REVIEW

Which intervention design factors influence performance of community health workers in low- and middle-income countries?
A systematic review

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Community health workers (CHWs) are increasingly recognized as an integral component of the health workforce needed to achieve public health goals in low- and middle-income countries (LMICs). Many factors influence CHW performance. A systematic review was conducted to identify intervention design related factors influencing performance of CHWs. We systematically searched six databases for quantitative and qualitative studies that included CHWs working in promotional, preventive or curative primary health services in LMICs. One hundred and forty studies met the inclusion criteria, were quality assessed and double read to extract data relevant to the design of CHW programmes. A preliminary framework containing factors influencing CHW performance and characteristics of CHW performance (such as motivation and competencies) guided the literature search and review.

A mix of financial and non-financial incentives, predictable for the CHWs, was found to be an effective strategy to enhance performance, especially of those CHWs with multiple tasks. Performance-based financial incentives sometimes resulted in neglect of unpaid tasks. Intervention designs which involved frequent supervision and continuous training led to better CHW performance in certain settings. Supervision and training were often mentioned as facilitating factors, but few studies tested which approach worked best or how these were best implemented. Embedment of CHWs in community and health systems was found to diminish workload and increase CHW credibility. Clearly defined CHW roles and introduction of clear processes for communication among different levels of the health system could strengthen CHW performance.

When designing community-based health programmes, factors that increased CHW performance in comparable settings should be taken into account. Additional intervention research to develop a better evidence base for the most effective training and supervision mechanisms and qualitative research to inform policymakers in development of CHW interventions are needed.

Keywords Community health workers, low- and middle-income countries, performance, systematic review
KEY MESSAGES
- A systematic review of 140 quantitative and qualitative studies identified factors related to the nature of tasks and time spent on delivery, human resource management, quality assurance, links with the community, links with the health system and resources and logistics having an influence on CHW performance.
- Good performance was associated with intervention designs involving a mix of incentives, frequent supervision, continuous training, community involvement and strong co-ordination and communication between CHWs and health professionals, leading to increased credibility of CHWs.
- When designing CHW programmes, policymakers should take into account factors that increased CHW performance in comparable settings, to maximize programme outcomes.

Introduction
Countries across the globe are striving to achieve universal health coverage. There is a massive shortage of 4.25 million health workers in Africa and Asia, while the distribution of existing health workers within countries is inequitable (WHO 2006). In response to the human resources for health crisis, many countries have made renewed investments in community health worker (CHW) programmes to extend the reach of inadequate health systems to hard-to-reach and underserved populations, and to expand coverage of key interventions.

A CHW has been defined as ‘any health worker carrying out functions related to health care delivery; trained in some way in the context of the intervention, and having no formal professional or paraprofessional certificate or degree in tertiary education’ (Lewin et al. 2010, p. 7). In addition, it is argued that CHWs ‘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’ (Lehmann and Sanders 2007, p. 1). There are many different types of CHWs and different names are used, like lay health workers (LHWs), a synonym for CHWs in this article, and traditional birth attendants (TBAs), who are focusing particularly on maternal health tasks. CHWs may operate in the public or private sectors, respond to single or multiple diseases and health issues and show differences in their levels of knowledge and training, their practice settings and remuneration and their relationship with regulatory systems (Bloom et al. 2001). CHWs are part of the broader group of close-to-community providers, who are health workers forming the first point of contact at community level, having up to 3 years paraprofessional training, so this group includes auxiliary staff.

Evidence shows that CHW programmes can effectively deliver evidence-based interventions in a separate article.

Methodology
This review, conducted in 2013, was undertaken using a framework approach (Dixon-Woods 2011). Based on reading of selected international literature (Chen et al. 2004; Haines et al. 2007; Bhutta et al. 2010; Kane et al. 2010; ERT1 2012; ERT2 2012; Glenton et al. 2013; Palazuelos et al. 2013). Community support can also enhance CHW performance (ERT1 2012).

We conducted a systematic review on intervention design factors influencing performance of CHWs, to contribute to the evidence base needed by policymakers in the development of CHW programmes.

Criteria for considering studies for this review
We included quantitative and qualitative studies that concerned CHWs working in promitional, preventive or curative primary health care in low- and middle-income countries (LMICs). The studies should have described a factor related to intervention design. The review covered studies including: CHWs, their clients and their families/carers, CHW supervisors, the wider community, policymakers, programme managers, other
(professional) health workers and any others directly involved in or affected by CHW service provision. We differentiated CHW performance outcome measures at three levels (Figure 1): CHW level, mediating processes and end-user level. The CHW level outcomes indicate mechanisms and characteristics of performance at the CHW level, such as self-esteem, motivation, attitudes, competencies, adherence to standards and procedures, job satisfaction and capacity to facilitate community agency. Among these mechanisms and characteristics of performance, motivation and job satisfaction are especially interrelated. Motivating factors determine the level of motivation and satisfaction. Greater job satisfaction is often associated with higher levels of motivation, but it is not a prerequisite for motivation. Motivation is a critical component of performance (Franco et al. 2002). Performance outcome at the CHW level was taken as the focus of the review. In our preliminary framework, CHW level outcomes contribute to end-user outcomes such as utilization of services, health-seeking behaviour, adoption of practices that promote health and community empowerment. Mediating processes, such as access, quality, responsiveness, productivity and community capacity to claim rights, all contribute to end-user outcomes. The three outcome levels that constitute CHW performance are intermediary outcomes and ultimately contribute to reduction of morbidity, mortality, incidence of disease or other conditions and to improved health status and well-being (Figure 1).

Search methods for identification of studies
We searched EMBASE, PubMed, Cochrane, CINAHL, POPLINE and NHS-EED for eligible studies. The search strategy focused on broad contextual, health system and intervention design factors influencing performance of close-to-community providers. This study was part of a research program investigating performance of close-to-community providers of which CHWs constitute an important part. For the purpose of this article, we focus on CHWs, as the largest amount of evidence on intervention design factors influencing performance was related to CHWs. We used existing search strategies on LHWs (Lewin et al. 2010) and adapted these to include the broader focus of our study (Supplementary Appendix 1). We included English language studies from 2007 to July 2013. Reviews and cost-effectiveness studies were not included, but used for hand searching of reference lists. To avoid duplication, we did not include studies that had been previously included in the review of Glenton et al. (2013) and included results of this review in the discussion.

Selection of studies
Two reviewers independently assessed titles and abstracts of identified documents to evaluate potential eligibility. An overview of inclusion criteria is provided in Box 1. In case of diverging opinions, inclusion was discussed until consensus was reached. Persisting disagreements were resolved by seeking a third reviewer’s opinion. Full-text papers were assessed by two reviewers out of a team of four.

Box 1. Overview of inclusion criteria
Quantitative and qualitative studies on CHWs
Studies describing factors related to intervention design
Studies conducted in LMICs
English language studies
Studies published 2007–July 2013

Data extraction and management
A data extraction form was developed from the preliminary conceptual framework. This was piloted through joint
assessment of several studies and adjustments were made to clarify categories and sub-categories of the intervention design factors assumed to influence CHW performance (Figure 1, second box from left). The data extraction form also contained a description of the intervention and study and the outcome measures.

Assessment of quality
Quality of included literature was assessed independently by two reviewers, using an adapted version of the Critical Appraisal Skills Programme (CASP) method (CASP 2010).

Data synthesis
Identification of themes was done by assessment of all data extraction forms. Descriptive analysis of the contents of all included papers was conducted per category (thematic coding). New (sub)categories deriving from the literature were added to the framework where needed.

