Achieving child survival goals: potential contribution of community health workers

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There is renewed interest in the potential contribution of community health workers to child survival. Community health workers can undertake various tasks, including case management of childhood illnesses (eg, pneumonia, malaria, and neonatal sepsis) and delivery of preventive interventions such as immunisation, promotion of healthy behaviour, and mobilisation of communities. Several trials show substantial reductions in child mortality, particularly through case management of ill children by these types of community interventions. However, community health workers are not a panacea for weak health systems and will need focussed tasks, adequate remuneration, training, supervision, and the active involvement of the communities in which they work. The introduction of large-scale programmes for community health workers requires evaluation to document the impact on child survival and cost effectiveness and to elucidate factors associated with success and sustainability.

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Introduction

Progress towards the United Nations' Millennium Development Goals, including those on maternal and child mortality, is off track, particularly in sub-Saharan Africa. The Millennium Development Goal on child mortality aims for a two-thirds reduction from 1990 to 2015, but at current progress this may not be attained until 2165 in sub-Saharan Africa.[1,2] It is estimated that over 60% of deaths in children under age 5 years (currently >10 million per year) could be prevented by various existing interventions.[3] Recent analysis indicates that 41–72% of newborn deaths can be prevented by available interventions, if provided at high coverage, and around half of this reduction is possible with community-based interventions.[4]

However, the health systems in many countries are too weak and fragmented to enable the scaling-up of essential interventions for maternal, newborn, and child health.[5] One key challenge is the need to develop and strengthen human resources to deliver essential interventions.[6,7] The density of health workers (doctors, nurses, midwives) is inversely associated with maternal, infant, and under-5 mortality,[8] and is more than ten times higher in Europe and North America than in sub-Saharan Africa. Various factors are responsible for inadequate human resources in many countries, including inadequate supply, migration, poor morale, and the effects of HIV/AIDS.[6,7,9]

These factors, together with the high cost of training doctors and nurses and the low use of services based in health facilities in many areas, have rekindled interest in the possibility of substantial health gains from the use of community health workers and mid-level health workers such as clinical assistants. Several African and south Asian countries are currently investing in new cadres of community health workers as a major part of strategies to reach the Millennium Development Goals, in some cases arguing that they preferentially reach the poor who are less likely to use health facilities. For example, Ethiopia is training 30 000 community-based health extension workers (women) to focus on maternal, newborn, and child health, malaria, and HIV. India, Kenya, Uganda, Ghana, and South Africa are also considering national programmes for community health workers. Therefore, it is now timely to assess the evidence that such health workers can perform the necessary tasks and function as part of a sustainable workforce.

In the 1970s and 1980s, community health workers were a cornerstone of primary health care as envisaged by the Alma Ata declaration. However by the early 1990s, enthusiasm for community health workers had diminished for several reasons, including the challenges of scaling-up programmes in a sustainable fashion while maintaining effectiveness, and the perceived success of some vertical programmes.[10]

Search strategy and selection criteria

This article draws on literature searches done by several of the authors for several publications that reviewed topics of relevance to community health workers.[12,14,16–18,50,72,73] The Cochrane Library was searched for additional systematic reviews using the terms "community health workers", "lay health workers", "mid level health workers", and "primary health care". Additional references were provided by individuals listed in the acknowledgments section and by some of the reviewers. Some examples of programmes for community health workers referred to were presented at the Countdown to 2015 Child Survival Conference, sponsored by *The Lancet* and other organisations, which took place at the University of London in December 2005. We have also included some references to grey literature sources, which may not have been peer-reviewed, that provided contextual information about the factors conducive to scaling up and sustainability of programmes for community health workers.

To address questions of impact and cost effectiveness, we focused on the conclusions of randomised trials and systematic reviews of such trials where these were available, but other designs, such as case studies, were drawn upon to provide evidence about factors that determine the performance and sustainability of programmes for community health workers.

