study aimed to evaluate the contribution of CHWs with a focus on identifying the critical elements of an enabling environment that can ensure they provide quality services in a manner that is sustainable.

The method of work included a collection of primary data in five countries: Brazil, Ethiopia, Malawi, Namibia, and Uganda.

The findings show that delegation of specific tasks to cadres of CHWs with limited training can increase access to HIV services, particularly in rural areas and among underserved communities, and can improve the quality of care for HIV. There is also evidence that CHWs can make a significant contribution to the delivery of a wide range of other health services.

The findings also show that certain conditions must be observed if CHWs are to contribute to well-functioning and sustainable service delivery. These conditions involve adequate systems integration with significant attention to: political will and commitment; collaborative planning; definition of scope of practice; selection and educational requirements; registration, licensure and certification; recruitment and deployment; adequate and sustainable remuneration; mentoring and supervision including referral system; career path and continuous education; performance evaluation; supply of equipment and commodities.

The study concludes that, where there is the necessary support, the potential contribution of CHWs can be optimized and represents a valuable addition to the urgent expansion of human resources for health, and to universal coverage of HIV services.

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*AIDS* 2010, **24** (suppl 1):S45–S57

## Introduction

The shortage of qualified medical staff in low and middle-resource countries has reached a crisis point and represents a major barrier to scaling up HIV services.

A 2006 report from the World Health Organization (WHO) on antiretroviral therapy (ART) coverage and a subsequent report released by the Joint United Nations Programme on HIV/AIDS (UNAIDS) on the barriers to scaling up HIV services both show that a shortage of

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human resources for health is one of the major bottlenecks [1]. It follows, therefore, that rapid strengthening of human resources for health is a vital part of any effort to increase the coverage of HIV services [2–13].

Several countries have begun to formalize the practice of task shifting for HIV services as one of a range of emergency strategies designed to address the human resources for health crises [14,15]. Task shifting involves extending the scope of practice of existing cadres of health workers to allow for the rational redistribution of tasks among the health workforce in order to make better use of human resources and ease bottlenecks in the service delivery system [2,7,16–19]. For example, in a number of high-income countries, such as Australia, the United Kingdom and Northern Ireland and the United States, as well as in low-income countries such as Malawi, the role of nurses has been extended in some settings to include the prescription of routine medication including ART [16,17,20–23].

When necessary, task shifting can also involve the creation of new cadres to extend the workforce capacity. These new cadres can be trained and deployed much faster than traditional medical doctors and nurses because they receive specific, competency-based training that is designed to equip them to perform clearly delineated tasks [24]. New cadres, created under the task shifting approach, can be mid-level (for example, clinical officers who, in the right circumstances, have successfully delivered many of the services traditionally reserved for doctors). The task shifting approach has also been used to deploy community health workers (CHW) – non-professional cadres of health workers who undertake short course training and work within their own communities to complement and support the services provided by other health workers [25]. For example, in Malawi and Uganda, the basic care package for people living with HIV/AIDS has been designed to be delivered by non-specialist doctors or nurses supported by CHW and people living with HIV/AIDS [26]. Similarly, Ethiopia has implemented a plan to hire CHW to expand the current workforce delivering HIV services [27].

The experiences of countries that have deployed CHW in response to the AIDS epidemic have, in many cases, included benefits that extend beyond HIV services and that imply potential for further extending the role of CHW in the delivery of a wider range of health services. Despite many good examples of the successful employment of CHW [28], however, there is still debate about the relative merits and most appropriate role for CHW and a shortage of evidence to show precisely what factors are associated with their successful and sustainable deployment [29]. Our study aimed to evaluate the involvement and contribution of CHW to the HIV response with a focus on identifying the tasks that CHW can deliver successfully and the critical elements of a

enabling environment that can ensure that CHW provide quality services in a manner that is sustainable.

## Methods

To analyze whether CHW increase coverage of HIV services and to investigate the factors for success, the following two areas of investigation were identified: the reorganization of clinical services under a task shifting model including CHW, and the regulatory and policy framework needed to support such a model. In each area of investigation, different themes were identified, as described in Table 1.

The method of work included a collection of primary data in five countries: Brazil, Ethiopia, Malawi, Namibia and Uganda. In each area of investigation, the work included desk review, the development of survey tools and data gathering tools, country visits and analysis of findings.

For the analysis of the regulatory and policy framework, the desk review focused on country-specific documents including national strategic plans, policies and guidelines, constitutions and all other legal statutes and regulations that regulate healthcare workers. In Ethiopia, Malawi, Namibia and Uganda, face-to-face interviews were conducted with senior government officials (e.g. Minister of Health, Minister of Education, Minister of Capacity Building), with representatives from national healthcare provider associations, with non-governmental organizations (NGO) providing HIV prevention, care and treatment, with associations representing people living with HIV/AIDS and with other stakeholders in the country. Materials were collected to document the policies (e.g. regulations) and practices found during the site visits. A total of approximately 50 key informants was interviewed in each country, making a total of approximately 200 interviews. In Brazil, national records were reviewed.

For the study of the reorganization of clinical services, a desk review and analysis of human resources plans, and specifically HIV service scale-up plans, was undertaken and included interviews with key informants. In Ethiopia, Malawi, Namibia and Uganda, a total of 73 facilities was selected across the four countries to provide a cross-sectional view of the existing delivery model for HIV services. Information was collected by direct observation of patient-provider encounters using observational checklists ( $n=152$ ) and semistructured interviews ( $n=389$ ) on the tasks performed by CHW, health outcomes when possible, and service users' satisfaction. The opinions and involvement of people living with HIV/AIDS were collected via standard interviews with key informants and focus group discussion. In Brazil, a review of national data records was performed.

**Table 1. Areas of investigation and themes analysed in the country studies.**

Analysis of regulatory framework for CHW	Analysis of reorganization of clinical services including CHW
Collaborative planning Education and training Recruitment procedures Employment conditions Sustainability Informal constitution of CHW	Competencies and scope of practices Access to services and quality Mentoring and supervision Service users' satisfaction CHW views and opinions

CHW, Community health worker.

## Results

### Analysis of regulatory framework for task shifting to community health workers

The research conducted in Brazil, Ethiopia, Malawi, Namibia and Uganda found that all five countries had performed some regulatory assessment to determine the adequacy of the existing norms to support task shifting to CHW, either in the delivery of HIV services or of other services. The assessment typically focused on areas such as: scope of practice; standards of care; pre-service and in-service training; labour issues; working conditions; and supervision and monitoring.