Results
Search results and study types
We identified 7302 titles from 2007 to July 2013, of which 660 were selected for abstract reading. From these, a total of 348 full-text papers were read. Another set of 109 full-text papers derived from hand searching of reviews was read (Figure 2). In total, 150 papers were included in the broader literature review and for the purpose of the review we present in this article, 140 papers were included, as we excluded seven papers reporting on auxiliary staff and three papers only reporting on broad contextual factors or health system factors. A list of included studies and their basic characteristics can be found in Supplementary Appendix 2. A total of 45 studies were of qualitative nature, 45 studies used mixed methods research and there were 50 quantitative studies. One hundred and six studies were intervention evaluations while 34 studies did not report on an intervention.

Study respondents
Ninety-seven studies included perspectives of people involved in the CHW programme. In 83 studies, the CHWs themselves were asked for their perspectives, client perspectives were covered in 50 studies and perspectives of others (like policymakers and health workers other than CHWs) were presented in 47 studies. The studies that did not include perspectives focused either on CHWs as the object of the study or on the effects (at the impact level) of a particular intervention (partly) delivered by CHWs. The majority of these were quantitative studies.

Setting
Eighty-three studies were conducted in Africa and 55 in Asia, one was from Oceania and two included Latin America (of which one was part of a multi-country study). The studies and interventions took place in rural (majority) and urban settings. The programmes were run by either Non-Governmental Organizations (NGOs) or governments or a collaboration of both. In 100 studies, the CHWs delivered services to people in their homes and/or in the community. In 40 studies, CHWs delivered services in health facilities; in most of these (n = 28), facility-based services were combined with home or community-based services. CHWs solely working at the facility level were most often lay counsellors in the field of HIV.

CHW names
Many different names of CHWs were found. For an overview of the ones used in this article, see Table 1.

Health focus and CHW tasks
Seventy-six studies reported on CHWs with various promotional and preventive tasks in primary health care. These included studies on CHWs having a role in the identification of health conditions and referral to health facilities, for example, in the case of pregnancy. Fifty-one studies reported CHWs having a mix of promotional, preventive and curative tasks. For example, CHWs were involved in diagnosis and treatment of diseases, mainly in children below 5 years, at the community level. Ten studies reported on CHWs with solely curative tasks and three studies did not specify the nature of CHWs’ tasks. Fifty-five studies focused on maternal, neonatal or child health or a combination of these. If there was a focus on a single disease or issue, most of the times this was HIV (n = 26), malaria (n = 9), promotion of family planning (n = 7) or tuberculosis (n = 3). Eight studies focused on other specific diseases or conditions. Twenty-nine studies reported on CHWs having tasks regarding multiple diseases or health issues. A number of studies included trained TBAs assisting deliveries at the household level.

Outcomes of CHW interventions
The majority (n = 99) of the included studies reported outcomes at the level of the CHW. Fifty-six studies reported changes in
performance through measuring competencies and knowledge levels. For example, in Nepal, a significantly higher self-efficacy and knowledge level of peer educators on HIV and AIDS was measured after training (Posner et al. 2009). Assessments of quality scores per community-based distributor (CBD) providing injectable contraceptives in Madagascar demonstrated that CBDs retained information taught during training (Hoke et al. 2008). Among children treated by CHWs in Kenya, 80% of all guideline-recommended procedures were performed correctly (Rowe et al. 2007a,b). Some studies measured job satisfaction or retention (which is related to performance at the CHW programme level (Willis-Shattuck et al. 2008) as outcome measures at the CHW level. For example, CHWs in an urban setting in China who experienced a heavy workload had a low job satisfaction (Ge et al. 2011).

Forty-one studies reported on changes in performance as a result of self-reported variations in motivation or self-esteem. For example, Community-based surveillance volunteers (CBSVs) in Ghana explained that respect of the community had enhanced their motivation; they felt pride in their role as a volunteer (Dil et al. 2012). Improvement in self-esteem as a result of increased respect from the community was reported by community volunteer workers (CVWs) providing palliative home-based care in Uganda (Jack et al. 2012).

### Intervention design factors

The literature reported on various factors related to the design of the CHW interventions having an effect on CHW performance. We divided these into factors related to: nature of tasks and time spent on delivery, human resource management, quality assurance, community links, health system links and resources and logistics.

#### Nature of tasks and time spent on delivery

Several factors influencing CHW performance were related to the nature of CHW tasks and the time spent on delivery. Only seven studies reported on this, as presented in Table 2.
Four studies reported that CHWs felt more recognized by the community, enhancing their motivation, when they provided curative tasks or administered injections. For example, health surveillance assistants (HSAs) in Malawi providing curative treatment to children below 5 years, strongly indicated that this added role changed how they viewed their own position in the health system. With the new role, the community recognized them as ‘village doctors’, and they viewed themselves as more equal to clinicians. They reported helping the community and increased appreciation of the community as a result of their new curative role as motivating factors. However, a demotivating factor for some was the fact that they were not able to treat complicated cases (Callaghan-Koru et al. 2012). Smith et al. (2013) found that community health volunteers (CHVs) in Madagascar performed slightly better if they perceived that they had more responsibilities when compared to CHVs perceiving to have fewer responsibilities (Smith et al. 2013). Flexibility in tasks was discussed as a factor that could contribute to CHW retention in Uganda, although it could also lead to neglect of certain health issues within the programme (Brenner et al. 2011).

One study found a significant correlation between the time spent on each client and performance of CHWs in Zambia. The moderate to low performing CHWs corresponded to very short client contact times (Furth and Crigler 2012). Another study found a correlation between the time spent on the job and performance of CHWs working in reproductive health in Madagascar: a higher number of hours worked as a CHW per week was associated with better performance scores in relation to competencies, measured as tasks correctly undertaken for child illnesses and family planning (Smith et al. 2013).

In summary, having more curative tasks was found to increase CHW motivation and longer service delivery time and time spent on the job were associated with higher CHW performance.

**Human resource management**

The literature identified many factors related to human resource management that could influence CHW performance. We categorized them into eight broad categories: CHW characteristics, workload, clarity on CHW tasks and roles, selection and recruitment process, incentives, supervision, performance appraisal and training-related factors.

**CHW characteristics**

Performance of CHWs can be influenced by the characteristics of the CHWs that were recruited and implementing the intervention. Therefore, we considered them as potential intervention design factors (although in many studies, they were not predefined as intervention design factors). Relevant characteristics identified in the literature were: gender, education level, years of experience, personal experience with the health condition, community of origin, age, household duties, marital status, social class and wealth (Table 3). Gender of the CHWs was discussed in four studies. A study on CHWs in Kenya found that male CHWs were 1.6 times more likely to keep better records than female CHWs, while females were 58% more likely to counsel and 71% more likely to be able to convince their clients to adopt evidence-based maternal care practices than men (Crispin et al. 2012). A study on community antiretroviral therapy and tuberculosis treatment supporters (CATTS) in Uganda, using a regression model to identify characteristics of CATTS that influenced loss to follow up, found that male CATTS lost more patients for follow up than female CATTS (Alamo et al. 2012). Kebriaei and Moteghedi (2009) measured job satisfaction of ‘behvarz’ (CHWs) in Iran by conducting a cross-sectional survey and found there was no difference between males and females in job satisfaction (one of the direct determinants of CHW performance, see Figure 1).

