MISCELLANEOUS PAPERS

EFFECTIVENESS OF COMMUNITY HEALTH WORKERS (CHWS) IN THE PROVISION OF BASIC PREVENTIVE AND CURATIVE MATERNAL, NEWBORN AND CHILD HEALTH (MNCH) INTERVENTIONS: A SYSTEMATIC REVIEW

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Abstract

Due to a shortage of health workers, many low income countries rely on community health workers (CHWs) for the provision of a wide range of primary health care services, both curative and preventive, including maternal newborn and child health (MNCH) interventions. Several systematic reviews have analysed the contribution of CHWs although none has specifically focused on their role in relation to MNCH. This review was designed to find evidence of the effectiveness of CHWs in providing basic preventive and curative MNCH interventions, and to identify the factors that are crucial to their performance.

It was restricted to articles published from 1998-2008 in the English language. It included studies with qualitative and quantitative designs. Six electronic databases were searched and data was extracted using a pretested data extraction form designed basing on the Centre for Reviews and Dissemination (CRD) guidelines (2008). A narrative synthesis approach was used. The quality of included studies was assessed using pretested validity assessment tools and the applicability of interventions was evaluated using the RE-AIM framework. After the filtering, 14 studies were critically appraised, and the majority (12/14) demonstrated that CHWs were effective at reducing neonatal/child mortality rates; promoting breastfeeding practices; increasing sulfadoxine-pyrimethamine (SP) coverage for intermittent preventive treatment of malaria in pregnancy (IPTp); they provided depot medroxy-progesterone acetate (DMPA) injections as safely as qualified staff; and treated malaria in children effectively, thereby reducing workload of health professionals at peripheral health facilities. Crucial factors to their performance included training, remuneration, inadequate medical supplies, and lack of career development structure.

The review shows that CHWs can be effective at providing basic curative and preventive MNCH interventions. Developing country health systems can make use of this available resource to increase access of MNCH interventions.

Key words: Community health workers, maternal health, child health, effectiveness, systematic review.

Introduction

The use of community health workers (CHWs) has been in existence for quite a long time, but became more pronounced after the Alma Ata Declaration of 1978, with many lively and mushrooming programmes of CHWs throughout the 1980s (Lehmann and Sanders, 2007). However, it declined during the 1990s due to poor programme management, policy shifts and inadequate demonstrated evidence of their contribution and effectiveness (Gilson et al, 1989).

More recently this practice has been revitalised in some developing countries due to the increased disease burden created by HIV/AIDS, and has been identified as one of the strategies to address the crisis of shortage of skilled health professionals (JLI, 2004; WHO, 2006). It is also argued that the increasing recognition of lay people participating in their own health agenda instead of being viewed as passive recipients, which is upheld as an ethical requirement for public health and health care interventions (Jennings et al, 2003) has also contributed to the re-emerging interest in CHWs programmes.

Although CHWs evolved with community based health care programmes, and were strengthened by the PHC approach after Alma Ata, the understanding of the concept and the subsequent use of CHWs have tended to vary across countries and organisations, being influenced by the economic capacity and aspirations of those engaging them (Mburu, 1994). In some places, CHWs have mainly been engaged with a focus on community development approaches by trying to bridge the gap between communities and formal health services. They have been seen to play a vital role as advocates for social change. In some others, they have predominantly played a technical and community management role, including the management of specific cases with various illnesses.

Rationale for the Study

The literature demonstrates CHWS as having impact on communities in the areas of social mobilisation, building of trust, morbidity and mortality (Bhattacharyya et al, 2001; Lewin et al, 2005; Winch et al, 2005; Lehmann and Sanders, 2007) although some of these have been difficult to quantify. Most studies have tended to focus on the use of CHWs in preventive and curative health services for the general population. The need for conducting this review was arrived at after confirming that the most recent literature from the nine systematic reviews had taken on a very broad scope when trying to determine what CHWs are, what they do, and what has been the impact of their interventions in the general population, in both low and high income countries.

None of the systematic reviews focused specifically on the effectiveness of CHWs in provision of maternal, newborn and child health (MNCH) interventions as a continuum of care. The few that tried to include maternal or child health interventions, included quite insufficient evaluation studies, thus making valid conclusions from them unrealistic. An absence of a systematic review considering exclusively CHWs and MNCH interventions, coupled with the desire of wanting to compare the much talked about criticisms of CHWs against the current evidence of their practice offered a plausible justification for the need to undertake a new one.

Women of reproductive age, newborns and children, contribute to more than a half of the total population in the developing world, and face a number of health challenges especially in accessing the care they need most (Castello et al, 2004). International agencies have always expressed the need to ensure that this group of the population accesses timely and appropriate health services in order to reduce the high morbidity and mortality rates witnessed among them. For instance every year 530,000 women die from maternal causes, four million infants die in the neonatal period and a similar number are stillborn (Maine and Rosenfield, 1999; Haines and Cassels, 2004). One contributory reason is the inadequate access to services by this group. The World Health Organisation (2005) emphasises that it is vital for both women and children to access timely services as it is unethical to deal with health issues of women, while ignoring their children and vice-versa, because these groups are naturally interlinked, and mutually benefit from each other. CHWs are viewed as important and necessary in scaling up MNCH interventions, however questions like to what extent, and how effective they are have largely remained unanswered.