Cross-country findings are presented below in the following categories: collaborative planning; education and training; recruitment procedures; employment conditions; sustainability of financing for the services rendered; and informal constitution of health workers. Promising examples of the creation of CHW cadres are described in Boxes 1–3.

#### *Collaborative planning*

Country visits showed that collaborative planning with all relevant stakeholders at the initiation of the design process of any CHW programme, whether for HIV or other services delivery, is a key factor for the success of the programme's development as well as its implementation. For example, for the health extension workers in Ethiopia, the key players include (but are not limited to) Ministry of Health, Ministry of Education and all other line ministries and agencies that have jurisdiction over some aspect of the practice of CHW (e.g. Ministry of Labour, Ministry of Local Government and Rural Development, Ministry of Human Resources Management and Development), medical councils and associations, nurse and midwives councils and associations, and pharmacy, medicine and poison boards and related associations. In Brazil, the family health programme was designed through collaboration between the Ministry of Health, municipal state and managers and Pan American Health Organization (PAHO).

#### *Education and training*

Country findings highlighted the need for standardized and nationally endorsed training, which also includes continuing education. Education requirements, training programmes, and certification processes currently vary

within and across countries. In Brazil, the Ministry of Health is in charge and offers training through regional health schools. In other countries, the Ministry of Health (specifically the HIV programme) and NGO typically train and 'certify' CHW who have undergone a short period of training, with more or less interaction between the ministry and the NGO concerned, as in Malawi and Ethiopia. In some instances, the Ministry of Health will provide the training of NGO-based CHW. In others, such as Uganda, the Ministry of Health will sponsor the training, and in others the ministry will simply approve the curriculum or not intervene at all, as in Namibia.

#### *Recruitment procedures*

Recruitment varies significantly within and among countries. In Ethiopia, for example, the Federal Ministry of Health, with regard to the health extension programme (see Box 1) uses as selection criteria people who have been innovators in the community. In contrast, the Community Counsellors in Ethiopia (a NGO programme), must have a high school diploma, be a resident of the town where they will work, should have been involved in HIV-related activities and be willing to serve the area where they live for at least one year. In Brazil, CHW are hired by the municipalities. In Uganda, NGO recruit CHW with diverse backgrounds; some cadres must have a university degree or diploma, whereas others have no previous medical experience.

#### *Employment conditions*

Country findings highlighted the need for defined career structures and promotion opportunities, which ideally are incorporated into the creation of a CHW programme and the broader civil servant system already in existence in the country. This was found to have been the case in Brazil and Ethiopia. The findings also pointed to an evolution over time, whereby CHW typically take on additional responsibilities and skills, which are learned on-site and are thus not a part of a standardized training programme with other CHW. Concerns were raised regarding the expansion of the role of CHW based on the local needs of the facility or community and how it may conflict with other professionals who have been trained and certified to provide these services.

#### *Sustainable financing for services rendered*

Sustainable payment and financing for services rendered is a key factor in recruiting and retaining CHW. In many cases

**Box 1.**

In Ethiopia, the largest cadre of CHW is the health extension worker, assigned both at the health post and community level. The health extension worker programme in Ethiopia is the country's flagship programme that addresses the prevention of diseases and promotion of health at the community level. The programme started after seeing the great work done in agriculture by agricultural extension workers. It is based on Ethiopia's health sector development programme and was introduced as a vehicle to attain the millennium development goals. The programme is an innovative health service delivery programme that aims at universal coverage of primary health care. It gives priority to the prevention and control of communicable disease such as HIV, tuberculosis and malaria, with the goal of providing equitable access to health services. The model was developed over a 2-year period beginning in 2003 after extensive consultation of the Federal Ministry of Health with all pertinent stakeholders, including the Federal Ministry of Education, Federal Ministry of Labour and Social Affairs, Federal Ministry of Finance, Federal Ministry of Capacity Building, Council of Ministers, Civil Services Commission, technical vocational training schools, regional health bureaus and regional education bureaus. As a result of such broad consultation, the Federal Ministry of Capacity Building approved civil service structure, the Civil Service Commission approved minimum job requirements and grading, and the Federal Ministry of Health proposed the key intervention areas, duties and responsibilities, recruitment criteria and the training. Defined career structure and promotion as well continuous training was incorporated into the programme. The students are selected in the community from the community and need to have middle school education. The training is a one-year training that includes both in-class and practical sessions and the health extension programme includes training in hygiene and environmental sanitation, family health services, disease prevention and control including HIV, tuberculosis and malaria and health education and communication. After completion they are certified by the Federal Ministry of Health. After graduation, they work 75% outreach in the community and 25% at a health post. The government decided to accelerate the implementation of the health extension programme in order to cover the whole country by 2009, i.e. 30 000 health extension workers will be deployed.

**Box 2**

In Malawi the CHW cadres called health surveillance assistants, developed over an extended time and in response to numerous public health emergencies, are trained for over a 10-week period by the Ministry of Health for a wide range of primary prevention and clinical care areas. At the completion of the training, the health surveillance assistants receive a certificate of 'attendance', which allows them to provide some level of primary care. The key players involved in planning or implementing the scale-up of this cadre included the Nursing and Midwives Council, Medical Council of Malawi, Ministry of Health and Population, Nurses and Midwife Association, Ministry of Education, Ministry of Labour, Health Services Commission, the College of Health Sciences, Ministry of Local Government and Rural Development, Department of Human Resources Management and Development, Medical Council of Malawi and the Pharmacy, Medicine and Poison Board. To date, the health surveillance assistants have not been recognized as a healthcare provider group by any of the regulatory councils or provider associations. They are managed by the Ministry of Health and provided salary and remuneration as other low-skilled labourers. National strategic planning documents have recently targeted the health surveillance assistants for rapid scale-up and expansion to meet the ever growing demand for clinical care in the rural areas. Regarding HIV services, the health surveillance assistants are used for HIV testing and counselling services and home-based services such as adherence monitoring and dispensing ART. In general, the country has used its existing regulatory structures (formal and informal) to accomplish a significant level of 'task shifting' in a relatively short period of time.

they are either day or contractual workers with unreliable payment systems for the services that they provide, or they are paid in a non-monetary form. Country experiences support a solution whereby CHW are part of a civil/public service structure. In countries where this integration is not possible, an alternative and reliable source of funding for payments and salaries should be identified and established at the inception of the programme so as to be able to recruit and most importantly retain these CHW in the places that they are most needed to work. In addition to the health extension workers in Ethiopia, another good example of this is the creation of 8000 community nutrition and HIV/AIDS workers by the Office of the President and Cabinet of Malawi. This particular cadre of CHW is the result of

combining two cadres that existed under two distinct ministries (the home craft workers under the Ministry of Gender and the farm home assistants under the Ministry of Agriculture). These CHW are civil servants with an established salary payment structure.