The education level of CHWs as a possible influencing factor on CHW performance was researched in five studies. For example, higher levels of education of CHWs in Kenya were associated with good record-keeping, appropriate use of job aids and appropriately counselling clients, although lower literacy CHWs were still able to satisfy and convince their clients to adopt evidence-based maternal care practices (Crispin et al. 2012). CHVs working in reproductive health in Madagascar were performing better in correctly executing their tasks in diagnosis and treatment of childhood illnesses, reproductive health and family planning when they had more years of education (Smith et al. 2013). More years of education may lead to better performance but may also lead to a higher dropout rate. ‘Shasthya Shebikas’ in Bangladesh who dropped out of the programme were more often higher educated (Alam et al. 2012b). In Iran, no difference in job satisfaction based on education level of ‘behvarz’ was found (Kebriaei and Moteghedi 2009). More years of experience as a CHW was associated with appropriate use of job aids, client satisfaction and client enablement in Kenya (Crispin et al. 2012). However, CATTS in Uganda who had served >6 years lost more patients than CATTS who had served < 6 years (Alamo et al. 2012). In Iran, no difference in job satisfaction based on years of service of ‘behvarz’ was found (Kebriaei and Moteghedi 2009).

### Table 2 Factors related to nature of tasks and time spent on delivery

| Factor                        | Detail on influence or association                                                                 | Studies                                                                 |
|-------------------------------|----------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|
| Nature of tasks and roles     | Extended tasks (curative, injections) increased CHW’s self-reported motivation                     | Burn (2008), Callaghan-Koru et al. (2012), Hoke et al. (2008), and Sadler et al. (2011) |
|                               | Higher number of perceived responsibilities increased CHW performance                               | Smith et al. (2008), and Sadler et al. (2011)                           |
|                               | Flexibility in tasks: may lessen impact at end user or impact level but may contribute to CHW retention | Brenner et al. (2011)                                                  |
| Service delivery time         | Longer service delivery time associated with higher CHW performance                                 | Furth and Crigler (2012)                                               |
| Time spend on job             | More time spend on job per week associated with higher CHW performance                              | Smith et al. (2013)                                                   |
Three studies reported on the influence of the experience of the CHW with the health condition of their clients. For example, CVWs delivering AIDS or cancer-related palliative care in Uganda reported that having personal experience with these diseases increased compassion for the patients (Jack et al. 2012). A mixed methods study on adherence support workers (ASWs) in Zambia who were living with HIV reported that ASWs had stronger bonding with clients and hence increased client adherence (Torpey et al. 2008).

The community of origin of the CHW is another factor that could be associated with CHW performance. CHWs that came from the community that they are serving were reported to be more trusted by that community, which could influence their performance (Puet et al. 2013; Simwaka et al. 2012; Smith et al. 2007). However, in Uganda, some community members preferred CATTs that lived further away and did not visit their home because of the stigma related to HIV (Alamo et al. 2007a). In contrast to this, Alam et al. (2012b) found that single 'Shasthya Shebikas' in Bangladesh were more likely to have a higher chance of dropping out if they were married women. This was explained to be due to girls getting married and following their husbands to live somewhere else or not being allowed by their husbands to continue their work as peer supporters (Simba and Kakoko 2009). In Iran, no difference in job satisfaction was found between married and unmarried 'behvarz' (Kebriaei and Moteghedi 2009).

In India, female CBDs from upper social classes (castes) established an easy relationship with middle and higher cast women but had real problems making services accessible for women with a significantly lower social status (Abbott and Luke 2011) and Srivastava et al. (2009). CHWs in Kenya reported fewer dropouts among CHWs above the age of 40, possibly because older people had fewer household duties (Olang'o et al. 2010). Alam et al. (2012b) confirmed this assumption: 'Shasthya Shebikas' in Bangladesh who did not face problems due to household responsibilities were more than twice as likely to stay on.

Peer educators in reproductive health in Tanzania were reported to have a higher chance of dropping out if they were married women. This was explained to be due to girls getting married and following their husbands to live somewhere else or not being allowed by their husbands to continue their work as peer supporters (Simba and Kakoko 2009). In contrast to this, Alam et al. (2012b) found that single 'Shasthya Shebikas' in Bangladesh had a higher dropout rate than married peers. In Iran, no difference in job satisfaction was found between married and unmarried 'behvarz' (Kebriaei and Moteghedi 2009).

The wealth of CHWs could also influence performance. 'Shasthya Shebikas' in Bangladesh who reported to be dependent on the income they earned through their work as CHW were more active than colleagues with other jobs (Ahmed 2008; Alam et al. 2012b). Moreover, richer 'Shasthya Shebikas' more often dropped out of the programme (Alam et al. 2012a, b).
In summary, CHWs with a higher education level, CHWs having experience with the health condition they focus on, CHWs having fewer household duties and CHWs who are depending on the income gained from the CHW work were found to perform better than others. Gender, residence, age, marital status and social class of the CHW had mixed effects on CHW performance.

**Workload**

In 14 studies, a high workload was reported by CHWs, and this could result in lower motivation and ultimately lower performance (Burn 2008; Kebrjiaei and Motegeghi 2009; Perez et al. 2009; Lewis 2010; Rahman et al. 2010; Ge et al. 2011; Gusdal et al. 2011; Javanparast et al. 2011; Alamo et al. 2012; Callaghan-Koru et al. 2012; Kalyango et al. 2012; Medhanyie et al. 2012; Puchalski Ritchie et al. 2012; Kok and Muula 2013). The CHW-population ratio is a factor that can influence performance of CHWs. Several studies indicated that a small population to cover is preferable above a large population to cover regarding CHW performance (Edward et al. 2007; Suri et al. 2007; Burn 2008; Azad et al. 2010; Darmstadt et al. 2010; Sadler et al. 2011; Kalyango et al. 2012). A high number of patients to be supported by CATTs in Uganda was significantly associated with increased loss to follow up (Alamo et al. 2012).

**Clarity on CHW tasks and roles**

Few studies reported that the lack of clarity on roles amongst CHWs themselves or in the community affected CHW performance. A study on ASHAs in India found that ASHAs’ perceptions about job responsibilities were more limited than their formal job descriptions. The majority of them were not aware about their role in changing behaviour regarding infant feeding, family planning, child marriage, girl education, hand washing and sanitation. Possibly this was related to the fact that for these particular tasks, ASHAs were not paid (Srivastava et al. 2009). CBSVs in Ghana reported community-related challenges of their work, because of a lack of community understanding of the duties of a CBSV (Dil et al. 2012). In Bolivia, a lack of community understanding of the role of ‘manzaneras’ was reported to cause distrust, because district health authorities and local leaders failed to advertise ‘manzaneras’ roles in the community (Bartos et al. 2009).

CHWs gained more respect in general if they were able to prescribe drugs, but sometimes this could lead to community expectations that could not be met (Table 7). For example, in Malawi, HSAs working in community case management of childhood illnesses were asked by community members to also treat adults, which was not included in the programme (Callaghan-Koru et al. 2012). Kalyango et al. (2012) also refer to a lack of community appreciation for age restrictions, which had a negative impact on performance of CHWs in Uganda. Client demands were also a challenge in Zambia, where clients still asked for anti-malarial treatment in spite of a negative test result (Chanda et al. 2011). CHWs in Kenya working in home-based care on HIV reported that expectations of people living with HIV about CHWs delivering them goods or money were reasons for CHW dropout (Olang’o et al. 2010). CHWs in South Africa reported similar expectations of the community as a demotivating factor (Suri et al. 2007).

