# Effectiveness of interventions to strengthen national health service delivery on coverage, access, quality, and equity in the use of health services in low and lower middle income countries

Protocol written by Barbara Willey, Lucy Smith Paintain, Lindsay Mangham, Josip Car and Joanna Armstrong Schellenberg, part of London School of Hygiene and Tropical Medicine and Imperial College London

EPPI-Centre
Social Science Research Unit
Institute of Education
University of London

July 2012

PROTOCOL

The authors are part of London School of Hygiene and Tropical Medicine and Imperial College London and were supported by the Evidence for Policy and Practice Information and Co-ordinating Centre (EPPI-Centre).

This protocol should be cited as: Willey B, Smith Paintain L, Mangham L, Car J, Schellenberg JA (2012) Effectiveness of interventions to strengthen national health service delivery on coverage, access, quality, and equity in the use of health services in low and lower middle income countries. Protocol. London: EPPI-Centre, Social Science Research Unit, Institute of Education, University of London

# Contents

# 1 Overview

The focus of this systematic review is to describe recent experience from low and lower middle income countries of interventions to improve the delivery of health services by front-line workers. This review will assess these interventions using a range of indicators, which describe the effect on the availability and quality of services, utilization and equity in use of health services, and where possible patient's health status and mortality.

This protocol outlines the context and rationale for the review (sections 2 & 3), aims and objectives (section 4), and methods, including the criteria for considering studies (section 5.1), the search strategy (section 5.2), as well as data collection and analysis plans (section 5.3).

# 2 Background

*Missed opportunities*

Low coverage of effective and cost-effective interventions that could save lives has been partially attributed to weak and inefficient health systems (Travis, Bennett et al. 2004), leading to the identification and promotion of health system strengthening as a global health priority (Bryce, el Arifeen et al. 2003; World Health Organization 2007; World Health Organization 2009; Frenk 2010). An evaluation of the main causes of mortality in low and middle income countries, and the availability of interventions to prevent and treat the majority of these causes, highlights the tremendous missed opportunities for improving health currently experienced by these countries.

The most recent global data, from 2008, show that there were over 57 million deaths worldwide, almost 20% of which were in children under the age of five, and 40% of these occurred during the first seven days of life (World Health Organization 2009; World Health Organization 2010). Mortality, and under five mortality in particular, is disproportionately concentrated in low and middle income countries (LMICs), where 99% of deaths in under-fives occur (World Health Organization 2009). Although Ischemic heart disease and stroke fall within the top ten causes of death in low income countries, leading causes of death in these regions remain dominated by infectious disease. These principally include respiratory infections, diarrhoea, HIV, malaria, tuberculosis, and neonatal-related complications such as prematurity, intrapartum-related deaths or birth asphyxia, and neonatal infections.

It has been estimated that two-thirds of child deaths, and between 35-55% of neonatal deaths, could be avoided by implementing known effective and cost-effective interventions at scale (Claeson, Gillespie et al. 2003; Jones, Steketee et al. 2003; Darmstadt, Bhutta et al. 2005). The implementation and delivery of many of these interventions lie within the remit of health systems, which the World Health Organization (WHO) has proposed are responsible for three key functions: improvement of population health and reduction of inequalities; responsiveness to the expectations of the population; and fairness in financial contribution (World Health Organization 2000). However, constraints exist to health systems equitably delivering life-saving interventions (World Health Organization 2000; World Health Organization 2007; World Health Organization 2009), and renewed efforts to strengthen health systems, including health service delivery, have been seen (Bryce, el Arifeen et al. 2003; Travis, Bennett et al. 2004; Madon, Hofman et al. 2007; Frenk 2010; Fryatt, Mills et al. 2010).

The challenge for global health is to translate these efficacious interventions into effective public health policies that are successfully implemented at scale. The emphasis of evaluating interventions to improve health delivered at scale has been highlighted by *The Lancet,* which emphasized that effectiveness evaluations of large-scale global health programmes “must now become the top priority in global health” (Lancet 2010). Evaluations of interventions implemented under near-programmatic conditions, with reported detail on context, are necessary to aid understanding of why and how interventions are effective, provide evidence on implementation, and inform policy

makers in other settings to enable them to establish whether the intervention and its outcomes are reproducible in their setting.