*Informal constitution of health workers*

In each of the countries studied, many CHW are not trained by the Ministry of Education, nor recognized by the Ministry of Public Services or any of the professional councils or associations. Rather, they tend to originate from and be trained through the NGO sector. Often, they receive a small allowance or salary, non-financial incentives, or work on a volunteer basis (particularly at

**Box 3**

In Brazil the community health agents' programme and the family health programme, both launched by the Ministry of Health, have deployed CHW since the early 1990s. The number of CHW has risen rapidly from 29 000 in 1994 to 229 000 in 2009, and this growth has been accompanied by a significant expansion of family health teams – each of which includes between four and six CHW.

CHW were officially integrated into the civil service structure in 1991 and the cadre was recognized as a profession in 2002. All CHW receive a salary, whereas minimum recruitment requirements, training requirements and the scope of practice for CHW are defined under federal law. CHW take compulsory introductory courses offered by regional health schools and technical schools and receive in-service supervision.

The competencies and scope of practice of the CHW involved in these programmes do not involve the performance of any medical or nursing procedures. They focus on disease prevention and health promotion, including counselling activities. CHW support individuals, families or neighbourhoods, and their activities include regular home visits, record keeping and data inputting and promotion of grass-roots participation in health policies and engagement in local intersectoral actions.

The reported impacts include improvements in coverage of immunization and prenatal services and some studies have shown improvements in health outcomes including decreases in infant mortality, cardiovascular morbidity and improving oral care.

district level health centres). In Uganda, the high level of government support for 'task shifting' in the NGO sector has resulted in a large number of cadres providing HIV and non-HIV clinical services in the field. Although this is essential in meeting the needs of communities, it has raised concerns about the level of standard training that is competency based and the extent of the supervision provided to these cadres. Similarly, in Namibia, training is conducted by NGO that support the community volunteers. More than one-third of volunteers undergo a week-long training, whereas other training programmes range from as little as 1–3 days up to 2 weeks. Training programmes vary depending on the type of volunteer, and a clear certification process does not exist. For many, there is no follow-up continuous education system. Creating standards of practice and oversight for CHW was identified as an important step to ensure the safety and quality of services.

Table 2 summarizes the necessary conditions for the successful implementation of the task shifting approach, including CHW, as found in the five study countries.

**Analysis of reorganization of clinical services**

Cross-country findings are presented below in the following categories: competencies and scope of practice; coverage and quality of services; mentoring and supervision; service users' satisfaction and CHW views and opinions.

*Competencies and scope of practice*

The results from the country studies show that CHW contribute significantly to the delivery of HIV services. The tasks that CHW were undertaking were similar between the study countries. In general, they included the identification and referral of people living with HIV/AIDS, counselling and support, the execution and interpretation of rapid HIV testing, follow-up of stable clients on first-line ART, dispensing of drugs prescribed by

a qualified provider, tasks related to the prevention of mother-to-child transmission and monitoring and support of adherence. CHW also provided supportive services for HIV care, including as pharmacy assistants, data clerks, X-ray technicians and laboratory assistants. CHW often played other numerous roles and had responsibilities that included providing community level education programming and outreach beyond HIV service delivery, as in Brazil. A complete list of tasks performed in any of the five countries is provided in Table 3.

*Coverage of services and quality*

Observation of the involvement of CHW led to the conclusion that this had a positive impact on both the coverage and quality of services.

First, the study showed that the first contact with the health system for people living with HIV is with CHW in 39% of cases, with doctors in only 24% of cases and with social workers in 15% of cases. With regard to specific country examples, in Ethiopia, people receiving HIV testing and counselling rose from 500 000 to 1 600 000 from 2006 to 2007 after CHW were trained to deliver these services, among other interventions. In Namibia, the facilities with CHW providing adherence counselling and other forms of support witnessed 91% of patients ever started on ART still on first-line therapy. In other facilities in Namibia, the ART initiation rate increased significantly after CHW were appointed to deliver HIV testing and counselling; from having little more than 2000 patients on ART since 2002, the number of patients starting ART increased to 160 per month after the CHW intervention. In Uganda, in the facilities where CHW were assigned to data management, records appeared to be more completed. Furthermore, the facilities applying a task shifting approach that also included CHW had a better default rate than others that were using a more traditional service delivery model (5.8% versus 8.5%). In Brazil, coverage for immunization and prenatal con-

Table 2. Analysis of regulatory framework: summary of country findings.

Areas of investigation	Brazil: PACS and PSF programmes	Ethiopia: HEW programme	Malawi: HSA programme	Namibia: CHW programme	Uganda: AN/NA programme
Collaborative planning	<p>PACS programme: Launched by Ministry of Health. Based on regional, successful experiences [1–5]</p> <p>PSF programme: designed through collaboration between Ministry of Health, municipal and state managers, regional experiences and PAHO</p>	<p>Discussion among Federal Ministry of Health, Federal Ministry of Capacity Building, Federal Ministry of Labour and Social Affairs, Federal Ministry of Education, other councils of ministers, regional governments, professional associations, CBO/NGO, educational institutions, international organizations and others</p>	<p>Collaborative planning did not occur when the programme was established by the Ministry of Health</p>	<p>CHW exist outside of the regulated system and their establishment and management generally occur without the same level of collaboration</p>	<p>Collaborative planning, especially with the Nursing and Medical Council, did not occur when the programme was established by the Ministry of Health</p>
Standardized training	<p>Before professionalization: in-service supervision, short-term courses offered by regional joint initiatives composed by universities and regional health schools. After professionalization (2002): an introductory course is a minimum requirement. A professionalizing course (1200 working hours) offered by regional health schools and technical schools is highly desirable. According to federal law, Ministry of Health is in charge of defining training contents for the professionalizing course</p>	<p>Ministry of Health trains for 1 year in hygiene and environmental sanitation, family health services, disease prevention and control and health education and communication. Upon completion of the programme, the Ministry of Health certifies the HEW</p>	<p>Ministry of Health provides training for a 10-week period on a wide range of primary prevention and clinical care areas. At the completion of the training, HSA receive a 'certificate of attendance'</p>	<p>Training is conducted by NGO. More than one-third of CHW undergo a week-long training, whereas other training programmes range from a few days to 2 weeks. Unclear whether a certification process exists for CHW</p>	<p>Ministry of Health stopped training the AN/NA</p>
Recruitment procedures	<p>Decentralized: CHW selected and hired by municipalities</p>	<p>HEW: selected from the community because they are innovators and leaders in their district</p>	<p>MOHP directly recruits HSA</p>	<p>CHW are volunteers affiliated with local and international NGO</p>	<p>The AN/NA are recruited directly by Ministry of Health</p>
Employment conditions leading to defined career structures and promotion opportunities	<p>CHW cadre was officially integrated into the civil service structure in 1991 and was recognized as a profession in 2002. A federal law states minimum requirements and scope of practice</p>	<p>Federal Ministry of Capacity Building approved a civil service structure incorporating the HEW; the Civil Service Commission approved minimum job requirements and grading, and Federal Ministry of Health proposed the key intervention areas, duties, responsibilities, recruitment criteria and the training. Defined career structure and promotion and continuous training were incorporated into the programme</p>	<p>The HSA cadre is integrated into the civil service structure</p>	<p>Although NGO train and recruit CHW, supervision is sometimes performed by civil servants at the regional level. Generally, supervision was felt to be inadequate, leading to high attrition rates among community volunteers</p>	<p>The AN/NA cadre is integrated into the civil service structure</p>