In summary, we found that a lack of clarity on CHW tasks and roles, especially from the side of the community, lowered motivation and performance of CHWs.

**Incentives**

Eighty-one studies presented information on incentives given to CHWs. Factors influencing CHW performance related to incentives are presented in Table 4. There were a range of different incentives, sometimes combined in packages including: financial incentives, such as fixed salaries for those CHWs that were employees of the government or an NGO, regular and irregular allowances, performance based financial incentives, income from selling services (fees) and income from selling commodities, and non-financial incentives, such as material incentives (goods, rewards), access to training, supervision and supplies, preferential treatment and community trust and respect. (Dis)satisfaction related to incentives could lead to lower or higher motivation and influence CHW performance. In 25 studies, CHWs reported that they were dissatisfied with the incentives they received, whether financial or non-financial. Sixteen studies reported CHWs’ satisfaction with incentives.

Remuneration was often reported as an important (de)motivator. However, other incentives remained important. For example, an evaluation of a CHW programme in Kenya revealed that 65% of the interviewed CHWs acknowledged that reimbursements motivated them to continue serving while others said that material incentives contributed to motivate them (38.5%) or would improve their motivation (76%). In some studies, CHWs reported to prefer financial above non-financial incentives (Rahman and Tasneem 2008; Bartos et al. 2009). ASHAs in India reported financial incentives (82%), being in a government job (67%), contributing to charity (44%) and improved self-esteem (37%) as motivating factors. The majority of ASHAs were satisfied and 44% reported to be willing to continue without incentives (Srivastava et al. 2009). HSAs in Malawi were demotivated because they had to spend...
Factors that influence performance. The authors reported that better performance, especially when compared with other greater monetary incentives did not necessarily correlate with CHWs who were paid a monetary incentive performed better than volunteer CHWs who data from this study indicated that CHWs who were paid a incentive and performance (task completion) in Zambia. The 2012). Financial incentives Financial incentives increased motivation Bartos et al. (2009), Callaghan-Koru et al. (2012), Lewis (2010), Rahman and Tasneem (2008), and Srivastava et al. (2009). Table 4 Factors related to incentives

| Factor                        | Detail on influence or association                                      | Studies                                                                 |
|-------------------------------|--------------------------------------------------------------------------|------------------------------------------------------------------------|
| Financial incentives          | Financial incentives increased motivation                                 | Bartos et al. (2009), Callaghan-Koru et al. (2012), Lewis (2010), Rahman and Tasneem (2008), and Srivastava et al. (2009) |
|                               | CHWs getting financial incentives performed better than CHWs receiving in-kind incentives | Furth and Crigler (2012)                                               |
|                               | CHW perceiving they get financial incentives performed better on guideline adherence | Rowe et al. (2007a)                                                    |
|                               | CHWs selling commodities for income faced competition: CHWs less active but no influence on retention | Alam et al. (2012a, b), Rahman and Tasneem (2008), and Winch et al. (2008) |
|                               | Performance-based incentives led to decreased performance regarding certain tasks | Scott and Shanker (2010) and Srivastava et al. (2009)                  |
|                               | Unmet promises regarding financial incentives led to demotivation        | Dil et al. (2012), Maes and Kalofonos (2013), and Yirga et al. (2010)   |
|                               | Lack of community trust: led to lower CHW motivation/performance          | Ahmed (2008), Alam et al. (2012a, b), Amare (2011), Burn (2008), Callaghan-Koru et al. (2012), Chibanda et al. (2011), Das et al. (2008), Dawson et al. (2008), Dil et al. (2012), Furth and Crigler (2012), Hill et al. (2008), Jack et al. (2012), Javanparast et al. (2011), Kalyango et al. (2012), Kim et al. (2012b), Lewis (2010), Maes and Kalofonos (2013), McPherson et al. (2010), Mutalemwa et al. (2009), Nyanzi et al. (2007), Osaka et al. (2010), Rahman and Tasneem (2008), Razee et al. (2012), Rowe et al. (2007a), Sahay and Mehdendale (2011), Saleem et al. (2007), Saravananan et al. (2011), Scott and Shanker (2010), Smith et al. (2013), Srivastava et al. (2009), Takasugi and Lee (2012), Teela et al. (2009), and Yirga et al. (2010). |
| Non-financial incentives      | Community trust, respect and recognition: enhanced motivation/self-esteem/retention/self-assessed performance/adherence to guidelines | Behdjat et al. (2009), Burn (2008), Callaghan-Koru et al. (2012), Dil et al. (2012), Elmardi et al. (2009), Furth and Crigler (2012), Gudsal et al. (2011), Jack et al. (2012), Javanparast et al. (2011), Mukherjee and Eustache (2007), Nyanzi et al. (2007), Rahman and Tasneem (2008), Rahman et al. (2010), Root and van Wyngaard (2011), Rowe et al. (2007a), Sanjana et al. (2009), Schneider et al. (2008), Simba and Kakoko (2009), Simwaka et al. (2012), Smith et al. (2013), Srivastava et al. (2009), and Takasugi and Lee (2012). |
|                               | Lack of community trust: led to lower CHW motivation/performance          | Bartos et al. (2009), Dick et al. (2007), Moctlo et al. (2011), Nyanzi et al. (2007), and Schneider et al. (2008) |
|                               | Willingness to help reported as motivating factor/increasing self-esteem  | Behdjat et al. (2009), Burn (2008), Callaghan-Koru et al. (2012), Dil et al. (2012), Elmardi et al. (2009), Furth and Crigler (2012), Gudsal et al. (2011), Jack et al. (2012), Javanparast et al. (2011), Mukherjee and Eustache (2007), Nyanzi et al. (2007), Rahman and Tasneem (2008), Rahman et al. (2010), Root and van Wyngaard (2011), Rowe et al. (2007a), Sanjana et al. (2009), Schneider et al. (2008), Simba and Kakoko (2009), Simwaka et al. (2012), Smith et al. (2013), Srivastava et al. (2009), and Takasugi and Lee (2012). |
|                               | Personal development/knowledge gain reported as incentive                | Alam et al. (2012b), Bartos et al. (2009), Burn (2008), Callaghan-Koru et al. (2012), Dick et al. (2007), Dil et al. (2012), Lewis (2010), Peltzer et al. (2010), Rahman et al. (2010), Root and van Wyngaard (2011), Schneider et al. (2008), Simba and Kakoko (2009), and Takasugi and Lee (2012) |
|                               | Preferential treatment reported as incentive                               | Alam et al. (2012), Rahman and Tasneem (2008), and Takasugi and Lee (2012) |
|                               | Hope for future employment reported as incentive                          | Bartos et al. (2009), Rahman et al. (2010), Schneider et al. (2008), and Simba and Kakoko (2009) |
|                               | Having a government job reported as incentive                              | Srivastava et al. (2009)                                               |
|                               | Career advancement                                                        | Burn (2008) Furth and Crigler (2012), Kebriaei and Moteghedi (2009), Kok and Muula (2013), and Rahman et al. (2010) |

their own money to run village clinics (Callaghan-Koru et al. 2012).

Furth and Crigler (2012) researched the correlation between incentives and performance (task completion) in Zambia. The data from this study indicated that CHWs who were paid a monetary incentive performed better than volunteer CHWs who received only gifts in kind. However, the data also showed that greater monetary incentives did not necessarily correlate with better performance, especially when compared with other factors that influence performance. The authors reported that little consideration was given to incentives relative to workload or time commitment. CHWs in child health in Kenya were performing better in their consultations with children and had a higher adherence to guidelines when they thought that they received four to five benefits (including making money) than those that thought they received fewer than four benefits (Rowe et al. 2007a).