For more information on **the health extension progamme in Ethiopia** see http://cnhde.ei.columbia.edu/programs/hep

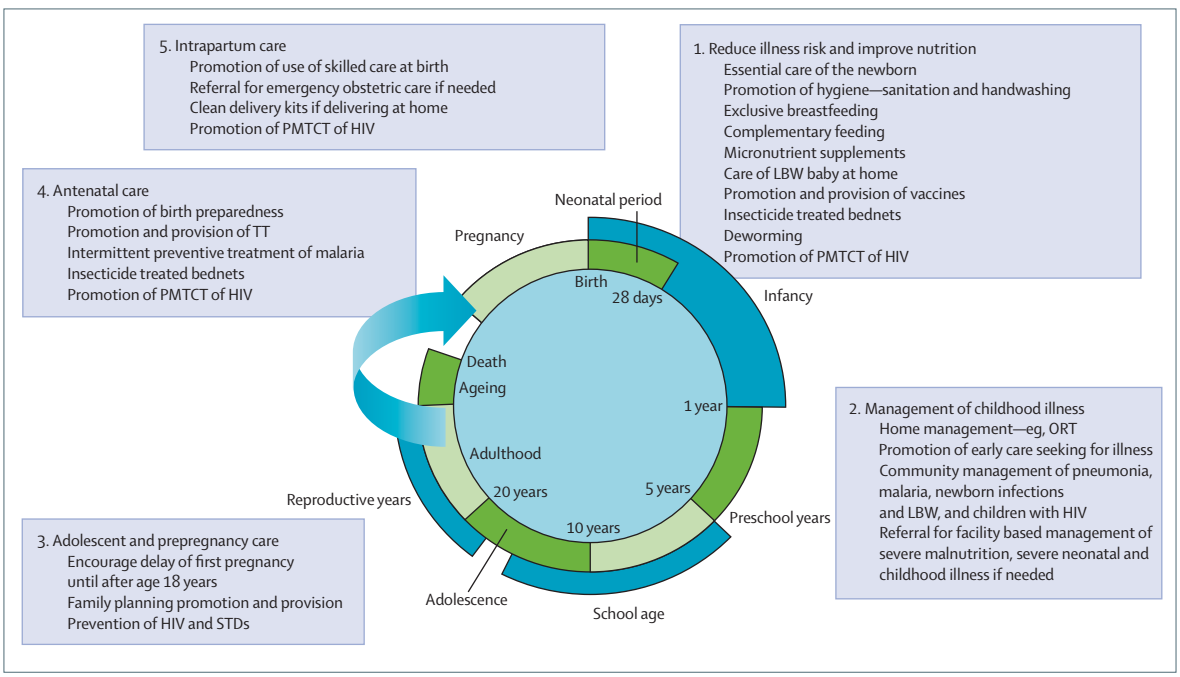

Figure 1: **Child health interventions throughout the life cycle which are feasible at the community level**
LBW=low birth weight. ORT=oral rehydration therapy. TT=tetanus toxoid. STD=sexually transmitted diseases. PMTCT=prevention of mother to child transmission

Historically, programmes for community health workers have emerged in very different political and societal contexts. There are philosophical and political differences between the promotion of community health workers as community advocates and agents that change behaviour and the view that they are essentially an extension of formal health care.[11]

In this Review we focus on child survival, although many of the issues are also relevant to other priority areas encompassed by the Millennium Development Goals. Child survival is most effectively addressed with the provision of care during the lifecourse (figure 1), an approach that emphasises the intergenerational gains of improved health (eg, improved nutrition in young girls, delayed age of first pregnancy, and death of the mother affects the survival and health of the next generation[12,13]). Although we acknowledge the importance of a lifecourse approach, in this Review we primarily consider interventions that directly improve child health (panel 1,[14,15] figure 1).

Who are community health workers and mid-level workers?

Complex and sometimes confusing terminology is used to describe various types of non- professional health workers.[16] A statement from a WHO Study Group suggests that,[17] "Community health workers should be members of the communities where they work, should be selected by the communities, should be answerable to the communities for their activities, should be supported by the health system but not necessarily a part of its organization, and have shorter training than professional workers".

Community health workers include the most generic type of community-based workers, including cadres such as village health workers, community resource people, or workers known by local names. In addition to general community health workers, there are also more specialised cadres such as community rehabilitation facilitators, community-based directly observed therapy (short-course) supporters for tuberculosis, traditional birth attendants, HIV/AIDS communicators, etc. All these types of community workers typically perform one or more functions associated with health-care delivery and are trained in some way but usually have no formal professional or paraprofessional certification. The training might be recognised by the health services and national certification authority, but does not form part of a tertiary education certificate or degree.

Many other types of auxiliary or mid-level health workers can also make useful contributions to community health care, for example formally trained nurse aides, medical assistants, physician assistants, paramedical workers in emergency and fire services, and other health paraprofessionals. These categories differ from community health workers because they are generally part of the formal health services organisation, trained for longer periods, and are usually facility based. In practice, precise classification can be difficult because of the wide range of backgrounds and roles of such health workers.

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Which interventions can be delivered in community settings?