<p>Informal constitution of health workers with involvement of government ministries and adherence to minimum standards</p>	<p>CHW must have completed primary school, live in the area they will serve by the time of selection and conclude a mandatory introductory course (working hours may vary). All CHW are remunerated as volunteer work does not exist in public service</p>	<p>NGO train community counsellors who receive 21 days of classroom teaching, 10 days of practical attachment and 3 months of internship at identified hospitals, after which they receive a certificate for the completion of the programme</p>	<p>CHAM trains 'cadres for HIV testing' who undergo a 5-week intensive course sponsored by MOHP as well as 'community-based care providers' who follow a 2-week module developed by MOHP. At the end of the training, CHAM awards them 'certificate of attendance'</p>	<p>A draft policy for community-based health care has been developed by MOHSS (April 2007) outlining the need for guidelines and standards on training and accreditation, supervision and compensation of CHW. Discussions at MOHSS were also underway to allow for the incorporation of community counsellors into the public sector</p>	<p>NGO train multiple cadres of CHW with training that can require university-based degrees or diplomas to NGO-provided training that can last 12 weeks. However, the training curriculum must be approved by the Ministry of Health</p>
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AN, Auxiliary nurse; CBO, community-based organization; CHAM, Christian Health Association of Malawi; CHW, community health worker; HEW, health extension worker; HSA, health surveillance assistant; MOHSS, Ministry of Health and Social Services; NA, nursing assistant; NGO, non-governmental organization; PACS, community health agent; PAHO, Pan American Health Organization; PSF, family health programme.

sultancies increased significantly and infant mortality decreased after the deployment of CHW in the family health teams.

### *Mentoring and supervision*

Better outcomes were observed when CHW were offered sustained and supportive supervision within the structure and functions of the health team. When it occurs continuously, this type of supervision becomes a routine part of a health worker's job. Such supervision can have a motivating effect on health workers and is an opportune time to provide follow-up training, improve performance and solve other systemic problems. It is also important to underline that certain tasks can be safely delegated only if supervision is provided on a constant basis. It was observed that supportive supervision requires motivation on the part of supervisors and staff to adopt new behaviour, locally appropriate tools and the investment of time and resources. In Brazil, for example, 30 CHW are under the supervision of one nurse and, in the family health teams, four to six are supervised by a nurse. Also of importance was the commitment of the top management and the integration of the programme into existing human resource management systems.

### *Services users' satisfaction*

People living with HIV reported a high level of satisfaction with the services they received from CHW. In a survey of 200 people living with HIV, more than 90% were satisfied or extremely satisfied with their assigned CHW.

### *Community health workers' views and opinions*

The study also included focus groups and qualitative interviews with over 400 CHW to understand their expectations and to assess their understanding of their contribution to the health care of the community they service. CHW stated their willingness to assume more extended tasks. In some cases, professional health workers, such as nurses and doctors, supported the role of CHW and recognized that their services allowed them to concentrate on more complicated tasks. In other cases, however, senior cadres felt threatened by CHW. Focus group discussions with people living with HIV/AIDS concluded that they can make an important contribution in the role of trained CHW. Starting from their personal experience, CHW who are themselves living with HIV can make a crucial contribution to addressing issues such as prevention, disclosure, adherence, self-care and stigma and discrimination. People living with HIV/AIDS often show a preference for CHW who are also living with HIV/AIDS.

## **Discussion**

### **Learning the lessons of the past**

CHW of one kind or another have been involved throughout the history of organized health services [25].

**Table 3. HIV clinical tasks performed by community health workers in the countries studied.**

1. HIV sensitization, literacy, education, counselling
  - Community-based education
  - Facility-based education
2. Testing and counselling in facility and community
  - Recognize HIV-related illnesses and refer a patient for HIV testing
  - Offer HIV testing and counselling (including TB patients and TB suspects)
  - Conduct pre-test counselling
  - Execute and interpret HIV test (rapid test or ELISA)
  - Conduct post-test counselling
3. Preventive interventions
  - Basic interventions:
    - Provide key information on HIV, safer sex and condom use and distribute condoms and educational materials when available
    - Educate and counsel on STI
    - Manage STI
    - Assess family status including pregnancy, family planning, partner and children status
    - Advise on prevention for IDU and harm reduction
  - Prevention of mother-to-child-transmission:
    - Offer HIV counselling and testing to pregnant women
    - Execute and interpret HIV test (rapid test or ELISA)
    - Counsel mother on interventions to reduce the risk of transmitting HIV to her infant
    - Advise and counsel on safer sex, partner and children testing
    - Assess the acceptability of the proposed interventions
    - Educate on basic preventive measures: malaria, TB, worms
    - Introduce information regarding infant feeding options
    - Discuss plans for delivery, the likely delivery location and the birth attendant, review strategies to decrease the risk of transmission at the time of delivery
    - Discuss where the prophylactic antiretroviral drugs will be kept until needed and how the woman will access the ART at the correct time
    - Advise and counsel on family planning
  - PEP:
    - Recognize exposure that could place HCW at risk for HIV infection
    - Manage self-limited side effects of antiretroviral drugs in PEP regimens
    - Manage severe toxicities of antiretroviral drugs in PEP regimens
    - Execute and interpret post-exposure HIV test
    - Provide counselling and support, and refer to formal psychological counselling as needed
    - Provide facility and community-based education regarding health worker safety and PEP, as part of general HIV education and stigma reduction
  - Circumcision:
    - Provide sexual and reproductive health counselling
    - Conduct presurgical counselling
  - Positive prevention
    - Educate and counsel on preventing sexual and non-sexual transmission of HIV
    - Counsel on reproductive choices and family planning
    - Advise on how to prevent other infections
    - Encourage physical activity
    - Advise on nutrition, clean water, and other sanitation measures
4. Clinical management of HIV
  - Triage
    - Decide which patient needs to be seen by which health worker
    - Patient visit and clinical review
  - Register
    - Find medical record and return it to files
  - Take weight
  - Take vital signs
  - Take height
  - Assess clinical signs and symptoms
  - Assess pregnancy status, family planning and HIV status of partners and children
  - Determine functional status
  - Review TB status
  - Register results/ fill in laboratory result form
  - Administer intramuscular or subcutaneous injections
  - Provide wound care or change dressings
  - Provide psychological support
  - Complete medical record (paper/electronic)
  - Manage TB co-infection
  - Identify an HIV-positive patient with symptoms such as chronic cough and/or chronic fever and/or weight loss as a TB suspect and encourage/assist clinic visit
5. ART
  - Preparation for ART
  - Explain goal, benefits and risks of ART
  - Counsel patient on the importance of adherence and explore options to maintain long-term adherence