This systematic review therefore sought to gather all feasible published evidence regarding the utility of CHWs in the provision of MNCH interventions in low income countries. The choice was based on the fact that a huge volume of literature existed on the role CHWs have played in MNCH interventions in the developing world and systematic review has the potential to reduce this quantity into meaningful, convenient and applicable information for the use of both public health practitioners and policy-makers (Jackson and Waters, 2005).

Aim and Goal of the Study

The aim of this systematic review was to synthesize current research evidence on the effectiveness of CHWs in providing basic curative and preventive MNCH interventions and elicit factors that influenced their performance. The ultimate goal is to contribute to the existing body of evidence on CHWs, in order to influence policy makers and enable public health practitioners in low income countries to design effective CHW programmes that will promote and enhance MNCH interventions that embrace the participation and full involvement of local communities.

Review Questions

This review sought to answer the following questions:

- Are CHWs effective in providing basic preventive and curative maternal, newborn and child health interventions?
- What factors are crucial to CHWs performance?

METHODOLOGY

This review, conducted in 2009, adhered to the following guidelines: The Cochrane Effective Practice and Organisation of Care (EPOC) Review Group Data collection checklist (McAuley and Ramsay, 2002), the Guidelines for Systematic Reviews of Health Promotion and Public Health Interventions from The Cochrane Collaboration (Armstrong et al, 2007); and the Centre for Reviews and Dissemination (CRD)'s Guidance for Undertaking Reviews in Health Care (CRD, 2008)

Inclusion and Exclusion Criteria

This was based on a number of parameters as outlined below:

Study Design

Study types included in the review play a major role in determining the internal and external validity of interventions which therefore indicate the strength of evidence. Petticrew and Roberts (2003) have formulated typologies of evidence which are constructed on a hierarchical order of study designs to be used for Systematic Reviews: Randomized Controlled Trials (RCTs), other experimental studies, surveys, and qualitative studies, being classified as first, second, third and fourth choice respectively. Although it is highly emphasised that RCTs should take the first precedence in systematic reviews because of their methodological quality that minimises bias and confounding, and are therefore suitable for answering questions like "does it work?" (Jackson and Waters, 2005; Oliver et al, 2005; Higgins and Green, 2006), for this review, besides RCTs, other experimental designs and surveys were also included after the preliminary search discovered that there were no sufficient RCTs to review.

Study Participants

All CHWs interventions involving basic health care provision to women of reproductive age (15-49 years), newborns and children, and taking place in communities (neighbourhoods and households) of low-income countries were considered.

Types of interventions

Any intervention delivered by CHWs and intended to promote health, manage illness, or provide health support to women; newborns and children was considered.

Types of outcome measure

Studies were included if they assessed any of the variety of behavioural, educational, social, environmental and physiological outcomes associated with women, newborns and children, such as: utilisation; cost, immunisation coverage, breastfeeding, uptake of services, morbidity and mortality, among others.

Setting

Interventions taking place in the recipient communities, i.e. neighbourhoods and households so long as they involved CHWs and women, newborns and children were considered.

Language restriction

Because of time and logistical constraints the review was restricted to studies that were available in the English language; this may have caused the exclusion of useful studies that met the other parameters.

Search Sources

Both electronic and manual searches had been planned to be conducted originally, however, because of time and financial constraints it was not possible to conduct manual searches, especially for the grey literature. Because public health studies tend to be scattered in different databases and therefore quite complex to identify due to the multi-disciplinary nature of the interventions (Beahler et al, 2000; CRD, 2008) a wide range of electronic databases, both health-related and non health-related, were searched including: PubMed, Medline, Academic Search Complete, Cochrane, ASSIA, and CINAHAL. The search was restricted to articles that had been published from 1998-2008.

Search terms

Due to the fact that some of the public health terminology is imprecise and constantly changing (The Cochrane Collaboration, 2005) the use of sensitive searches which combined text words with keywords, complemented by synonyms were employed. Keywords and their synonyms that were used as search terms were developed based on the recommendations of CRD guidelines (2008) that urge that search terms must be developed based on categories of PICOS, summarised as: population/target group (P), intervention (I), comparators/context (C), outcomes (O), and study design (S). Some of the core search terms included: community health workers, maternal health, child

health, newborn health, and infant care.

Assessment of the existing volume of relevant studies

For purposes of assessing the existing volume of relevant literature, an initial electronic database search was conducted on PubMed, and Academic Search Complete. This retrieved some articles that were used to refine the pilot search terms into the final search terms utilised across all the databases.