A growing array of effective interventions can be delivered in the community (figure 1).[18,19] These encompass behavioural interventions to promote healthy behaviour, such as hand washing and breastfeeding, preventive interventions, such as insecticide-treated nets for malaria and micronutrients, and more complex tasks, such as prevention of mother to child transmission of HIV, case management of childhood illnesses such as malaria, pneumonia, and neonatal sepsis. In addition, the active involvement and empowerment of communities through community health workers may have positive effects on health, for example by changing health beliefs and improving access to health and other services.

Why should interventions be delivered in community settings?

Currently the coverage of many effective interventions is low[3,4]—well under 50% in many cases—and the quality of care is deficient in many communities.[20] Care for neonatal disorders has received little emphasis in public health programmes, and only 3–12% of children born at home in five south Asian and sub-Saharan African countries received a visit from a trained health worker within 3 days of birth.[2]

Improvement in health facilities alone is not sufficient to avert a large proportion of child deaths because facility-based services often emphasise curative care over prevention and because children from poor families are less likely to access health facilities than those wealthier families.[21] Unless barriers to both preventive and curative care are addressed and care is brought closer to patients,[22] these high risk and poor populations will be the last to be reached.[4]

Analysis of the implications of three different delivery approaches—outreach, family-community care, and facility-based clinical care—predicted that outreach and family-community care in combination at 90% coverage could result in an 18–37% reduction in neonatal mortality, even with no change in facility-based care services.[4]

An integrated delivery schedule comprising 18 contacts with mother and child over the first five years of life has been proposed to deliver the effective preventive child survival interventions, almost entirely through community-based and outreach delivery approaches.[19] High coverage of such preventive interventions would reduce the need for treatment, although many of the essential curative interventions could also be delivered at the community level—eg, management of pneumonia. However, severe neonatal and childhood illness is best managed in facilities with health professionals, although community health workers may improve the prospects for survival of severely ill children by, for example, administering rectal artemether for severe malaria before referral.[23] Over time the goal must be to strengthen community, outreach, and facility care, as well as institutionalisation of communication and referral linkages between these levels. However, in many cases where human resources are most lacking, prioritising the community level can be feasible and cost effective[20] and can be a means to reducing inequity by preferentially reaching the poorest.[24,25]

Where resources are not currently available for an integrated schedule to address child survival priorities, preventive measures, such as measles vaccination and insecticide-treated nets can be delivered via community distribution campaigns or child health days. These campaigns can increase intervention coverage rapidly and

***Panel 1:* An example of a programme for community health workers at scale, Pakistan's National Programme for Family Planning and Primary Health care**

The Lady Health Workers programme,[14] was initiated by the Federal government in 1994 to provide maternal and child health services at the community level with health workers. These workers belong to the local community, have an education (at least grade 8 standard), and receive a 6-month training programme. Each health worker has a catchment area of 200 families (1000 population) with a coverage at present of about 50–60% of the population for the rural areas and urban slums of Pakistan. By the end of 2006, about 100 000 health workers were trained

The health workers provide the following services

Making home visits for

- Counselling mothers on maternal and child health issues particularly breast feeding, complementary feeding, and immunisation
- Providing iron and folic acid supplements to pregnant women
- Providing condoms and oral contraceptives
- Treating minor illnesses in women and children, and referring patients

Maintaining linkage with traditional birth attendants who attend home deliveries

Facilitating village health committees and women's committees to discuss maternal and child health and educational activities

There are a few areas where the programme has shortfalls

Coverage of remote areas is still insufficient particularly in hard to reach areas, such as North West Frontier Province, due to the challenges of recruiting health workers in these populations and also a lack of reliable transport for existing workers

Few health workers attend deliveries but general liaison with traditional birth attendants is good, especially in areas with few skilled birth attendants

The supply of drugs and other commodities is varied

The polio eradication programme has diverted the attention of health workers away from their regular activities

Many new programmes want to deliver interventions through the programme. However, care is needed to avoid over-burdening the workers with competing priorities and expanding interventions of various initiatives, such as directly observed therapy for tuberculosis and injectable contraceptives

The village health committees are not as active as expected, although the women's committees function better

Current health education is too diffuse, with inconsistent messages

Notwithstanding the above, the programme is a rare example of successful large-scale community programmes using community health workers with minimum skills, and there is some evidence that it has effect on neonatal survival[15]

equitably.[26,27] Community volunteers play major parts in such campaigns by notifying community members before the campaign and encouraging use of insecticide-treated nets afterwards.