‘Shasthya Shebikas’ in Bangladesh earn some income with providing certain health services and selling of commodities. Those who reported competition with others (pharmacies,
village doctors, TBAs) were reported to be less likely to be active (Alam et al. 2012a) but competition was not an important predictor of retention (Alam et al. 2012b). CHWs in Mali who obtained income by selling drugs had to compete with informal vendors that sold drugs in smaller, cheaper quantities (Winch et al. 2008).

Two studies reported on a negative side of performance-based payments of ASHAs in India. ASHAs could earn money for bringing people to the clinic and helping with biomedical interventions. They could not earn money for encouraging village health meetings nor discussing health issues on social change more generally, although this was part of their role. This resulted in an over-focus on paid tasks (Srivastava et al. 2009; Scott and Shanker 2010).

In three studies, CHWs reported to be demotivated because of unmet promises regarding allowances or stipends (Yirga et al. 2010; Dil et al. 2012; Maes and Kalofonos 2013).

In 34 studies, CHWs reported that trust and respect from the community was an important non-financial incentive enhancing their motivation. We present these incentives, as they are potentially related to intervention design. Social rewards included more greetings, more honor and more participation in decision making. This social prestige might be a stronger factor in rural settings, because of the existence of more stable communities with stronger social fabric (compared to more unstable urban slum communities; Alam et al. 2012a). In some cases, social rewards were culturally determined. An example is that the greatest social reward many TBAs in Gambia appreciated was the recognition given at the naming ceremony when they participated in shaving the baby’s head and carrying it to the elders for prayers (Nyanzi et al. 2007). An example of how respect by the community could enhance CHW’s status was reported in a study by Jack et al. (2012, p. 757) on CVWs involved in palliative care in Uganda, where one of the volunteers said: ‘I was selected to be vice chairperson in the village’. Alam et al. (2012b) reported that social prestige and community approval were correlated with CHW retention. CHWs who reported to enjoy more social prestige were more than three times as likely to remain. A cross-sectional study on Care Facilitators (CFs) working in HIV home-based care in Zimbabwe found that the more the communities accepted, appreciated and supported the CFs in their activities, the more CFs were motivated to perform (Osawa et al. 2010). Rowe et al. (2007) found that CHWs working in child health in Kenya showed better guideline adherence when they reported to receive respect from the community. In Ethiopia, perceived good performance of CDDs by the population was associated with increased compliance. The authors discussed that insufficient knowledge of CDDs might hamper the acceptability of the CDD in the community (Yirga et al. 2010).

There were some examples in the literature of community distrust. For example, ‘manzaneras’ in Bolivia were reported to occasionally being afraid to conduct home visits, because community members unfairly spread rumours of ‘manzaneras’ eating the food instead of providing it to the little children (Bartos et al. 2009). LHWs working on farms in South Africa were sometimes criticized by the community because they had a better relationship with the farmer (the employer) and nurses than community members, because of their job (Dick et al. 2007).

In several studies, CHWs reported their willingness to help and care for other people as an incentive that enhanced their motivation. For example, CBSVs in Ghana reported that altruism towards the community was a vital factor to take on and remain in the role as CBSV. Moreover, seeing the health and education of the community improve also emerged as a motivator (Dil et al. 2012). In Zambia, CHVs overwhelmingly felt happy to be able to help their communities (92% of CHVs working in child health and 95% of CHVs working in reproductive health; Smith et al. 2013). In Uganda, CVWs in palliative care reported that the reason for becoming a volunteer stemmed from traditional values of wanting to help other people (Jack et al. 2012).

In various studies, CHWs reported that personal development or knowledge gain served as an incentive. Perceived access to skills and knowledge of ‘Shasthya Shebikas’ was important for retention in rural areas of Bangladesh, but was not a driving factor among urban ‘Shasthya Shebikas’ (Alam et al. 2012b). CHWs in South Africa reported that although being CHW was not held in high esteem, one motivator was the development of a professional identity, especially for those working as counsellors, and they desired to advance in that role (Schneider et al. 2008).

Some studies referred to preferential treatment as an incentive for CHWs. For example, Alamo et al. (2012) reported that the non-financial benefits, like free care and treatment and school fees support that CATTs in Uganda received, contributed to the high retention of CATTs (Alamo et al. 2012). ‘Shasthya Shebikas’ in Bangladesh reported that they would prefer to get a salary, but they also expected other incentives, like preferential access to loans (Rahman and Tasneem 2008).

In four studies, CHWs reported that their CHW job would result in future other employment and this was a motivating factor. For example, ASHAs in India reported that the second most important motivating factor after gaining money (82%) was having a government job (67%; Srivastava et al. 2009).

In a few studies, CHWs reported to be demotivated because of a lack of career advancement. For example in Zambia, opportunities for advancement were strongly correlated with higher levels of engagement (defined as satisfaction plus motivation) of CHWs, but there was no correlation found between engagement and CHW performance (Furth and Crigler 2012). CHWs in Bangladesh reported no promotion opportunities as being a reason for leaving the project, although it was reported that CHWs had the opportunity to become a supervisor based on exemplary performance (Rahman et al. 2010).

In summary, many studies reported that both financial and non-financial incentives, including career advancement, increased motivation and performance of CHWs.

**Supervision**

In a total of 80 studies, it was stated that a supervision structure was available, but most of them were lacking information on its precise structure and its implementation. The review identified a few aspects of supervision being related to CHW performance: whether the CHW programme setup...
involved any form of supervision and the frequency and location of supervision (Table 5).

Community reproductive health workers (CRHWs) in Uganda found supervision increased credibility and recognition, it made them feel part of the team (Martinez et al. 2008). The ways in which supervision was motivating or demotivating CRHWs was sometimes associated with the skills and attitude of supervisors. Community home-based care workers in South Africa reported problems with supervisors, such as lack of management skills (40%) and ‘selfishness’ (38%) Moetlo et al. 2011. CBSWs in Ghana felt demotivated by the supervision they received: ‘They (current supervisors) seem to forget that the work is a voluntary one and as such we should be treated well and encouraged’. The CBSWs identified the need for good quality supervision to increase retention: ‘Even if there is no money in it you would feel that you are being supervised and that would motivate you to do the work well’ (Hill et al. 2008, p. 43).

The studies showed a variety in frequency of supervision. There were two studies that researched the effect of frequency of supervision on CHW performance. One study showed that a lower frequency of supervision resulted in lower performance of CHWs in Madagascar (Smith et al. 2013) while another study in Kenya found no effect of frequency of supervision on CHW guideline adherence (Rowe et al. 2007a).

Only one study referred to the location of supervision. In rural Zambia, supervision in the health centre was not appreciated by CHWs as they felt they missed out on providing care to their own village (Chanda et al. 2011).

In summary, many studies reported supervision to be important to increase CHW performance, although details of the supervision structure and its implementation contributing to success were scarce. CHWs who perceived their supervision as insufficient often reported to be demotivated.

### Performance appraisal

Fifteen studies reported on performance appraisal systems. Some of them reported certification after skills assessments (Hoke et al. 2008; Sanjana et al. 2009; Shankar et al. 2009; Root and van Wyngaard 2011; Javanparast et al. 2012). Only one study researched how appraisal influenced CHW performance; Furth and Crigler (2012) found that organizations with stronger performance appraisal systems were more likely to have more engaged CHWs. However, there was no correlation between engagement and performance.