Literature search

The literature search was based on combining search terms from the five categories highlighted earlier. Although the expectation was that there would be a great diversity in the search terms utilised across the different databases, this was not the case for the original core search terms, agreed upon after an initial search, were applicable across all the data bases as evidenced from the little difference in specificity and sensitivity of the retrieved articles across the databases. However, Cochrane, Pubmed and Medline databases were more significant than others at retrieving relevant articles especially the cluster randomised trials and quasi-experimental studies.

Reading article titles and abstracts and obtaining them

For the purpose of conducting this process systematically, a Study Inclusion Screening Form was designed, which was utilised to arrive at the decision of either including or excluding an article basing on its abstract and title. Many of the studies were excluded on the basis that either the abstract or title was irrelevant to the review. Secondly, the articles that passed the first screen were obtained mainly by downloading them from the internet. The downloaded articles were again screened in order to determine whether or not they should be included in the review on the basis of the inclusion and exclusion criteria. Thirdly, the remaining studies were critically appraised, and those that were found not to contain any evaluation were further dropped. Finally, the studies that passed all the rigorous screening tests were included in the review and data were extracted from them.

Data extraction validity assessment and synthesis

The data extraction form and validity assessment tools were formulated based on the guidelines outlined in CRD Report 4 (CRD, 2008), and the EPOC Data collection checklist (McAuley and Ramsay, 2002). The data extraction form incorporated twelve core categories and was piloted on one study after which some modifications were made.

The methodological quality of the study, the effectiveness of the intervention and the applicability of the findings were assessed thoroughly. The judgement about effectiveness of CHWs was made on the basis of:

a) Evidence of an increase in the utilisation of CHWs services by women, newborns and children, and

b) The reported outcomes by the author(s), taking into account the study aims, study design, methodological quality and appropriateness of the intervention. Basing on these criteria, the included studies were categorised into:

1) **Inconclusive,** when the study was considered of methodologically low quality

2) **Effective,** where the study methods were considered to be strong or moderate and there was a positive significance in the reported outcomes of the intervention.

3) **Partially effective,** if the study methods were categorised as strong or moderate, but the reported outcomes were not significant; and

4) **Ineffective,** where there was no change in the reported outcome irrespective of the methodological quality of the study.

Since this review intended to include primary studies that had been conducted using both quantitative and qualitative designs, two validity assessment tools were developed, one for qualitative studies, and another for quantitative studies.

Validity assessment for all studies included in the SR was done and the final decision about the quality of the study was made on the basis of the quality of reporting and viability of the study design and methods. Consequently the studies were categorised into:

1) Strong quality studies
2) Moderate quality studies and
3) Low quality studies.

However, the process of assessing validity for qualitative studies was challenging as not all qualitative aspects of the studies were being reported.

Analytical approach

A Narrative Synthesis approach was preferred in this review, and this involved the collation, combination and summary of the findings of the included studies. Meta-analysis was not possible because the formal pooling of results would be difficult due to the diverse study designs, and the fact that most intervention participants were not randomised. However, studies were grouped according to level of similarity in their measured outcomes such as neonatal/child mortality reduction, promotion of breastfeeding practices, provision of

sulfadoxine-pyrimethamine (SP) for intermittent preventive treatment of malaria in pregnancy (IPTp) and improvement of antenatal care (ANC) attendance, among others.

Determining generalisability/applicability of interventions

A major hindrance to the wide dissemination of most interventions found to be efficacious is that they are of limited or unknown generalisability/applicability. It has been stated that:

> *"Applicability is a key part of the process of summarizing evidence, since the goal of systematic reviews is to recommend interventions that are likely to be effective in different settings. Reviewers should use the RE-AIM model for conceptualising the potential for translation and the public health impact of an intervention. The user can then compare their situation to the RE-AIM profile of the included studies or body of evidence."* (The Cochrane Collaboration, 2005, pp. 85-86)

The RE-AIM framework developed by Glasgow et al (1999) was used to determine the generalisability/ applicability of the included studies.

Strength and Weaknesses of the Review

One of the strengths of this review is that the process undertaken was systematically documented enabling the reader to assess for bias. The iterative step by step process adhered to when conducting this study, as stipulated in the methodology section of this review, enabled the minimisation of possible bias at the various stages involved. Another considerable strength of the review is that it provides the only systematic review in this subject area. As stated earlier the other nine systematic reviews encountered considered primary studies that had used CHWs in the provision of curative and preventive services in general populations and in mixed settings, and had included primary studies conducted in both developed and developing countries. Although some were quite specific like, for instance, Winch et al, (2005) who looked at management of pneumonia or malaria in children by CHWs but did not include maternal health services. Thirdly, most studies included in this review are of strong or moderate methodological quality which enhances its strength since systematic reviews depend on the quality of data contained within them to demonstrate effectiveness.