- Prepare the individual patient and/or patient's caregiver to initiate ART
- Establish readiness of the patient to start ART
- Explain food/other diet restriction when needed
- 6. Early follow-up (up to 3 months from starting ART)
  - Clinical monitoring
  - Take weight
  - Take vital signs
  - Determine functional status
  - Monitor and support adherence
  - Respond to new signs and symptoms and possible side effects
  - Recognize/manage self-limiting antiretroviral drug side effects and encourage/assist consultation or clinic visit when necessary
  - Manage TB co-infection
  - Identify symptoms such as chronic cough and/or chronic fever and/or weight loss as a TB symptoms suspect in the first three months of ART and encourage/assist clinic visit
  - Provide combined TB/ART directly observed treatment if necessary
  - Recognize side effects of TB and/or HIV medications and encourage/assist consultation or clinic visit when necessary
  - Dispensing and arranging follow-up
  - Dispense antiretroviral and other drugs
  - Arrange follow-up visit
- 7. Long-term follow-up (3 months after initiation of ART)
  - Clinical monitoring
  - Monitor and support ART adherence
  - Take weight
  - Take vital signs
  - Determine functional status
  - Request CD4 cell count test and viral load (if available and indicated)
  - Recognize/manage self-limiting antiretroviral side effects
  - After decision for initiation of TB treatment, provide TB treatment to patients other than sputum-positive pulmonary TB patients
  - Recognize side effects of TB and/or HIV medications and encourage/assist consultation or clinic visit when necessary
  - Provide combined TB/ART directly observed treatment if necessary in a patient who is on ART for more than 3 months
  - Dispensing and arranging follow-up visits
  - Dispense antiretroviral and other drugs
  - Arrange follow-up visits
- 8. Clinical management of HIV-positive pregnant women
  - Clinical management
  - Describe the benefits and risks of ART in the first trimester and during pregnancy in general, and general health for pregnant women
  - Explain when to start ART; adherence and monitoring; management of mild side effects
  - Educate on basic preventive measures: malaria, TB, worms
- 9. Clinical management of newborns, including prevention of mother-to-child transmission
  - Clinical management
  - Explain timing for HIV test of the child to parents
  - Counsel HIV-positive mothers with a child of unknown HIV status on feeding options
- 10. Clinical management of HIV-positive children
  - Nutrition
  - Educate and counsel on proper local foods
  - Educate and counsel on clean water and sanitation
- 11. Psychosocial support for HIV-positive children and for other children in household, including orphans
  - Educate and counsel caregiver
  - Support and counsel the child
  - Support child and caregiver for disclosure
  - Support child and caregiver for appropriate development
  - Support child and caregiver for illness and death
  - Support for orphans and vulnerable children and their caregivers
  - Initiation of ART
  - Educate and counsel child and/or caregiver to adherence
  - Determine any barriers to adhering to ART
  - Offer assistance in disclosure if necessary
  - Assist the family in incorporating ART into daily life
  - Explain the management and planning for an uninterrupted supply of medication for children
- 12. Palliative care
  - Pain management
  - Conduct pain assessment(s)
  - Teach the patient and caregiver how to give pain medicine
  - Teach the patient and caregiver how to give oral morphine
  - Advise on non-pharmacological methods for controlling pain
  - Symptom management
  - Manage common symptoms (weight loss, nausea, fever, diarrhoea, trouble sleeping, anxiety, etc.)
  - Psychosocial support and end-of-life care
  - Counselling, psychosocial and spiritual support
  - Support at end of life
  - Support for caregivers, family members and children

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ART, Antiretroviral therapy; ELISA, enzyme-linked immunosorbent assay; IDU, injection drug user; PEP, post-exposure prophylaxis; TB, tuberculosis.

Following the Alma Ata conference in 1978, the Health Care For All movement saw many countries experimenting with different approaches to the mobilization of cadres of health workers with only little formal training in order to expand general health promotion and disease-specific services [28]. Indeed, it was the WHO Alma Ata declaration on Primary Health Care in 1978 that established CHW as a generic title and defined their role internationally [28]. Over time, and under pressure of fiscal reform, however, the commitment of governments to these programmes faltered and, in many cases, their management and funding shifted to the non-state sector [16]. As a result, programmes of varying types, qualities, aims and standards proliferated, and doubts were raised about the potential of CHW to deliver quality care [16].

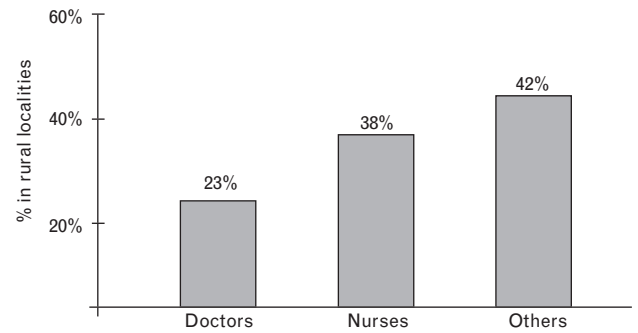
In the current era, CHW are again being promoted as a key to scaling up health services in the face of both scarce human resources for health and limited financial resources. Bearing in mind the lessons from the past, issues about quality of care, standardization of services and training and certification have now assumed greater importance [16,29]. Also the factors associated with success and sustainability still need to be more fully elucidated [29].