### Training-related factors

A total of 113 studies reported that the CHWs had received initial training. Forty-seven studies reported on the availability of refresher trainings. However, only 18 studies investigated the association between training and CHW performance (see Table 6).

CHWs reported that training increased motivation and some studies linked training to CHW knowledge and performance. An 8-day training course for TBAs in Pakistan found that TBAs in the intervention arm showed better performance than untrained TBAs (Miller et al. 2012). Saravanan et al. (2011) found that despite training of TBAs, lifesaving practices for mothers and babies were not followed in India. ‘Behvarz’ in Iran reported that the pre-service training had a positive impact on their capacity to provide health care services and to build their confidence and skills in communicating with rural people. The friendly environment of the training centres, the nature of the trainer-trainee relationships and the highly qualified trainers were particularly noted as having a positive impact on the learning process and motivation. Other ‘behvarz’ complained about quality and timing of the training, the infrequency of courses, inadequate qualified trainers who were unfamiliar with the ‘behvarz’ working environment, the lack of practical sessions and lack of adaptation of training materials to the local context (Javanparast et al. 2012).

Training was sometimes seen as an income-generating activity by CHWs. CHWs in Malawi and Kenya reported favouritism in selecting CHWs for trainings as a demotivating factor (Olang’o et al. 2010; Kok and Muula 2013). In Zambia, trained TBAs were less likely than non-trained TBAs to attend a delivery without payment (40 vs 49%) and more likely to be paid in cash (55 vs 43%). Mothers were more likely to choose an intervention TBA above a control TBA and higher compensations were paid to intervention TBAs (Gill et al. 2011).

Several studies reported on a possible positive influence of continuous training on CHW job satisfaction and motivation (Lewis 2010; Ge et al. 2011). Smith et al. (2013) found a clear correlation between receiving refresher training and performance (the ability to assess, classify, treat, or refer appropriately as required by guidelines) of CHVs in Madagascar (Smith et al. 2013). No association between the frequency of refresher trainings and CHWs’ guideline adherence was found in Kenya (Rowe et al. 2007a).

One study reported that the participatory way of developing training materials was crucial for the success of the CHW

### Table 5 Factors related to supervision

| Availability of supervision | Lack of supervision decreased motivation | Callaghan-Koru et al. (2012, 2013), Gusdal et al. (2011), Hill et al. (2008), Javanparast et al. (2011), Kok and Muula (2013), Moetlo et al. (2011), Nsabagasani et al. (2007), Perez et al. (2009), and Suri et al. (2007). |
| Frequency of supervision | Frequency of supervision was not correlated with guideline adherence in one study, in another study it increased CHW performance | Amare (2011), Lewis (2010), Martinez et al. (2008), Puett et al. (2013), and Simuwaka et al. (2012). |
| Location of supervision | Facility-based supervision hindered CHW’s work | Rowe et al. (2007a) and Smith et al. (2013). |
| Supervision increased motivation | |
| |

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**Table 6 Factors influencing CHW performance**

- **Supervision**
  - Callaghan-Koru et al. (2012, 2013), Gusdal et al. (2011), Hill et al. (2008), Javanparast et al. (2011), Kok and Muula (2013), Moetlo et al. (2011), Nsabagasani et al. (2007), Perez et al. (2009), and Suri et al. (2007).
  - Amare (2011), Lewis (2010), Martinez et al. (2008), Puett et al. (2013), and Simuwaka et al. (2012).
- **Frequency of supervision**
  - Rowe et al. (2007a) and Smith et al. (2013).
- **Location of supervision**
  - Chanda et al. (2011).
as protocols and guidelines and monitoring and evaluation. The literature identified factors related to quality assurance that motivated, job satisfaction and performance. HIV in Uganda (Dambisya and Matinhure 2012).

Facilitating factors for task shifting towards CHWs working in reported by various stakeholders within the health system as anchors included churches, mosques, ‘idirs’ (burial associations) and women’s associations (Amare 2011). In another study from Ethiopia, community members participated in the construction of health posts (where HEWs are working; Teklehaimanot et al. 2007). In Mozambique, a community-based vital registration and health information system project for routine surveillance of births, deaths and childhood illnesses was instituted using a network of 2300 volunteers. Community structures played a role in supporting volunteers (Edward et al. 2007). In Guinea, involvement of religious leaders in VHCs was crucial for acceptance of the work by CBDs. The VHCs acted as the health services’ local liaison, informing villagers of clinic dates, seeking those lost to follow-up and encouraging men and women to attend health education activities (Dikaite and Keita 2009).

Puchalski Ritchi et al. (2012) reported that HSAs in Malawi were supported by guardians (who were relatives or friends). The task of guardians was to directly observe the patients taking their TB medication on a daily basis. Good guardians were acknowledged to improve patient adherence if they functioned as planned. However, some guardians were ineffective because they lived too far away from the patients and intervention (health promotion by Lady Health Workers in Pakistan; Omer et al. 2008).

In summary, training was found to positively influence CHW motivation, job satisfaction and performance.

**Quality assurance**
The literature identified factors related to quality assurance that could influence CHW performance. We have categorized them as protocols and guidelines and monitoring and evaluation.

| Factor                          | Detail on influence or association                                                                 | Studies                                                                                                                                 |
|---------------------------------|------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| Training in general             | Training enhancing CHW motivation                                                                   | Alamo et al. (2012), Dil et al. (2012), Javanparast et al. (2012), and Simwaka et al. (2012)                                         |
|                                 | Training generally resulting in expanded CHW knowledge/performance                                     | Gill et al. (2011), Hamer et al. (2012), Hien le et al. (2008), Javanparast et al. (2012), Miller et al. (2012), Puett et al. (2013), and Saravana et al. (2011) |
|                                 | Training linked to allowances and favouritism leading to demotivation                                | Kok and Muula (2013) and Olang’o et al. (2010)                                                                                       |
| Continuous training             | Continuous training increasing job satisfaction/motivation                                           | Ge et al. (2011) and Lewis (2010)                                                                                                 |
|                                 | Continuous training increasing CHW performance                                                      | Smith et al. (2013)                                                                                                                 |
|                                 | Frequency refresher training no effect on guideline adherence                                         | Rowe et al. (2007a)                                                                                                                  |
| Development of training materials | CHW participation in development training materials increased sense of ownership                   | Omer et al. (2008)                                                                                                                  |

**Protocols and guidelines**
Four studies reported on the use of protocols and guidelines and how their use could affect CHW performance (Rowe et al. 2007a; Dambsiya and Matinhure 2012; Javanparast et al. 2012; Kalyango et al. 2012). For example, standard operating procedures and institutional and programmatic guidelines were reported by various stakeholders within the health system as facilitating factors for task shifting towards CHWs working in HIV in Uganda (Dambsiya and Matinhure 2012).

**Monitoring and evaluation**
In 49 of the included studies, a monitoring and evaluation system was reported to be in place. Six studies reported on community monitoring, mainly by village health committees (VHCs). Two studies made a reference to CHW performance (Table 7). The engagement of pregnant women in the assessment of community facilitators in Indonesia provided social accountability and empowered the women to expect good quality services from the CHWs. Moreover, the authors assumed that the awareness that the community facilitators would be evaluated by the pregnant women they served provided an additional incentive to actively engage the target population and created good relationships (Shankar et al. 2009). Community medicine distributors (CMDs) in Uganda reported that community support in the form of feedback and rewards had a greater influence on their performance than that from the health system (Kalyango et al. 2012).