Despite this, some aspects in the inclusion and exclusion criteria for the review were weaknesses. For instance the review was restricted to only articles that had been published in English language. Ideally a systematic review should include all available articles regardless of the language of publication, and those reviews that are restricted to English language are likely to have biased results (CRD, 2008). In addition, although it had been planned that both electronic and manual searches would be conducted, only electronic searches were done due to unforeseen constraints. Due to this, it is possible that some relevant studies may have been missed. This is a significant pitfall for the review, for it is known that most studies dealing with the evaluation of CHWs are most likely to be found in grey literature or organisational reports rather than electronic databases, because it is non-governmental organisations that have tended to utilise CHWs most (Lehmann and Sanders, 2007). The possibility of having missed some vital studies is further increased owing to the fact that the search was conducted by a single researcher contrary to the prescribed way of having more than one researcher (CRD, 2008). However the wide-ranging search strategy and the range of databases searched make it unlikely that missed studies would portray quite different evidence from the one being presented by this review. Finally, the findings of some studies included in this SR, for instance Rahman et al (2008) which discussed maternal depression, have not been adequately discussed. However their main outcomes and the impacts they had have been highlighted elsewhere.

REVIEW FINDINGS

The aim of this review was to examine the effectiveness of Community Health Workers in relation to the provision of curative and preventive Maternal, Neonatal and Child Health interventions and to identify the factors that influence their performance. The review demonstrated that CHWs can be effective because their interventions showed significant improvements in a number of MNCH outcomes.

The review identified 14 studies (six Cluster Randomised Trials, four QES, two Randomised Controlled Trials and two surveys) evaluating the effects of CHWs' interventions on MNCH outcomes in community care settings. The diversity of the research designs of the included studies coupled with the non-randomisation of participants in most studies, did not make meta-analysis of the outcomes possible. However, some studies were categorised according to some degree of similarity in their outcomes and hence four major categories emerged: those that showed positive impact of CHW interventions on neonatal/child mortality; breastfeeding promotion; uptake and coverage of Sulfadoxine-pyrimethamine for IPTp; and those where treatment of malaria for children and provision of depot

medroxy-progesterone acetate (DMPA) injections were effective hence managing to reduce workloads of peripheral health professionals. These are explored further below.

Outcomes

Interventions of four studies (I, A, E, & F) demonstrated significant reductions in neonatal or child mortality rates of 30%, 34%, 40.6%, and 54% respectively. These significant findings are comparable to those demonstrated by other studies: Lehmann et al (2004); Winch et al (2005); and Lehmann and Sanders (2007), conducted elsewhere demonstrated similar findings. Sazawal and Black (2003) also reported an overall reduction of 24% in the total mortality of the under fives in their interventions implemented by CHWs, which further strengthens the evidence of CHWs being effective in provision of basic curative and preventive health care for the newborns and children.

Positive breastfeeding practices were demonstrated by two studies (C & G). In one of the interventions, 70% of the mothers were able to breastfeed exclusively up to five months compared only to 6% of the mothers in the control group. In another intervention there was increased exclusive breastfeeding of infants of up to 24.7%. These findings clearly demonstrate that CHWs can be effective at promoting breastfeeding practices and are in line with the findings of Lewin et al (2005) that also indicated that the CHWs were effective at promoting the uptake of breastfeeding.

CHW interventions were also shown to have increased the uptake and coverage of SP. For instance 67.5% of pregnant women were able to access IPTp in the second trimester (Mbonye et al, 2007) as recommended by WHO and were also able to adhere to the second dose of SP, compared to 39.9% in the control. Likewise in another intervention the coverage of the two recommended doses of SP in pregnancy increased from 41.5% to 82.9% (Msyamboza et al, 2009). These findings were significant as they demonstrated that CHWs can be effective at increasing coverage and access of SP in their local communities. However, there was an unanticipated effect on ANC attendance reduction in the intervention of Msyambonza et al (2009). Although this was not witnessed in the study by Mbonye et al (2007) where ANC attendance for the recommended four visits increased from 34.3% to 41.5%, the use of CHWs in provision of SP may require to be cautiously approached because of this potential effect.

The comparison between CHWs and qualified staff (nurses and midwifes) in safety, client satisfaction and continuation rates of receiving the 2nd injection of a reversible contraceptive method (DMPA) indicated that CHWs were as effective as the qualified staff at providing DMPA injections (Stanback et al, 2007). As high as 88% and 85% of the women in reproductive age were able to receive their 2nd injection of DMPA from CHWs and qualified staff respectively. Satisfaction levels of women receiving DMPA injections from CHWs and qualified personnel were also found to be significantly high and similar at 95% and 93% respectively. The major concern with most health professionals for not letting lay people like CHWs provide injections hinges on safety issues, but the findings indicated that both the CHWs and qualified personnel exhibited low levels of adverse effects associated with DMPA injections, as low as less than 20% of the clients in both groups experiencing side effects (Stanback et al, 2007). These findings explicitly reveal that CHWs can be as effective as qualified staff in providing DMPA injections in their own communities. The findings are also synonymous with the findings of Tiono et al (2008) where CHWs were found to be effective at treating malaria in children and had reduced the workload of qualified staff at peripheral health facilities by 43%, hence enabling qualified staff at those units enough time to handle more serious conditions.