Impact and cost-effectiveness of community health workers

Most assessments are process associated and many address disease-specific programmes[26,27]—eg, increasing coverage of insecticide-treated nets or measles vaccines. South Asia has contributed to most of the studies on mortality impact; however, most of these were relatively small-scale programmes. There are few publications that address process assessment of breastfeeding and nutrition promotion,[28] integrated child health, or programmes for maternal, newborn, and child health. For example, UNICEF's high-profile Accelerated Child Survival Programme for implementing the community component of the Integrated Management of Childhood Illness strategy in several African countries[29] has not been rigorously assessed externally for impact on mortality.

Various trials have shown substantial reductions in child mortality, particularly with case management of ill children by community health workers. A meta-analysis of community-based trials of the effect of case management of pneumonia on mortality in neonates, infants, and preschool children suggested an overall reduction of 24% in mortality.[30] A trial in Tigray, Ethiopia, of training local coordinators to teach mothers to give antimalarials promptly to their sick children in the home showed a 40% reduction in under-5 mortality.[31] A systematic review of the management of pneumonia and malaria by community health workers identified seven intervention models according to their role in assessment of children, system of referral to health facility (verbal or written), and location of the drug stock.[32] The strongest evidence for an effect on mortality was for community-based pneumonia case management and active detection. The authors suggested that programmes that focus on treating malaria alone ignore the overlap between pneumonia and malaria in presenting signs and symptoms.

A controlled trial in rural India showed that home-based neonatal care and management of sepsis can more than halve neonatal mortality in a high-mortality setting.[33] Substantial reductions in infant and neonatal mortality rates in intervention, but not control communities, were reported over a 7-year period, with neonatal mortality decreasing even more precipitously than infant mortality. About one-third of the reduction in neonatal mortality was attributed to sepsis management, a further third to supportive care of neonates with a low birth weight, and around one-fifth to asphyxia management.[34] Subsequent data that assessed the value of clinical signs in predicting deaths caused by sepsis in over 3500 neonates[35] showed that the simultaneous presence of two of seven clinical signs was 100% sensitive and 92% specific. Health workers could use these signs to identify neonates for referral or treatment, with four presumptive patients being treated for each predicted death averted.

In a study that assessed the effect of the Lady Health Worker programme in Pakistan, performance in recognising and treating acute respiratory infections was weaker than for other simple skills, such as diarrhoea management and vaccination counselling, underscoring the need to improve performance in disease recognition.[14]

Assessment of a primary-care programme in the Gambia showed that measures of child morbidity decreased more in the intervention area, where community health workers were used, but child and infant mortality also declined in comparison villages, underscoring the need for careful study design.[37] The relative dearth of studies in settings that are representative of much of sub-Saharan Africa, especially in HIV-endemic populations, suggests the need for more research.

A recent systematic review examined the role of lay health workers in the delivery of simple interventions.[36] These interventions showed substantial diversity in the targeted health issue and the aims, content, and outcomes. Most interventions were used in high-income countries (35 of 43), but nearly half (15 of 35) of the studies from high-income countries focused on low-income and minority populations. Study diversity limited meta-analysis to outcomes for five subgroups (n=15 studies). Benefits in comparison with usual care were shown for lay interventions to promote immunisation uptake in children and adults, and to improve outcomes for malaria and acute respiratory infections, as shown in other reviews.[30,31]

An early economic assessment of a community health care programme studied community health workers that trained for 12 weeks and were deployed in two locations in Kenya's Western Province.[38] They provided basic health care and promoted selected health, sanitation, and nutrition practices. A cost-benefit analysis was done with the willingness-to-pay approach to compare the costs and benefits of the project. The assessment showed a large net present value and a benefit–cost ratio of about nine. The authors concluded that the results were "…strongly in favour of decentralisation of primary health care on similar lines in the rest of the country".[38]

An economic analysis was done on five community health care programmes that delivered primary health care services and one training centre for community health workers in the Western Cape Province of South Africa. Adjusting for inflation, the cost of contracts with community health workers seemed lower than with the public sector clinics.[39] Unfortunately, there was no assessment of cost-effectiveness.

In a recent review of the effects and costs of expanding immunisation services in developing countries, the use of community health workers was one of the interventions with the highest effect on coverage.[40] The

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use of community health workers in periodic outreach programmes was assessed in relatively small but diverse communities. One study[41] assessed the urban areas in Mexico and another study[42] looked at communities dispersed along a river in the Amazon region, Ecuador. The involvement of communities improved services by ensuring that houses were located precisely, potential recipients were registered, and the days of vaccination for children were chosen with parents. The use of community health workers was reported to cost less and was more effective than outreach teams of health staff, but it was unclear whether the isolated nature of the community was instrumental in influencing the results. These studies show how community health workers can reduce the costs of transport and lost productivity for recipients associated with seeking health care, both of which can act as barriers to utilisation.