*Health systems and Delivery of Health Services*

The mechanisms through which health system strengthening interventions are anticipated to result in improved health and reduced mortality are complex, and constraints to improved access to health care exist at different levels (Hanson, Ranson et al. 2003; World Health Organization 2009). In this review we have drawn on two conceptual frameworks to aid definition and understanding of health systems, constraints to improved access to health care, and mechanisms through which strengthening interventions can affect health (Hanson, Ranson et al. 2003; World Health Organization 2009).

A framework by Hanson *et al.* (Hanson, Ranson et al. 2003) highlights five levels at which constraints may act: i) community and household level; ii) health services delivery level; iii) health sector policy and strategic management level; iv) public policies cutting across sectors; and v) environmental and contextual characteristics (Table 1). This approach makes a useful distinction between factors within a community or household that may affect the demand for health care, and factors that exist at the service delivery level that may affect its supply. Strengthening the health system as a whole will require addressing constraints at all these levels, and interventions to strengthen health systems are likely to act across levels (World Health Organization 2009). However we believe that this framework is a useful starting point to help define health service delivery, and consequently the supply-side interventions to that will be relevant in strengthening it.

**Table 1:** Levels of constraints to improving access to priority health care, reproduced from (Hanson, Ranson et al. 2003)

| Level of constraint | Types of constraint |
|---|---|
| I. Community and household level | Lack of demand for effective interventions<br>Barriers to use of effective interventions (physical, financial, social) |
| II. Health services delivery level | Shortage and distribution of appropriately qualified staff<br>Weak technical guidance, programme management and supervision<br>Inadequate drugs and medical supplies<br>Lack of equipment and infrastructure, including poor accessibility of health services |
| III. Health sector policy and strategic management level | Weak and overly centralized systems for planning and management<br>Weak drug policies and supply system<br>Inadequate regulation of pharmaceutical and private sectors and improper industry practices<br>Lack of inter-sectoral action and partnership for health between government and civil society<br>Weak incentives to use inputs efficiently and respond to user needs and preferences<br>Reliance on donor funding that reduces flexibility and ownership<br>Donor practices that damage country policies |
| IV. Public policies cutting across sectors | Government bureaucracy (civil service rules and remuneration; centralized management system; civil service reforms)<br>Poor availability of communication and transport |

| Level of constraint | Types of constraint |
|---|---|
| | infrastructure |
| V. Environmental and contextual characteristics | Governance and overall policy framework<br>–Corruption, weak government, weak rule of law and enforceability of contracts<br>–Political instability and insecurity<br>–Low priority attached to social sectors<br>–Weak structures for public accountability<br>–Lack of free press<br>Physical environment<br>–Climatic and geographic predisposition to disease<br>–Physical environment unfavourable to service delivery |

Although frameworks and definitions of health system strengthening (Remme, Adam et al. 2010) and health system performance (Murray and Frenk 2000) are not wholly set, the WHOs six building blocks are a widely used starting point to define health system components, and we drew on this framework in the development of this review (World Health Organization 2007). The suggested building blocks include service delivery, workforce (human resources), information, medicines and technologies, financing, and leadership and governance. Recently, the building blocks have been presented as six overlapping circles with people at the centre (Figure 1), emphasising that the building blocks are not exclusive and that it is important to consider the inter-relations between them, and retain a systems perspective (World Health Organization 2009). This framework also highlights that people, and in the case of service delivery- front-line workers, are central. We therefore focussed on interventions that aimed to strengthen the capacity of front-line workers to deliver existing services to a defined standard or quality. Although interventions to improve equipment, drugs and supplies are an important component of health service delivery as defined by Hanson *et al.*, we did not consider these for inclusion since in the absence of interventions that also address the capacity of health workers to deliver services they are insufficient.