The studies in this review also show that CHWs had a large and positive impact on childhood vaccination rates, lowered rates of childhood diarrhoea, increased levels of child growth monitoring, and increased provision of iron tablets to pregnant women (OPM, 2002). However, the factors that enhance this effectiveness need to be considered before large scale programmes can be developed. These influencers could be identified and tackled using a systems approach proposed by Bhattacharyya et al (2001). Due to inadequate reporting on these factors exhibited in most of the included studies, this review was only able to identify a few of them, which are discussed below.

Factors Influencing Effectiveness of CHWs

Although most studies were not very explicit on the factors that may have influenced the effectiveness of CHWs, the following were reported to be responsible for the job stress in 25% of CHWs as reported in one study (Haq et al, 2008): long distances to work, inconsistent medical supplies, inadequate stipends, lack of career development structure, inadequate communication skills and low socio-economic status. The selection and training of CHWs, education level and previous experience were also significant. The selection and utilisation of CHWs from the very communities in which they lived was found to have

increased access to and coverage of the various MNCH interventions in the included studies, as the CHWs were available most of the time in their service areas whenever they were required. This revelation is synonymous with the findings of Ruebush et al (1994) and Lewin et al (2005), where CHWs had great impact on increasing the uptake of health services and other outcomes due to the fact that they were from the very areas they were servicing.

Most studies found that previous experience and some level of formal education were often emphasised as part of the important criteria for selection of CHWs. The reasoning was that past experience of CHWs in similar or quite related interventions could enable them to implement the interventions with confidence while minimising obvious mistakes that they would have committed during their previous practices, hence affirming the notion that the more practice and experience CHWs encounter the more effective they can become (Lehmann and Sanders, 2007).

The findings also showed that for CHWs to be effective, they need to be properly trained in whatever intervention they are to implement. Although the training approaches and duration varied across the different interventions, there was strong emphasis on training in all the interventions, with training duration ranging from 2 weeks to 15 months. In most studies training was conducted in the communities where CHWs were supposed to implement their interventions, whereas in others a mixture of both clinic and community based training was adopted. These findings concur with other findings where it was argued that initial and continuous training was even more important at influencing CHWs performance than who was to be selected as a CHW (Ashwell and Freeman, 1995). It is further argued that training CHWs within the very communities they are serving would strengthen their performance as this would enable them to acquire firsthand experience and be in position to avert the expected challenges (Ande et al, 2004).

The population size and range of services CHWs can efficiently cover are also some of the factors that can influence their performance. The findings revealed that these two interrelated factors differed across the interventions, but what seemed to be evidently common was that population coverage seemed to depend on the kind of services being offered either preventive or curative. For curative and technical services such as management of malaria in children, injection provision for DMPA and essential newborn care, CHWs were allocated relatively smaller and manageable populations or individuals to follow up. These findings tend to conform with the literature which indicated that for CHWs to be effective, they should cover a certain optimal population size with an optimal range of services in order to avoid work overload and fatigue (Prasad and Muraleedharan, 2007).

Even if some studies were not explicit on the kind of remuneration packages they offered to CHWs, those who did explicitly stated that they paid a monthly salary, in most cases that was slightly higher than the minimum wage of the particular country where the study took place. However, others provided non monetary remuneration such as back bags, gumboots, umbrellas and t-shirts among others. These findings also concur with the findings of Bhattacharyya et al (2001), where it was argued that there was no single package of incentives that can ensure that CHWs remain motivated and working for long but rather a mixture of them, which can enhance enthusiasm and hence their effectiveness.

Generalisability/Applicability of Findings

It is almost mandatory to assess the applicability of public health and health promotion interventions when conducting a systematic review because the goal of any review is to recommend interventions that are likely to be reproduced elsewhere under similar settings. Of the fourteen studies included in this review, the findings of ten interventions could be categorised as generalisable/applicable in other similar settings, as they reported in detail on most of the dimensions of the RE-AIM framework. Although the findings of ten studies were found to be generalisable, for practitioners interested in gauging intervention sustainability before implementation elsewhere, then only three studies (I, F, & A) would merit consideration for this criterion.

Indentified Gaps in Interventions

Although most (12/13) of the interventions generally affirmed that CHWs were effective at implementing the various MNCH interventions, some gaps were identified such as: studies that reported to have utilised both qualitative and quantitative designs, were not explicit especially on the qualitative aspects of the study, this made judging the validity and generalisability of such studies very challenging as there was not enough information to enable thorough judgement. In some studies implementation process aspects were not fully documented especially vital aspects on implementers (CHWs), e.g. aspects of motivation and incentives for CHWs were missing. This is vital especially when considering transferability of the findings.