Persuasive evidence on cost-effectiveness comes from a cluster trial that assessed the establishment of women's groups led by community health workers to provide education to reduce neonatal and maternal mortality. The programme achieved a substantial reduction in both the neonatal and maternal mortality rate[43] and was cost-effective with an incremental cost of $211 per life year gained amongst neonates.[44]

Direct comparisons of the performance of health professionals (doctors and nurses) and other health workers in child care have been undertaken at first-level facilities, for example in Bangladesh and Benin. In Bangladesh, few children attending first-level government health facilities were fully assessed or correctly treated and almost none of the carers was advised on how to continue care at home.[45] Importantly, low-level workers (family welfare visitors and nursing aides) did substantially better than high-level workers (paramedics, physicians, and nurses) in rational prescription of antibiotics and provision of appropriate advice to carers. A study in Benin showed similar results with higher percentages of children with diarrhoea receiving oral rehydration therapy and more children with fever being appropriately treated with a recommended anti-malarial by nursing aides compared with those seen by nurses (intermediate) and those seen by physicians (worst performance).[46,47] These findings provide added evidence for the potentially important contribution of non-professional health workers to child survival goals—not necessarily because they can do all clinical tasks better than professionals (they almost certainly cannot) but because they may have greater adherence to simple clinical practice guidelines.

There may be additional benefits of using community health workers in emergency situations, especially when rapid community access is required. After the recent earthquake in Pakistan, the government was able to mobilise over 8000 community health workers from the affected areas in camps and villages.[48] These health workers were able to provide preventive and curative services in remote and inaccessible populations.

In summary, the evidence (admittedly limited in quality and quantity) suggests that in some settings, with appropriate support and training, community health workers (and mid-level workers) can improve child health outcomes. This supports earlier evidence of the effectiveness of community health workers documented in case studies of projects as well as selected national experiences.[49] However, whether or not this potential can be realised in large scale national programmes depends on several contextual factors that crucially influence both the impact and sustainability of such programmes.[50]

Determinants of the success of community health worker programmes

Research has commonly been limited to relatively short-term studies in selected populations, and more work is needed to describe the key factors involved in sustaining performance over years and decades at scale. This requires institutionalisation of change, and one of the challenges from an assessment standpoint is the ability to capture and place a value on such change.[51] The determinants of success can be seen as comprising four main interacting categories (figure 2). The relative importance of such factors is likely to vary from one setting to another.

National socioeconomic and political factors

Many programmes for community health workers have emerged and been sustained in situations of political transition and popular mobilisation.[52] Interactions between mobilised and well-informed communities,

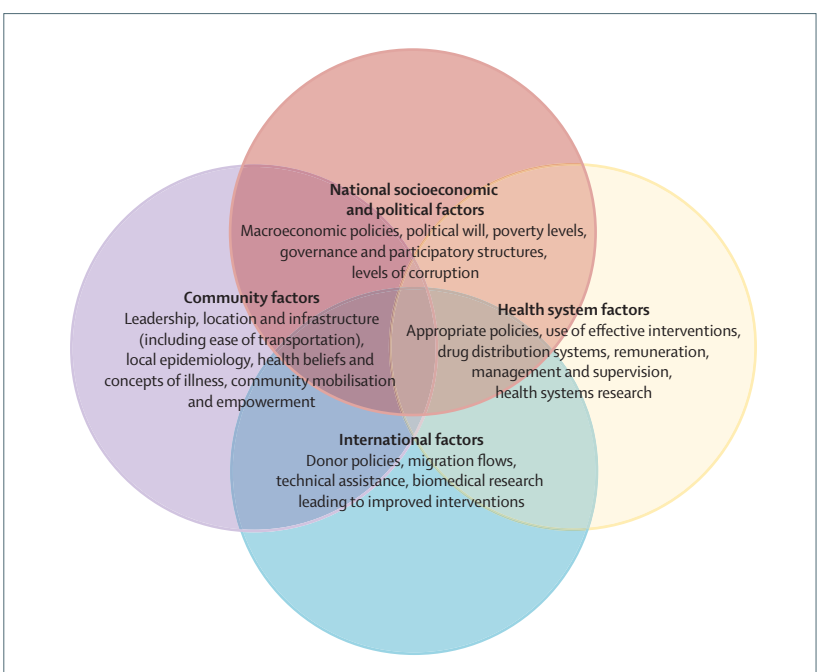

Figure 2: **Examples of factors that influence the impact and sustainability of community health programmes**

community-based workers, and formal health services have resulted in the rapid spread of child survival interventions with simultaneous mortality reduction.[53] However, where participatory democracy does not function, social class and caste divisions may undermine community support for community health workers and interfere with their functioning.