**Community links**
The role of communities in selection and community expectations, described under Human Resource Management, and the role of communities in monitoring, described under Quality Assurance, were found to influence CHW performance. In addition, community support can have a bearing on CHW performance. All factors related to community links are summarized in Table 7.

There are different ways in which communities can support the work of CHWs. Community members, including village doctors, referred cases of severe acute malnutrition to CHWs in Bangladesh (Sadler et al. 2011). In Ethiopia, community support for voluntary CHWs was strengthened by mobilizing various local institutions to serve as ‘community anchors’. Community anchors were raising community recognition for and acceptance of voluntary CHWs, supporting their goals and activities, and sustaining their motivation levels. The local institutions that the project had mobilized as community anchors included churches, mosques, ‘idirs’ (burial associations) and women’s associations (Amare 2011). In another study from Ethiopia, community members participated in the construction of health posts (where HEWs are working; Teklehaimanot et al. 2007). In Mozambique, a community-based vital registration and health information system project for routine surveillance of births, deaths and childhood illnesses was instituted using a network of 2300 volunteers. Community structures played a role in supporting volunteers (Edward et al. 2007). In Guinea, involvement of religious leaders in VHCs was crucial for acceptance of the work by CBDs. The VHCs acted as the health services’ local liaison, informing villagers of clinic dates, seeking those lost to follow-up and encouraging men and women to attend health education activities (Dikaite and Keita 2009).

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only acted when the client was sick or because of conflicting advice in case of multiple guardians. Peer educators in reproductive health in Tanzania had stopped because of lack of support from village leaders (Simba and Kakoko, 2009).

In summary, community support and its involvement in CHW selection and monitoring generally resulted in higher CHW motivation and performance.

**Health system links**

CHW’s links or ‘embedding’ in the health system is an often-stated factor in the literature, which could influence CHW performance. We found evidence on relationships of CHWs with other health staff (which could in turn influence CHW’s access to equipment, supplies and functional referral) and communication and co-ordination between them (Table 8).

Attitudes of other health staff had a major effect on how the CHWs felt and performed. In Malawi, clinicians were reluctant to give drugs to HSAs which hindered their performance, because of lack of drugs at the health centre or the fact that they were not aware of the program (of HSAs administering drugs; Callaghan-Koru et al., 2012, 2013). In Bolivia, some ‘manzaneras’ had conflicts with medical personnel and this led to feelings of inadequacy and inferiority. Some claimed that doctors did not value their work and would request more of them than they were able to provide (Bartos et al., 2009). CBSVs in Kenya were proud of their job and said they gained respect and recognition from the community, elders and district health staff, leading to motivation (Dil et al., 2012). CFs in Zimbabwe felt motivated by organizational characteristics like managerial support, but their performance was not influenced by organizational characteristics (Osawa et al., 2010).

Improved communication between CHWs and clinical staff by an m-health intervention in Uganda (Chang et al., 2011) and improved co-ordination between maternal health workers and other tiers of the system in Myanmar (Teela et al., 2009) were reported by CHWs as improving quality of care. A study on different types of CHWs in Mozambique discussed that the formation of community health teams (CHTs), in which different types of CHWs were working together, enhanced accountability towards the health system as well as the community. Each member had to report to the team leader and the rest of the team on activities and results. CHT members discussed difficult cases together and worked with community leaders to find solutions for problems encountered. Areas previously not reached were now reached, because of improved co-ordination (Simon et al., 2009).

In summary, we found that recognition of formal health staff increased CHW motivation and good communication and co-ordination structures increased CHW performance.

**Resources and logistics**

For resources and logistics, we found some evidence on job aids, transport and supplies influencing CHW performance.

Several studies reported on the use of job aids by CHWs; these were mostly simple tools used to support in (treatment) decision making (Rowe et al., 2007a; Sadler et al., 2011; Gill et al., 2012; Hamer et al., 2012; Javanparast et al., 2012; Lemay et al., 2012). CHWs in Malawi using Short Message Service (SMS) to ask medical questions, drug adverse effects and dosage amounts reported that their participation in the SMS network resulted in recognition and improved status among their clients and communities (Lemay et al., 2012). Simplicity of a treatment algorithm and clarity of a treatment chart provided clear guidance to CHWs working in child health in Zambia (Hamer et al., 2012). Simplicity of treatment algorithms was also mentioned as a contributor to success of CHWs interventions by Gill et al. (2012) and Sadler et al. (2011). However, in Iran, some younger and higher educated ‘behvarz’ reported that centrally produced step-by-step guidelines were too didactic and constrained participatory learning. There are too many step-by-step guidelines and instructions that we have to follow, we are not given a chance to search, to think and to analyze things’ (Javanparast et al., 2012, p. 6). Rowe et al. (2007a) researched the effect of the use of job aids by CHWs working in child health in Kenya and found that the use of a treatment card (reminding the CHW how to prescribe drugs) was associated with better overall guideline adherence, but the use of a flipchart job aid during consultations was not associated with better guideline adherence.
Lack of bicycles and having to pay for transport were often reported by CHWs as a factor limiting their work performance. Lack of supplies, such as drugs and education materials, were often reported to hinder CHW performance, while transport constraints and lack of supplies resulted in not being able to conduct the job. Several studies reported that CHWs were less motivated because of lack of supplies, such as drugs and education materials (Suri et al. 2007; Perez et al. 2009; Simba and Kakoko 2009; Moetlo et al. 2011; Callaghan-Koru et al. 2012; Dil et al. 2012; Kalyango et al. 2012; Takasugi and Lee 2012; Kok and Muula 2013). In some cases, lack of supplies resulted in not being able to conduct the job (Furth and Crigler 2012; Kalyango et al. 2012). However, Osawa et al. (2010) found no correlation between supplies and motivational outcome of CFs in Zimbabwe and in Kenya, no correlation was found between adequacy of medicine supplies in the village and CFs motivation (Sanaa 2010a).

In summary, job aids were often reported to facilitate CHW performance, while transport constraints and lack of supplies were often reported to hinder CHW performance.

**Discussion**

Based on the evidence found in this review, we created a more detailed conceptual framework (see Figure 3, second box from left). Besides intervention design factors, broad contextual factors and health system factors also influence CHW performance and are often either unchangeable by an intervention or preconditions for the functioning of interventions (results will be published elsewhere).

Our findings indicate that variations in the design of CHW programmes have a significant influence on CHW performance. The most prominent factors related to higher CHW performance were inclusion of curative tasks in CHWs’ job description; longer service delivery times; certain characteristics of CHWs such as higher education level, experience with health conditions to be dealt with, fewer household duties and lower wealth; financial and non-financial incentives; availability of supervision; training; community support, selection and monitoring; and recognition by and co-ordination and communication with other health staff. (Perceived) absence or poor quality of these factors could lead to lower CHW performance. Other factors that were often reported as barriers to CHW performance were high workload; lack of clarity on CHW roles and lack of resources and logistics. These intervention design factors form a complex web, influence each other and are highly context dependent.

CHW characteristics like gender, age, marital status, social status, past experience and selection of CHWs from within the community they serve may have an influence on CHW performance, although our review shows a mixed picture on the influence of these factors. Previous studies found that CHW retention rates are higher in programmes which selected CHWs based on past performance (Malarcher et al. 2011) and CHWs who are trusted members of the community better reflect the linguistic and cultural diversity of the population served (Bhutta et al. 2010; Campbell and Scott 2011; Glenton et al. 2013). These characteristics should be taken into account when developing selection criteria for CHW programmes and they are task and context specific. For example, one study on CHWs working in HIV care found clients to prefer CHWs from outside the community, because of stigma.