Despite good reporting based on the different dimensions of the RE-AIM framework by most

studies, which enabled judgement of generalisability/ applicability of interventions possible, some studies were silent on the unintended (negative) outcomes that the intervention may have caused. The extent to which interventions can become institutionalised or become part of the routine of the respective organisations were not reported. In addition, the long-term effects of the intervention on the outcomes after six months were also not reported, yet they are vital aspects when considering applying the findings of individual studies elsewhere. However, whereas there were some gaps identified in the interventions, generally there is good evidence from the findings of this review and those of similar reviews before that justifies the use of CHWs in providing curative and preventive MNCH interventions, whereas the common criticisms against their engagement that has influenced the current thinking is not evidence-based. It is therefore possible that the disregard for CHWs might be influenced by views from biased individuals who simply have no trust in engaging local people to complement health professionals in managing MNCH interventions within their own localities.

CONCLUSION

This review identified fourteen studies which evaluated the effectiveness of CHWs in providing a range of curative and preventive health care services to women in reproductive age, newborns and children. Some of the factors that influenced their effectiveness were also established through studies that had incorporated process evaluation of interventions into their main evaluation strategy and had adopted triangulation in the evaluation methodology.

The review had some limitations such as: restricting itself to studies published in English language, concentrating only on electronic databases for searches, this could have reduced the number of potential studies published in other languages, and also those reported on but unpublished. However, the extensive electronic database search conducted minimised this bias, and basing on the included studies, even if other vital studies could have been missed, it would not have been of great impact of influencing the findings of the review. Furthermore, the review was conducted by a single researcher contrary to the recommendations of CDR (2008), however, supervision and peer review from experienced senior staff played a vital role in trying to bridge this gap and the main researcher strictly adhered to the agreed review protocol thus minimising all the possible bias that could have arisen.

Despite the limitations noted, a number of conclusions can be made from this review: CHW interventions showed promising benefits in reducing neonatal/child mortality rates, improving the uptake and adherence to recommended breastfeeding practices for children up to six months. There was also increased uptake and coverage of SP for IPTp. Although ANC attendance increased in some interventions, it decreased in another, thus necessitating caution to be taken if these interventions are to be scaled up to other settings. CHWs were demonstrated to be just as effective as qualified professionals (nurses and midwives) at providing contraceptive injections to women of reproductive age in communities. They were also found to be effective at treating malaria in young children thus relieving workload from qualified health professionals operating in peripheral health units.

Most (10/13) of the interventions that were found to be effective were also found to be generalisable or applicable in other similar settings, although seven of the effective interventions were found to have had scanty or no information at all on the maintenance dimension of the RE-AIM model. Finally, it was found that to enhance the effectiveness of CHWs there is need to cater for the influencing factors such as: long distance to work, inconsistent medical supplies, inadequate stipends, lack of career development structure, selection, training and supervision, and the allocation of an optimal population and volume of duties so that CHWs can be in position to execute them with minimal work-related tension.

RECOMMENDATIONS

Based on the evidence presented in this review, a number of recommendations and unanswered questions for future research can be made to public health practitioners and policy makers at various levels. Public health practitioners need to always consider utilising CHWs in providing curative and preventive interventions that are known to be efficacious to women, newborns and children, along the continuum of care in order to avert the escalating problem of shortage of staff in developing countries. CHWs can be more appropriate as they are from those communities and can easily reach into poorest and rural areas. However, while intending to utilise CHWs, practitioners should ensure that those factors that enhance their effectiveness such as careful selection, appropriate training, adequate and continuous support are well catered for before commencing to use them CHWs.

Policy makers need to put in place policies that enable CHWs to become complementary to the formal health care system, since their usefulness is confirmed with evidence. Policies essential to the harnessing of the

resource of CHWs include: their formal recognition as a complementary human resource for health, additional to the formal health care system; formalisation and improvement of their selection, recruitment, training and remuneration, including creation of clear pathways for their career development; and creation of mechanisms for various support and coordination channels between CHWs, the formal health system, individual health care professionals and other stakeholders.

Whereas in all the included studies there was a component of CHW training, there is need for future research to establish which training approach/strategy is most appropriate at enhancing the effectiveness of CHWs. For example, the training of CHWs in managing malaria in children or providing SP for IPTp or providing essential newborn care stretching from prenatal care to postnatal care along the continuum of care needs to be harmonised in all places and in accordance with the approved treatment standards.

Among interventions that had quite similar anticipated outcomes such as neonatal mortality, child mortality, SP coverage, ANC attendance and breastfeeding practices, it was observed that each intervention had a slightly different implementation strategy. There is, therefore, need for future research to establish which intervention strategy would produce the highest measurement in level of the outcome for those interventions with similar outcomes and what would be the contributory factors to the differences observed. This would possibly enable researchers to formulate CHWs intervention typologies that can be adopted in different situations.

In summary, the evidence gathered by this review suggests that CHW programmes intended to promote MNCH outcomes can be effective, clearly refuting the much-hyped criticisms against their engagement discussed earlier that has tended to influence the current thinking of policy makers and practitioners. However, these programmes should not be misinterpreted as being easy or simple to manage, as there is considerable resource input required in the form of time, financial and other, neither are they a cheap alternative to professional care, but are worth an investment especially to rural poor communities that have limited access to qualified health care professionals since the only alternative in reality in such areas would be no care at all.