### The contribution to the expansion of the health workforce

Our findings show that the deployment of CHW further extends the rational redistribution of tasks under the task shifting approach and can help quickly expand the health workforce both at the facility and the community level. For example, in Ethiopia, 24 500 health extension workers have been trained in 3 years and deployed to their respective communities, and in Brazil the number of CHW increased from 29 000 in 1994 to 229 600 in 2009. Task shifting to CHW can make a major contribution to the decentralization of HIV and other services to rural areas where the shortages of human resources for health are most acute, and so bring health services closer to people in need. CHW can more easily be responsive to marginalized and underserved communities and so contribute to making health services more widely available. Their membership of the communities they serve makes them a vital link to the network of comprehensive public health services. Strong planning and monitoring is, however, needed to ensure an efficient system as a new cadre, or an old cadre with new roles, poses challenges for acceptance, coordination and sustainability. The review of the evidence is also showing that, as of today, CHW are widely distributed around the globe and have a greater presence in rural areas compared with more qualified cadres (Fig. 1).

### Improvements in coverage and quality of care

Based on the results of the study, the involvement of CHW is seen to produce good health outcomes and high



**Fig. 1. Percentage of doctors, nurses and non-professional workers in rural areas.** Source: World Health Report, 2006.

levels of service user satisfaction at the tertiary level (specialized hospital and facility), the secondary level (district hospital or district outpatient facility) and at the primary level (health centre or at the community level). The inclusion of CHW in health teams allows frequent service–user interaction at the community level, which improves adherence, patient follow-up and psychosocial support. They thus contribute to better outcomes than can be achieved through services delivered only by doctors and nurses.

A review of the recent literature also finds that there is a broad consensus that delegation to cadres of health workers with no formal clinical training can increase access to health care and improve the quality of care. There is quantitative evidence that CHW can have a positive impact on health outcomes. HIV programmes with the involvement of CHW have resulted in better adherence rates and better outcomes on ART [30–32]. A number of studies has found that CHW play an important contributory role in countries that are scaling up HIV services and concluded that overall CHW remain underutilized [33–35]. Some of the most robust evidence of the safety and effectiveness of task shifting to CHW in well-designed programmes comes from rural Haiti, where community-based care of people living with HIV/AIDS has been highly effective [33,34].

There is also evidence that CHW can improve the quality of health care in non-HIV services. In 1983, a primary healthcare programme in the Gambia trained CHW in birthing techniques. After 3 years, maternal and neonatal mortality halved compared with levels before the introduction of the programme [36]. An extensive field trial conducted from 1996 to 2003 in the Gadchiroli district of India trained CHW to deliver primary neonatal care. This trial reported significant improvements in health outcomes and showed that trained CHW are highly effective at reducing mortality among children [37]. Malaria prevention and treatment programmes have also benefited from the use of CHW. A trial of malaria prophylaxis in the Gambia provided by traditional birth attendants significantly reduced the frequency of

low-weight births [38]. A study in Zaire published in 1996 introduced CHW to treat malaria in 12 villages in one area while retaining only a health centre in a close ecologically comparable area. After only 2 years, 65% of malaria cases were being treated by these CHW in the 12 villages and morbidity had fallen by 50% compared with the control area [39]. CHW are also playing an increasingly important role in high-income countries such as the United States. It has been shown that they have contributed in increasing access to health care for vulnerable and underserved groups [40–42]. A number of studies exist that have systematically compared services delivered by CHW with the traditional medical model. One review of 43 studies found that CHW programmes showed greater efficiency in certain interventions, such as immunization uptake, but not in others such as the treatment of fever [43]. Other studies have also concluded that CHW interventions can result in better outcomes at some cost saving in comparison with clinic-based care [44–47].

### Key factors for success

The results from the country studies consistently show that certain conditions should be observed if CHW are to contribute to well-functioning and sustainable service delivery and to broader human resources for health strengthening. The crucial conditions for success can be clustered around eleven broad areas: (1) political will and commitment; (2) collaborative planning; (3) definition of scope of practice; (4) selection and educational requirements; (5) registration and licensure and certification; (6) recruitment and deployment; (7) systems integration including adequate and sustainable remuneration; (8) mentoring and supervision including referral system; (9) career path and continuous education; (10) performance evaluation; and (11) regular supply of equipment and commodities.

These factors should be addressed when creating and scaling up CHW programmes, and the development and implementation of these conditions should ideally involve a collaboration or partnership among all relevant stakeholders. These are likely to include representatives both of governmental line ministries and of non-governmental stakeholders, such as national and international NGO, international donors and donor countries and international organizations from the United Nations and professional associations. Countries that have implemented successful CHW programmes have benefited from the leadership of their Ministry of Health and noted the shepherding role it had in initiating a collaborative planning process and in inviting all of the relevant stakeholders to the table.

The review of the literature also showed that the provision of some sort of governmental support for task shifting to CHW is critical [48–51], including as key to successful implementation criteria such as standardized training protocol, effective selection and recruitment processes,

retention incentives, continuous education and wages or other appropriate and commensurate incentives [52–56]. On this last issue, there is a strong body of evidence indicating that if CHW are to be properly integrated into health systems, they must be sustained through a variety of measures including adequate remuneration [52,54,57]. There is virtually no evidence that volunteerism can be sustained for long periods of time [58].

### Barriers to implementation

The study consistently found that cadres that belong to the CHW category are typically not regulated by either the medical or nursing councils or other entities with regulatory authority (e.g. Ministry of Health). In some countries task shifting involving CHW takes place at a local level, but in these cases the country has little control over the process including training, enrolment, retention and quality of the services provided. The lack of regulation can undermine all necessary pre-conditions identified in the study and outlined in the paragraph above, such as the quality of services, adequate remuneration and retention of the cadre in the formal or informal service delivery system. Other additional barriers to the implementation of a task shifting approach that includes CHW were found to be resistance from higher level cadres who may feel threatened by their skills (although it has been observed that these cadres can develop an appreciation for the work of CHW over time as this relieves them of certain duties and allows them to perform higher-level tasks), weakness of the referral systems and finally lack of commodities and supplies.

### Conclusion

The multicountry study found consistent evidence that access to quality HIV services can benefit from a task shifting approach employing CHW. This is supported in the findings of other published data. The successful and sustainable deployment of CHW is, however, dependent on the existence of an enabling environment that includes a supportive regulatory framework, functioning referral systems, robust quality assurance mechanisms (such as standardized training and supportive supervision), adequate remuneration of health workers and sufficient resources for health service delivery.