**Figure 1:** WHO Health System Framework (World Health Organization 2009).


*Reviewing the evidence*

In this systematic review we assessed the evidence for the effectiveness of interventions to improve the delivery of health services at scale in low and lower middle income countries. As outlined in Figure 2 and in more detail in Section 4, we will review the effectiveness of supply-side interventions that were intended to improve the health services provided by front-line workers during their interaction with users. The evidence for improving health service delivery has to some extent been previously synthesized, however a focus on interventions delivered at scale and restricted to study designs that generate effectiveness evidence has not been applied.

**Figure 2:** Objectives of systematic review

1. To identify and describe characteristics of interventions that are intended to improve health services provided by front-line workers;

2. To assess and report the effectiveness of these interventions on:
    a. coverage of health services;
    b. access to health services;
    c. quality of health services;
    d. equity in the use of health services; and
    e. morbidity and mortality.

As part of the Commission on Macroeconomics for Health, Oliveira-Cruz *et al*. reviewed evidence for approaches to overcome health service delivery constraints (Oliveira-Cruz, Hanson et al. 2003). The authors used a very inclusive approach to study design, and considerable evidence has been published in the interim. Alexander Rowe and colleagues

have synthesised evidence on interventions to improve health worker performance (Rowe, de Savigny et al. 2005), and a larger review is in process (preliminary report presented in chapter 3 of *Improving health service delivery in developing countries* edited by Peters, El-Saharty, Siadat, Janovsky and Vujicic 2009). Again, an inclusive strategy for which study designs to include was used, and there was no emphasis of evidence at scale. A comprehensive systematic review on the effectiveness of supervision, limited to robust study designs, is available from Bosch-Capblanch and colleagues (Bosch-Capblanch and Garner 2010; Bosch-Capblanch, Liaqat et al. 2011), and as such interventions of supervision that are implemented in the absence of other interventions meeting inclusion criteria in this review were excluded.

This review will not be restricted to a specific disease area, however it is important to highlight that the evidence base for some specific health foci has been assessed, including provider-side interventions to improve malaria treatment (Smith, Jones et al. 2009), in-service training for newborn care, and interventions to improve quality of emergency obstetric care (Opiyo and English 2010; van Lonkhuijzen, Dijkman et al. 2010), using community health workers in low and middle income countries for maternal and newborn health outcomes (Sibley, Sipe et al. 2007), and in high, middle and low income countries the use of lay health workers for maternal and child health and the management of infectious diseases (Lewin, Munabi-Babigumira et al. 2010).

Furthermore, as this review aims to complement existing evidence, we draw attention to a number of existing reviews that address other levels within the Hanson *et al*. framework. At the community and household level these include reviews of user fees (Lagarde and Palmer 2011), demand side financing (Lagarde, Haines et al. 2007; Lagarde, Haines et al. 2009), and user-side interventions to improve malaria treatment (Smith, Jones et al. 2009); at the health sector policy and strategic management level, reviews exist on integration (Briggs, Capdegelle et al. 2001; Briggs and Garner 2006; Dudley and Garner 2011), incentives (Eldridge and Palmer 2009), pay for performance interventions for health workers in LMICs (Witter, Kessy Flora et al. 2012), and contracting out health services (Lagarde and Palmer 2009).

# 3 Why it is important to do this review?

- There has not previously been a focus on collating evidence on the effectiveness of interventions to strengthen health service delivery implemented at scale. It is important to assess this evidence as large scale implementation is required to achieve high coverage, without which substantial mortality impact would not be possible. Additionally there are implementation challenges with large-scale deployment that may not be encountered during pilot or smaller-scale studies.
- There is a need to inform policy makers and the policy decision-making process by characterising the alternative approaches that could be deployed to improve the delivery of health services by front-line workers, and by synthesising the evidence on the effectiveness of these approaches.
- In addressing these needs it is important to use information from studies that have a robust study designs in order to minimise the role of bias and chance in findings, and increase the internal validity of results. However, it is also important to address questions of implementation as this experience is likely to be of use in policy-making decisions.