REFERENCE LIST:

Ande O, Oladepo O and Brieger, WR (2004) Comparison of knowledge on diarrheal disease management between two types of community based distributers in Oyo State Nigeria. *Health Education and Research*, 19 (1); 110-113.

Armstrong R, Waters E, Jackson N, Oliver S, Popay J, Shepherd J, Petticrew M, Anderson L, Bailie R, Brunton G, Hawe P, Kristjansson E, Naccarella L, Norris S, Pienaar E, Roberts H, Rogers W, Sowden A, Thomas H. (2007) *Guidelines for Systematic reviews of health promotion and public health interventions. Version 2*. Melbourne University: The Cochrane Collaboration. Available at: http://www.ph.cochrane.org/Files/Website%20Documents/Guidelines%20HP_PH%20reviews.pdf. (Accessed on 28/02/2009).

Ashwell HE, Freeman P, (1995) The clinical competency of community health workers in the eastern highlands province of Papua New Guinea. *Perinatal and Newborn General Medicine Journal*, 38 (3); 198-207.

Beahler CC, Sundheim JJ, Trapp NI, (2000) Information retrieval in systematic reviews: challenges in the public health arena. *American Journal of Preventive Medicine*, 18 (4), 6-10.

Bhattacharyya K, Winch P, LeBan K, Tien M. (2001) *Community health worker incentives and disincentives: how they affect motivation, retention and sustainability.* Arlington, Virginia: BASICS/USAID.

Castello A, Osrin D, Manandhar D. (2004) Reducing maternal and neonatal mortality in the poorest communities. *British Medical Journal*, 329; 1166-1168.

Centre for Reviews and Dissemination (CRD). (2008) *Systematic reviews: CRD's guidance for undertaking reviews in health care, CRD report 4; 3rd edition*. York: NHS Centre for Reviews and Dissemination, University of York.

Gilson L, Walt G, Heggenhougen K, Owuor-Omondi L, Perera M, Ross D, Salazar L. (1989) National community health worker programs: how can they be strengthened? *Journal of Public Health Policy*, 10 (4); 518-532.

Glasgow RE, Vogt TM, Boles SM, (1999) Evaluating the Public Health Impact of Health Promotion Interventions: The RE-AIM Framework. *American Journal of Public Health,* 89 (9), 1322-1327.

Haines A and Cassels A, (2004) Can the millennium development goals be attained? *British Medical Journal*, 329; 394- 397.

Higgins JPT, Green S (eds). (2006) Cochrane handbook

for systematic reviews of interventions 4.2.6 [updated September 2006]. In: *The Cochrane Library, issue 4.* Chichester, UK: John Wiley & Sons Ltd.

Jackson N and Waters E (2005) Criteria for the systematic review of health promotion and public health interventions. *Health Promotion International*, 20 (4); 367-374.

Jennings B, Kahn J, Mastrolanni A, Parker LS, (2003) Ethics and public health: module curriculum. Available from: http://asph.org/userfiles/drph_Ethics and Public Health Model Curriculum.pdf. [Accessed on 28/02/2009].

JLI. (2004) Human resources for health. Overcoming the crisis. Cambridge: Global Health Initiative/Harvard University Press.

Lehmann U and Sanders D (2007) Community health Workers: What do we know about them? The state of the evidence on programmes, activities, costs and impact on health outcomes of using community health workers. Geneva: WHO.

Lehmann U, Friedman I, Sanders D, (2004): Review of the utilization and effectiveness of community-based health workers in Africa. Western Cape, South Africa: School of Public Health, University of the Western Cape.

Lewin SA, Dick J, Pond P, Zwarenstein M, Aja G, Van Wyk B, Bosch-Capblanch X, Patrick M, (2005): Lay health workers in primary and community health care. Cochrane Database of Systematic Reviews (1): CD004015.

Maine D and Rosenfield A, (1999) The safe motherhood initiative: why has it stalled? *American Journal of Public Health*, 89; 180-182.

Mburu FM. (1994) Whither community health workers in the age of structural adjustment? *Social Science and Medicine*, 39 (1); 883-885.

McAuley L and Ramsay C (2002): *Cochrane effective practice and organization of care (EPOC) review group: data collection checklist*. Available from: http://www.epoc.cochrane.org/Files/Website files/Documents/Reviewer Resources/datacollectionchecklist.pdf. [Accessed on 28/02/2009].

Oliver S, Harden A, Rees R (2005): An emerging framework for including different types of evidence in systematic reviews for public policy. *Evaluation*, 11 (4); 428-446.

Prasad BM and Muraleedharan VR (2007): Community Health Workers: A Review of Concepts, Practice and Policy Concerns. *Human Resource for Health Global Resource Centre*, Available from: http://www.hrhresourcecenter.org/hosted_docs/CHW_Prasad_Muraleedharan.pdf. (Accessed on 15. 02.2009).

Ruebush TK, Weller SC, and Klein RE, (1994): Qualities of an ideal volunteer community malaria worker: a comparison of the opinions of community residents and national malaria service staff. *Social Science and Medicine*, 39 (1); 123-131.