The deployment of CHW, under a task shifting approach, is already being undertaken in many countries to address health workforce shortages, particularly as an emergency response to the HIV epidemic. The tasks that have been safely and efficiently undertaken by CHW are numerous, and cover prevention, treatment and care, as described in Table 3.

There is sufficient evidence to convince policy makers that CHW can make a significant contribution to reinforcing an overstretched health workforce. Unless

certain conditions are met, however, the value of the intervention cannot be assured as doubts remain as to the quality and sustainability of the services that can be provided by CHW. If the positive outcomes that have resulted from the deployment of CHW for the delivery of HIV services are to be sustained and extended to a wider range of health interventions, then countries must heed the evidence on the need for an appropriate regulatory environment and for the other enabling conditions. With the necessary support, the valuable addition that CHW can make to the urgent expansion of human resources for health and to universal coverage can be optimized.

## Acknowledgements

This study formed part of a more comprehensive research project, 'The WHO-commissioned Study on Task Shifting', supported by the U.S. President's Emergency Plan for AIDS Relief (PEPFAR), UNAIDS and Cooperazione Generale allo Sviluppo, Ministry of Foreign Affairs, Rome, Italy. The authors were responsible for conceptualizing the paper, undertaking country visits and personally collecting some of the data. The authors had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. The authors are grateful to the countries that allowed them to gather information; to all those who helped in the collection of the data in countries and to all members of the WHO Task Shifting working group as listed in the WHO guidelines and recommendations on Task Shifting (see <http://www.who.int/healthsystems/TTR-TaskShifting.pdf>). The WHO guidelines and recommendations on Task Shifting were developed by the Human Resources for Health Department directed by Dr Manuel Dayrit.

*Conflicts of interest: None.*

## References

1. WHO, UNAIDS. *Progress on global access to HIV antiretroviral therapy. A report on 3 by 5 and beyond*. Geneva: World Health Organization; 2006.
2. WHO. *The World Health report 2006 – working together for health*. Geneva: World Health Organization; 2006.
3. Hanvoravongchai P. **Scaling up health workforces in response to critical shortages**. *Lancet* 2007; **370**:2080–2081.
4. USAID. *The health sector human resource crisis in Africa – an issues paper*. Washington, DC: USAID, Bureau for Africa; 2003.
5. Van Damme W, Kober K, Laga M. **The real challenges for scaling up ART in sub-Saharan Africa**. *AIDS* 2006; **20**:653–656.
6. United Nations General Assembly. *Towards universal access: assessment by the Joint United Nations Programme on HIV/AIDS on scaling up HIV prevention, treatment, care and support*. A/60/737. New York: United Nations; 2006.
7. WHO. *Scaling up HIV/AIDS care: Service delivery and human resources perspectives*. Geneva: World Health Organization; 2004.
8. U.S. President's Emergency Plan for AIDS Relief (PEPFAR). *Report on work force capacity and HIV/AIDS*. Washington, DC: Office of the US Global AIDS Coordinator, U.S. Department of State; 2006.
9. U.S. President's Emergency Plan for AIDS Relief (PEPFAR). *The power of partnerships: third annual report to Congress on PEPFAR*. Washington, DC: PEPFAR; 2007.
10. Dussault G, Dubois CA. **Human resources for health policies: a critical component in health policies**. *Human Resources for Health* 2003; **1**(1):.
11. Dräger S, Gedik G, Dal Poz MR. **Health workforce issues and the Global Fund to fight AIDS, Tuberculosis and Malaria: an analytical review**. *Human Resources for Health* 2006; **4**(23).
12. Gilks CF, Crowley S, Ekpini R, Gove S, Perriens J, Souteyrand Y, et al. **The WHO public-health approach to antiretroviral treatment against HIV in resource-limited settings**. *Lancet* 2007; **368**:505–510.
13. The Joint Learning Initiative. *Human resources for health: overcoming the crisis*. Cambridge, MA: Harvard University; 2004.
14. WHO, PEPFAR, UNAIDS. *Task shifting: rational redistribution of tasks among health workforce teams. Global recommendations and guidelines*. Geneva: World Health Organization, 2008.
15. WHO, UNAIDS, PEPFAR. *International conference on task shifting*. Addis Ababa Declaration, 10 January 2008. Available at [http://www.who.int/healthsystems/task\\_shifting/Addis\\_Declaration\\_EN.pdf](http://www.who.int/healthsystems/task_shifting/Addis_Declaration_EN.pdf). Accessed: 2 December 2009.
16. Samb B, Celletti F, Holloway J, Van Damme W, Lawson L, De Cock K, et al. **Task shifting: An emergency response to the health workforce crisis in the era of HIV. Lessons from the past, current practice and thinking**. *N Engl J Med* 2007; **357**:2510–2514.
17. Hongoro C, McPake B. **How to bridge the gap in human resources for health**. *Lancet* 2004; **364**:1451–1456.
18. Stringer SA, Zulu I, Levy J, Stringer EM, Mwangi A, Chi BH, et al. **Rapid scale-up of antiretroviral therapy at primary care sites in Zambia: feasibility and early outcomes**. *JAMA* 2006; **296**:782–793.
19. WHO. *Joint WHO/OGAC Technical Consultation on Task Shifting. Key elements of regulatory framework in support of in-country implementation of "task shifting"*. Geneva: World Health Organization; 2007.
20. Laurant M, Reeves D, Hermens R, Braspenning J, Grol R, Sibbald B. **Substitution of doctors by nurses in primary care**. *Cochrane Database Syst Rev* 2005; CD001271(1).
21. Willard S. **The nurse practitioner's role in managing dyslipidemia and other cardiovascular risk factors in HIV-infected patients: impact of antiretroviral therapy**. *J Assoc Nurses AIDS Care* 2006; **17**:7–17.
22. Lewis CE, Miramontes H. **Nurse practitioners in rural California and AIDS**. *J Assoc Nurses AIDS Care* 1999; **10**:39–42.
23. Kober K, Van Damme W. *Expert patients and AIDS care. A literature review on expert patient programmes in high-income countries, and an exploration of their relevance for HIV/AIDS care in low-income countries with severe human resource shortages*. Antwerp: Institute of Tropical Medicine; 2006.
24. Pilar UV, Massaquoi M, Samura F, Nalinkungi R, Foncha C, Karlsson N, et al. *Task-shifting in scaling-up HIV/AIDS care: some successes and lessons learnt from Thyolo District in rural Malawi*. Geneva: Médecins sans Frontières; 2007.
25. Abbat F. *Scaling up health and education workers: community health workers: a literature review*. London: DfID; 2005.
26. Zachariah R, Ford BN, Philips M, Lynch S, Massaquoi M, Janssens V, Harries AD. **Task shifting in HIV/AIDS: opportunities, challenges and proposed actions for sub-Saharan Africa**. *Trop Med Hygiene* 2009; **6**:549–558.
27. Assefa Y, Jerene D, Lulseged D, Ooms G, Van Damme W. **Rapid scale-up of antiretroviral treatment in Ethiopia: successes and system-wide effects**. *PLoS Med* 6(4):e1000056. doi: 10.1371/journal.pmed.1000056.
28. WHO. *Alma Ata 1978: Primary health care. Report of the International Conference on Primary Health Care*. Geneva: World Health Organization; 1978.
29. Haines A, Sanders D, Rowe AK, Lawn JE, Walker DG, Bhutta Z. **Achieving child survival goals: potential contribution of community health workers**. *Lancet* 2007; **369**:2121–2131.
30. Mukherjee JS, Eustache FE. **Community health workers as a cornerstone for integrating HIV and primary healthcare**. *AIDS Care* 2007; **19** (Suppl. 1):73–82.
31. Rosen S. **Patient retention in antiretroviral therapy programs in sub-saharan africa: a systematic review**. 4 *PLoS Med* e298, abstract, introduction, and discussion only (October 2007). Available at: <http://www.plosmedicine.org/article/info:doi/10.1371/journal.pmed.0040298>. Accessed: 2 December 2009.