Where management responsibility is increasingly devolved, especially in weak political systems, community workers may be "rewarded" appointments for political support by local governments and politicians. Some of these are poorly motivated and beyond the regular purview of the health system. An assessment of the programme for health workers in Hala, Pakistan indicated that as many as 20% were non-residential—ie, from different locations than their place of work, clearly illegal under the official programme.[14] Stronger community participation in the selection and monitoring of community health workers could help to overcome abuse of appointment systems, although this is generally conditioned by the extent of public participation in politics.[50] Political dominance by men at the community level may mitigate against the selection of women as community health workers.

Community factors

The mobilisation of specific communities, even in the absence of more general popular mobilisation, may play an important part in the improvement of maternal and newborn health. For example, the trial from Nepal[42] showed a significant benefit on maternal and neonatal mortality through a community-based participatory intervention that involved local women. This mortality benefit seemed to result from improved hygiene behaviour, increased access to safe delivery through enhanced care-seeking, and improved local transport, despite only 8% of women attending the groups.

Community location and infrastructure may have profound effects on the impact of community health worker programmes. Isolated communities, far from health facilities, can pose particular challenges.

Health system factors

A key determinant of the effectiveness of a programme for community health workers is its relationship with formal health services. Some of the experiences of implementing a large-scale programme in Pakistan are outlined in panel 1. Interactions between programmes for community health workers and formal health services can be affected by the way that programmes have been introduced, for example the degree of consultation and involvement of local communities and health personnel. There tends to be a wide gulf in the social, economic, and cultural background between other health personnel and community health workers. Many health personnel lack the background and orientation to provide a supportive environment for programmes for community health workers. Health professionals usually perceive community workers as lowly aides[16,54,55] who should be deployed as assistants within health facilities, sometimes overlooking their health promotion role within communities. Perceived superiority of health personnel can be problematic[50] but may be partly addressed in the education of medical students.[56] There may be also opposition from the medical profession ostensibly due to concerns about quality and the ethics of devolving care to health workers with limited training.

Rivalry may develop between nurses and community health workers leading to social feuds, with different groups supporting different workers and slowing access to the services offered.[57] Harassment and other constraints can particularly prevent health women workers from entering and staying in the health workforce.[58]

When a hierarchical and paternalistic relationship exists between community health workers and health personnel, communication deteriorates because of distrust and lack of understanding compounded by an increasing lack of respect.[59] Without adequate communication, the information about people's beliefs, needs, and expectations that community workers hold is lost to the health care system. Additionally, community health workers may inadvertently adopt some values advocated by the health professionals by selectively valuing curative as opposed to preventive health care. They may thus undervalue their own worth and seek to follow professionals' values. However, when community health workers are unable to provide even simple curative interventions, they may lose face in the community and the capacity for prevention may be undermined.[11] Although we are unaware of any specific evidence on the relative effectiveness of men versus women as community health workers, men might see less women and children and may therefore be less well placed to address child survival goals.

Drug and equipment supplies are usually organised through district or regional dispensaries and collected and delivered by community health workers. Availability of drugs and the cost of travel are important determinants of the effectiveness of community health workers.[60]

International factors

Expenditure ceilings and donor and international macroeconomic policies affect overall health expenditure and the equity of access to effective services. Creation of sufficient "fiscal space" to enable governments to finance health systems has been recognised as a priority for development policy.[61]

Improving performance of community health workers

One review concluded that community health workers did not consistently provide services that are likely to have substantial effects on health and that quality was usually poor.[62] Thus, a key consideration for the design, implementation, and ongoing management of programmes for community health workers is how high-

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quality performance by community workers will be achieved and maintained.

Financial incentives and remuneration

Most of the early studies imply that volunteers are the ideal to which most schemes for community health workers aspire and assume that there is a sufficient pool of willing people to take part in voluntary social service in rural areas and informal settlements.[63] However, most programmes pay their community workers either a salary or an honorarium and almost no examples exist of sustained community financing, aside from the possibly unique example of China's "barefoot doctors" who were remunerated from the surplus produced by collectivised production units. Even non-governmental organisations tend to find ways of financially rewarding their community workers.