While we found community involvement in selection to be a motivating factor in some contexts, there was also a need to balance selection by the community with input from administrators, leaders or health workers (Campbell and Scott 2011) to guarantee CHWs have both the necessary skills and represent different groups (Atkinson et al. 2011). Selection with involvement of the community and the community could also improve linkages of CHWs with both sides.

Multiple layers of inner and external factors contribute to individual motivation of CHWs. Clarity of roles (Nkonki et al. 2011), balance of curative and promotive tasks (Standing and Chowdhury 2008), recognition, workload and the ability to meet community expectations all contribute (Hermann et al. 2009; Nkonki et al. 2011; Glenton et al. 2013). Community trust and recognition was an often reported motivating factor for CHWs. Factors in the intervention design, like facilitation of support of traditional leaders or regular community meetings, could enhance community trust and respect towards CHWs and thereby CHW motivation.

While financial incentives increased performance of CHWs when compared with CHWs not receiving financial incentives, these should be predictable (Glenton et al. 2013). Non-financial incentives were also found to be important (Bhattacharyya et al. 2001; Lehmann and Sanders 2007; Prasad and Muraleedharan 2007; Bhutta et al. 2010) and mixing different types of incentives could be an effective strategy. The 1 million CHW campaign emphasizes that the optimal design of CHW programmes should involve full-time paid CHWs combined with a volunteer part-time community health workforce.
Our findings and those of others (Willis-Shattuck et al. 2008; Hermann et al. 2009; Wringe et al. 2010; Campbell and Scott 2011) support remuneration of CHWs, especially when they have multiple tasks or tasks that require a long service delivery time or time spent on the job per week and when remuneration is clearly linked to workload. This needs to be designed in a way that is sustainable and avoids conflicts between cadres (Mukherjee and Eustache 2007).

Our review points towards a positive effect of regular supervision from the health system on CHW performance, with problem-solving supervision being the most desired. In contrast, a Cochrane review concluded that it is uncertain whether supervision (of health workers in LMICs) is effective in the long term (Bosch-Capblanch et al. 2011). We found very little description of the exact mechanisms of supervision that contributed to success, such as type of supervisor, frequency of supervision and support to supervisors. In some studies, supervision was done in the context of the pilot intervention or research project conducted by a combination of research and NGO staff. In others, this was unclear. Some studies reported on the number of CHWs supervised per supervisor, but none measured the effects of different supervisor to CHW ratios on performance. Studies mentioning the use of mobile phones in supervision (Arem et al. 2011; Cornman et al. 2011; Jack et al. 2012) did not report a clear influence on CHW performance. Our review revealed that supervision has a number of indirect effects on motivation, retention, skills development and community recognition, supporting data from elsewhere that inadequate supervision may result in lack of legitimacy of CHWs in the eyes of the community (Atkinson et al. 2011).

Our review showed a positive effect of regular continuous education on CHW performance, but again, aspects of training that contributed to success were often not identified. Only one study reported that a friendly environment in training centres, a good trainer–trainee relationship and high quality trainers contributed to higher motivation of trainees. Many studies reported on trainings offering classroom theory sessions combined with practical exercises and more participatory sessions, but no study researched the influence of different training approaches on CHW performance. No evidence was found on effects of the length of training on CHW performance. Atkinson et al. (2011) discussed that CHWs who receive only short training may lack legitimacy from the community. Glenton et al. (2013) found that training should include counselling and communication skills. In addition to this, training on confidentiality is important to overcome community concerns about stigmatization. These additions to training would more closely reflect the expected but often unwritten tasks of CHWs than the often medical oriented training that is currently offered. Finally, we found no evidence on the linking of training to supervision or follow-up refresher trainings, strategies that are often used when creating a community of practice that may strengthen learning and support.

The literature clearly revealed the importance of embedment of CHWs in both their community and the health system. Community selection, monitoring and support were contributing to CHW motivation. While the importance of community involvement has been identified by other studies (Campbell and Scott 2011; ERTI 2012; Glenton et al. 2013), the exact mechanisms of how this can improve performance of CHWs has not been explored in depth in the literature (Green 2011); our review confirmed this. Links with the health system were reported as important by CHWs, as recognition of and communication and co-ordination with other health professionals and supervision from the health system increased credibility. Other reviews have
stressed this point as well (Rosato et al. 2008; Byrne and Morgan 2011; Glenton et al. 2013).

The unique position of CHWs in-between the community and the health system can result in a delicate balancing act, as CHWs are accountable to both. This could sometimes lead to a burden to the CHW. Clarity on the roles of CHWs, supervisors linked to the health system and committees at village level supporting the CHW and introducing clear processes for communication between these three parties in the intervention design could reduce this burden.

Many studies included in this review used motivation as an outcome measure, which could ultimately influence CHW performance, as presented in our conceptual framework. However, higher motivation and greater job satisfaction do not necessarily result in higher performance. For example, we found that performance-based incentives could be satisfactory for CHWs, but could lead to ignoring certain tasks which were not paid. Some studies investigated the influence of certain intervention design factors on other outcome measures, such as CHW competencies and adherence to guidelines. These outcome measures are important characteristics of CHW performance besides the often researched motivation, and should, therefore, be more often included in future research.

The recent trend of expanding CHW programmes in LMICs confirms the need for more research on factors having the potential to improve CHW performance. Beside the lack of evidence on mechanisms and specific aspects that could improve CHW performance related to supervision and training, we did also not find evidence on the influence of other factors associated with improving CHW performance (derived from initial reading of selected international literature), such as the use of guidelines and protocols, performance appraisal, specific aspects of monitoring and evaluation systems related to the health system, experience sharing visits, career advancement and the functionality of referral systems. Significant challenges remain for policymakers in using evidence to design programmes. Teasing out the exact impact of altering one factor over another may not be possible and no data exist on the impact of intervention bundles or the cost implications in most contexts.

Our review adds value to the current literature, as it included both qualitative and quantitative studies and was able to explore perceptions as well as measurements of characteristics of CHW performance. A limitation of our review is that factors influencing performance were often stated (to be important), but were rarely described in detail. Effectiveness trials are seldom linked with qualitative studies. The same is true for some less rigorous quantitative studies which were included in this review. Qualitative studies should be run alongside quantitative studies to generate insight into why an intervention was successful or not (Bhattacharyya et al. 2011; Glenton et al. 2013). The literature clearly shows the diversity of CHWs in LMICs. However, many studies do not clarify specific characteristics of CHWs, which hinders our understanding on how to increase CHW performance. A general vocabulary related to different types of CHWs could assist in making more nuanced recommendations. Furthermore, we might have missed relevant studies because of the delimiters of our search strategy.

Conclusion

CHWs increasingly are made a formal part of health systems in LMICs, with expanding tasks. Although their contribution towards achieving health goals has been shown in various programmes, there is little evidence on which specific factors have contributed to success. This systematic review found many factors related to intervention design that could influence CHW performance. These factors should be taken into account by policymakers during the development and adjusting of CHW programmes, taking the specific context of the situation in which programmes are implemented into account.

Supplementary Data

Supplementary data are available at HEAPOL online

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Conflict of interest

None declared.

Endnote

1 The Glenton review took place just before we started the review and was not yet published. The team shared the studies they included so that these could be taken out of our review.

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