Sazawal S and Black P (2003) Effect of pneumonia case management on mortality in neonates, infants, and pre-school children: a meta-analysis of community-based trials. *The Lancet,* 9; 547-556.

The Cochrane Collaboration. (2005) *Guidelines for systematic reviews of health promotion and public health interventions*. Version 1.2.

WHO. (2005) *The World health report: make every mother and child count*. Geneva, Switzerland: World Health Organization.

WHO. (2006) *The world health report 2006: working together for health.* Geneva: World Health Organization.

Winch PJ, Gilroy KE, Wolfheim C, Starbuck ES, Young MW, Walker LD, Black RE (2005): Intervention models for the management of children with signs of pneumonia or malaria by community health workers. *Health Policy Plan*, 20 (4); 199-212.

List of Included Studies in Alphabetical order

Baqui AH, El-Arifeen S, Darmstadt GI, Ahmed S, Williams EK, Seraji HR, Mannan I, Rahman SM, Shah R, Saha SK, Syed U, Winch PJ, Lefevre A, Santosham M, Black RE. (2008). Effect of community-based newborn-care intervention package implemented through two service-delivery strategies in Sylhet district, Bangladesh: a cluster randomised controlled trial. *The Lancet*; 371: 1936-1944.

Bari S, Mannan I, Rahman MA, Darmstadt GL, Seraji HMR, Baqui AH, El Arifeen S, Rahman MS, Saha SK, Nawshad ASM, Ahmed U, Ahmed S, Santosham M, Black RE, Winch PJ. (2006). Trends in use of referral hospital services for care of sick newborns in a community-based intervention in Tangail district, Bangladesh. *Journal of Health, Population and Nutrition*; 24 (4): 519-529.

Haider R, Ashworth A, Kabir I, Huttly SRA. (2000). Effect of community-based peer counsellors on exclusive breastfeeding practices in Dhaka, Bangladesh: a randomised controlled trial. *The Lancet*; 356: 1643-1647.

Haq Z, Iqbal Z, Rahman A. (2008). Job stress among community health workers: a multi-method study from Pakistan. *International Journal of Mental Health*; 2(15): 1-6.

Kidane G and Morrow RH. (2000). Teaching mothers to provide home treatment of malaria in Tigray, Ethiopia: a randomised trial. *The Lancet*; 356: 550-555.

Kumar V, Mohanty S, Kumar A, Misra RP, Santosham M, Awasthi S, Baqui AH, Singh P, Singh V, Ahuja RC, Malik KG, Ahmed S, Black RE, Bhandari M, Darmstadt GL, (2008). Effect of community-based behaviour change management on neonatal mortality in Shivgarh, Uttar Pradesh, India: a cluster-randomised controlled trial. *The Lancet*; 372: 1151-1162.

A. Leite AJM, Puccini FR, Atalah AN, Alves da Cunha AL, Machado MT. (2005). Effectiveness of home-based peer counselling to promote breastfeeding in the northeast of Brazil: a randomised clinical trial. *Acta Paedtrica*; 94: 741-746.

B. Mbonye AK, Bygbjerg, CI, Magnussen P. (2007). A community-based delivery system of intermittent preventive treatment of malaria in pregnancy and its effect on use of essential maternity care at health units in Uganda. *Transactions of the Royal Society of Tropical Medicine and Hygiene*; 101 (1):1088-1095.

C. Morrison J, Tamang S, Mesko N, Osrin D, Shrestha B, Manandhar D, Standing H, Costello A, (2005). Women's health groups to improve perinatal care in rural Nepal. *BioMed Central Pregnancy and Childbirth*; 5 (6): 1-12.

D. Msyamboza KP, Savage EJ, Kazembe PN, Gies S, Kalanda G, D'Alessandro U, Brabin B J. (2009). Community-based distribution of sulfadoxine-pyrimethamine for intermittent preventive treatment of malaria during pregnancy improved coverage but reduced antenatal attendance in southern Malawi. *Tropical Medicine and International Health*; 14 (2): 183-189.

E. Rahman A, Malik A, Sikander S, Roberts C, Creed F. (2008). Cognitive behaviour therapy-based intervention by community health workers for mothers with depression and their infants in rural Pakistan: a cluster-randomised controlled trial. *The Lancet*; 372: 902-909.

F. Stanback J, Mbonye AK, Bekiita M, (2007). Contraceptive injections by community health workers in Uganda: a nonrandomised community trial. *Bulletin of the World Health Organisation*; 85(10):768-773.

G. Tiono AB, Kabore Y, Traore A, Convelbo N, Pagnoni F, Sirima SB. (2008). Implementation of home based management of malaria in children reduces the work load for peripheral health facilities in a rural district of Burkina Faso. *Malaria Journal*; 7 (20):1-8.

H. OPM. (2002). *Lady Health worker programme: external evaluation of the national programme for family planning and primary health care, final repor*t. United Kingdom: Oxford Policy Management.