Even when the workload is light and can be fulfilled on a part-time basis, the costs entailed by lost economic opportunities may be too high. Job-seeking motivation in voluntarism has been noted in schemes in Nigeria[64] and India[65] where community health workers are paid a small honorarium. Other financial incentives range from a small salary from the state to payments for attendance at training sessions.[66] A high attrition rate contributes to decreased stability of the programme, increases training costs because of the need for continuous replacement, and makes the programme difficult to manage.[67] Fee-for-service payments or payments associated with drug sales may encourage inappropriate treatment at the expense of prevention and overuse of medications.

Non-financial approaches for improving performance of community health worker

Non-financial approaches to improving performance such as use of visual identification (badges, T-shirts etc), acquisition of skills, and flexible hours, may have less potential to distort care than fee-for-service payments or those associated with drug sales. Policymakers should consider using a mix of financial and non-financial incentives tailored to local circumstances combined with assessment.

Rationalisation of the tasks and improvement of the performance of health workers in the community is another method that has the potential to increase the coverage of effective interventions in a short time frame. A study of the performance of community health workers in the management of multiple childhood illnesses in Kenya indicated deficiencies in care, but around 90% of the cases of malaria (the most common problem identified) were adequately treated.[68] This suggests that interventions should be tailored to already reported deficiencies in practice. There is a need to ensure that training programmes focus on the acquisition of competencies for the detection of key clinical signs, such as the detection of rapid respiratory rate and chest indrawing.[69,70] It seems feasible that community health workers should be able to identify correctly around 70–80% of children with rapid respiratory rate.[69,71] Training programmes should also consider local symptom terminology and illness beliefs, which can affect the diagnosis of disease.[69] Programmes should be tailored to the literacy level of the community health workers.

Although the Cochrane Library includes few intervention studies in low-income and middle-income countries of strategies to improve the coverage of effective interventions,[72] a recent review,[73] based on limited evidence, reported that the simple dissemination of written guidelines is usually ineffective, supervision and audit with feedback is generally effective, and multi-faceted approaches may be more effective at changing practice than single component interventions. The authors concluded that supervision, as an intervention, deserves special attention, highlighting randomised trial evidence suggesting that supportive supervision leads to benefits, at least in the short-term, and that well-organised supervisory systems have the potential to improve motivation and provide professional development. Many assessments have, however, documented the weakness of supervision and support in national programmes.[59,74]

The guidelines for supervision should include a list of supervisory activities. The most important element of supervision is ensuring the two-way flow of information. It is also vital that the supervisor acts as a role model. The biggest challenge in supervision is scaling-up from successful small-scale programmes to national programmes. Particularly in rural communities supervisors may provide the only point of contact with the health system. Clear strategies and procedures for supervision need to be defined and the skills taught should encourage participation by supervisees. Peer support, through group meetings, may also make an important contribution to morale and motivation.

Health personnel need skills in assessing community situations, interacting and negotiating with people in groups as well as with individuals, and teaching using participatory techniques. Training institutions need to make greater use of problem-solving teaching approaches in which students are asked to collect and analyse information and devise relevant and appropriate solutions.[75] Training of community health workers and facility-based health personnel should be harmonised to ensure that there is mutual understanding of roles and responsibilities and that any guidelines for practice are consistent. Recent evidence from Peru shows how when integrated management of childhood illness was implemented in parallel to existing programmes, the expected synergies between health facility and community interventions were not achieved, partly because of failure to link training of these two cadres of health personnel.[76]

Strengthening the management capacity of district health teams to focus limited resources on priority problems can be done effectively in low-income settings,

Panel 2: **Community health workers in child survival: what we know and what we need to know**

Lessons learnt through programmes and assessments

- *Training is not enough:* supervision and support increase effect and sustainability, preferably with the possibility for referral of ill children
- *Tasks and roles specified:* community health workers will probably perform better with clearly defined roles and a limited series of specific tasks than if they are expected to undertake a wide range of tasks or have an ill-defined role
- *Targeted incentive systems:* incentives, monetary or otherwise, will probably reduce attrition and improve performance
- *Consistent community and policy support:* appropriate support can help to sustain programmes for community health workers; active involvement of communities is needed to ensure support is available and to promote use of community workers by community members