32. Weidle PJ. **Adherence to antiretroviral therapy in a home-based AIDS care programme in rural Uganda.** *Lancet* 2006; **368**:1587–1594.
33. Farmer P, Léandre F, Mukherjee JS, Claude M, Nevil P, Smith-Fawzi MC, et al. **Community-based approaches to HIV treatment in resource-poor settings.** *Lancet* 2001; **358**:404–409.
34. Koenig SP, Leandre F, Farmer P. **Scaling up HIV treatment programs in resource-limited settings: the rural Haiti experience.** *AIDS* 2004; **18**:21–25.
35. Swider S. **Outcome effectiveness of community health workers: an integrative literature review.** *Public Health Nursing* 2002; **19**:11–12.
36. Greenwood AM, Bradley AK, Byass P, Greenwood BM, Snow RW, Barnett S. **Evaluation of a primary health care programme in the Gambia. I: The impact of trained traditional birth attendants on the outcome of pregnancy.** *J Trop Med Hygiene* 1990; **93**:58–66.
37. Bang AT, Reddy HM, Deshmukh MD, Baitule SB, Bang RA. **Neonatal and infant mortality in the ten years (1993 to 2003) of the Gadchiroli field trial: effect of home-based neonatal care.** *J Perinatol* 2005; **25**:92–107.
38. Greenwood BM, Greenwood AM, Snow RW, Byass P, Bennett S, Hatib-N'jie AB. **The effects of malaria chemoprophylaxis given by traditional birth attendants on the course and outcome of pregnancy.** *Trans R Soc Trop Med Hygiene* 1989; **83**:589–594.
39. Delacollette C, Van der Stuyft P, Molima K. **Using community health workers for malaria control: experience in Zaire.** *Bull WHO* 1996; **74**:423–430.
40. Bureau of Labor Statistics. *Social and human service assistants. Occupational Outlook Handbook 2006–7.* Washington, DC: United States Department of Labor; 2006.
41. Fedder DO, Chang RJ, Curry S, Nichols G. **The effectiveness of a community health worker outreach program on healthcare utilization of west Baltimore City Medicaid patients with diabetes, with or without hypertension.** *Ethnicity Dis* 2003; **13**:22–27.
42. Brownstein J, Bone L, Dennison C, Hill M, Kim M, Levine D. **Community health workers as interventionists in the prevention and control of heart disease and stroke.** *Am J Prevent Med* 2007; **29**:128–133.
43. Kober K, Van Damme W. *Expert patients and AIDS care. A literature review on expert patient programmes in high-income countries, and an exploration of their relevance for HIV/AIDS care in low-income countries with severe human resource shortages.* Antwerp: Institute of Tropical Medicine; 2006.
44. WHO. *Community contribution to TB care: practice and policy. Review of experience of community contribution to TB care and recommendations to national TB programmes.* Geneva: World Health Organization; 2003.
45. Gilroy K, Winch P. *Management of sick children by community health workers. Intervention models and programme examples.* Geneva: UNICEF, World Health Organization; 2006.
46. Juraci A, Cavaletti M, de Lima G, Houthausen R. *Evaluating the impact and cost of interventions with community health workers on child health: a Brazilian experience.* Boston: Harvard School of Public Health; 1998.
47. Islam MA, Wakai S, Ishikawa N, Chowdhury AM, Vaughan JP. **Cost effectiveness of community health workers in tuberculosis control in Bangladesh.** *Bull WHO* 2002; **80**:445–450.
48. Miles K, Seitio O, McGilvray M. **Nurse prescribing in low-resource settings: professional considerations.** *Int Nurs Rev* 2006; **53**:290–296.
49. Gray A, Strasser S. *Prescribing and dispensing by nurses in district-level health facilities.* South Africa: Health Systems Trust; 1999.
50. Rosenfield AG, Limcharoen C. **Auxiliary midwife prescription of oral contraceptives. An experimental project in Thailand.** *Am J Obstet Gynecol* 1972; **114**:942–949.
51. Jagwe J, Merriam A. **Uganda: delivering analgesia in rural Africa: opioid availability and nurse prescribing.** *J Pain Symptom Manage* 2007; **33**:547–551.
52. Baker B, Benton D, Friedman E, Russell A. *Systems support for task shifting to community health workers.* Geneva: The Global Health Alliance; 2007.
53. Berman P, Gwatkin D, Burger S. **Community-based health workers: head start of false start towards health for all?** *Soc Sci Med* 1987; **25**:443–459.
54. Lewin SA, Dick J, Pond P, Zwarenstein M, Aja G, van Wyk B, et al. **Lay health workers in primary and community health care.** *Cochrane Database Syst Rev* 2007; CD004015(4).
55. Swider S. **Outcome effectiveness of community health workers: an integrative literature review.** *Public Health Nursing* 2002; **19**:11–20.
56. Nemcek M, Sabatier R. **State of evaluation: community health workers.** *Public Health Nursing* 2003; **20**:260–270.
57. Lehmann U, Friedman I, Sanders D. *Review of the utilisation and effectiveness of community-based health workers in Africa.* JLI Working Paper 4(1). Geneva: Joint Learning Initiative; 2004.
58. Lehmann S, Sanders D. *Community health workers: what do we know about them?* Geneva: World Health Organization; 2007.