Health system research gaps

- *Recruitment and retention:* what factors and policies increase recruitment of community health workers and reduce attrition?
- *Roles:* if community health workers do better with specific roles, which roles and how many can they undertake with a given level of training and support? How can these be integrated with other community-level work and with other levels in the health system? What are the roles of community drug sellers in delivering effective interventions and how can they be engaged?
- *Equity:* to what extent do community health workers reach the poorest and how can inequities in coverage be addressed by appropriate targeting?
- *Improving performance and incentive systems:* what level, method of remuneration, and types of non-financial incentives maximise cost-effectiveness but are sustainable? What are other effective approaches to improving performance?
- *Referral linkages:* how can referral linkages be operationalised especially if communications and transport systems are weak?
- *Communications:* can mobile technologies be used to improve communications with community health workers and lead to improved health outcomes in isolated communities?
- *Routine supplies:* how can basic supplies be made regularly available, and what is the best mix of social marketing, community-based distribution and strengthened health system logistics to ensure equitable access?
- *Drug use:* How appropriate is the use of drugs by community health workers and what is the impact of drug use on resistance patterns?
- *Implementation:* Under what conditions should programmes for community health workers be implemented? And under what conditions can these programmes be phased out? Large-scale implementation of programmes should be accompanied by research to assess and ensure that the expected impact and value for money are achieved

For more information on **fixing health systems** see http://www.idrc.ca/tehip

For more information on **Tanzania's Essential Health Interventions Project** see http://www.idrc.ca/en/ev-3170-201-/-DO_TOPIC.html

as shown by a programme that has placed powerful, but easy to use, decision-making methods, in the hands of local decision makers in Tanzania. These methods associated data about disease burden in the local community with data about patterns of expenditure, and indicate where there are mismatches so that managers can take corrective action. An assessment suggested that improved priority setting at the district level could reduce under-5 mortality substantially. Thus community delivery of appropriate interventions is strongly influenced by the competence of local management. Guidance on the implementation of programmes for community health workers based on extensive experience such as that of the BASICS II programme in Nigeria[77,78] may be helpful, but contextual factors need to be considered when applying such guidance in other settings.

The need for new knowledge to improve health systems

A Task Force convened by WHO suggested a wide ranging research agenda covering 12 topic areas, which, if addressed, could provide the knowledge to improve health system functioning.[79] Human resources in general and the role of community health workers and mid-level cadres in the delivery of effective interventions constitute key topics for such research. This research agenda must be addressed as a matter of urgency by embedding evaluative research in initiatives to promote child survival. Such assessment will probably cost only a few percent of the resources required for such programmes. Without such research there is a real danger that resources will be wasted and that, in the absence of sustained progress, scepticism about the feasibility of attaining the Millennium Development Goal for child survival will undermine the political will for increased investment. Some examples of lessons learned and research questions that, if addressed, would help to strengthen the knowledge for implementation of programmes for community health workers are shown in panel 2.

Monitoring indicators of the effectiveness of human resource policies,[80–84] including those that address the community delivery of child survival interventions, is essential to inform policymakers. There is a dearth of information relevant to such indicators in many countries.

Conclusions

Given the challenges, especially in Africa, as a result of political or natural crisis, structural adjustment, health sector reform, HIV/AIDS, as well as the loss of professional skills, consideration of a renewed role for community health workers is relevant and timely.[85] Tasks need to be focused; community workers cannot provide comprehensive care for all community health needs. Supportive management, including appropriate supervision and availability of infrastructural support are critical issues for programme success; yet they are usually overlooked. The implementation of large-scale programmes should be accompanied by research to show that the anticipated effect and value for money are achieved and to document the reasons behind successes and failures.

Community health workers are only one component of a human resource policy and need to be integrated into overall assessments of human resource requirements. The processes of assessment should include the numbers, skills and distribution of health personnel to meet population health needs, as well as political choices which reflect the values and resource constraints in

individual countries.[86,87] Community health workers do not replace the need for facility-based health services; and they require additional financing not only for the initial costs, but also the recurrent costs for training, management, logistics, supervision, assessment, and remuneration or other incentives. Recruitment of community health workers must not be used as an excuse for not addressing health priorities that require more advanced skills for their resolution, such as the provision of skilled attendants at birth to reduce maternal mortality. Policymakers should also consider how to overcome legal barriers such as to community health workers prescribing or giving injections.

Although community health workers are not a panacea for weak health systems, the evidence base, despite limitations, does suggest they can have an important role in increasing coverage of essential interventions for child survival and other health priorities. Nearly 30 years after the Alma Ata declaration, the time is right to reassess the potential contribution of community health workers in accelerating coverage of essential interventions, particularly in poor and underserved communities.

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Contributors

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Conflicts of interest statement

We have no conflict of interest.

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