# 4 Aim & Objectives

This review aims to assess the published and grey literature evidence for the effectiveness of supply-side interventions that are intended to improve the health services provided by front-line workers during their interaction with users. Crucially, we will focus on interventions in low or lower middle income countries that are implemented and evaluated at scale- defined as an intervention implemented in at least one district (lowest level of health administration).

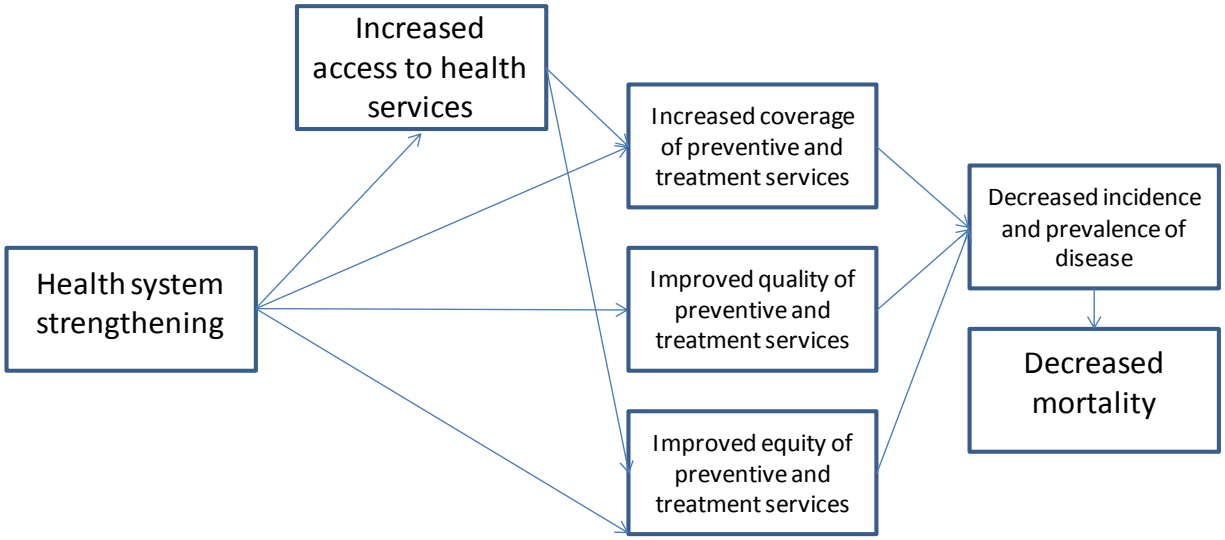
The specific objectives of this review are:

1. To identify and describe characteristics of interventions that are intended to improve health services provided by front-line workers;

2. To assess and report the effectiveness of these interventions on:
    a. coverage of health services;
    b. access to health services;
    c. quality of health services;
    d. equity in the use of health services; and
    e. morbidity and mortality.

In this review we will also aim to map out the availability of robust epidemiological evidence for the effectiveness of interventions on outcomes, by means of a logic model showing anticipated pathways of influence (Figure 3). The pathways through which health service delivery improvement is anticipated to affect outcomes, in particular survival impact, are complex. However, as simple starting point is shown in Figure 3. Figure 3 shows that the inputs and processes of strengthening the health system are anticipated to improve outputs, and in turn influence outcomes of access, coverage, quality, and equity, and eventually have an impact on reduced incidence (prevention) and prevalence (treatment) of disease, which in turn have an impact of reduced mortality.

**Figure 3:** Simple framework for causal link between Health System Strengthening and Mortality



# 5 Methods

## 5.1 Criteria for considering studies for this review

Criteria for considering studies for this review will be categorized under participants, interventions, study designs, and outcomes. Specific inclusion and exclusion criteria, with examples, are listed in Appendix 1.2.

### *5.1.1 Types of participants*

We will focus on countries defined by the World Bank as low and lower middle income economies (listed in Appendix 2). Health care personnel, including community health workers, will be eligible for inclusion. Personnel will be eligible both as individual health workers, and as part of wider teams (e.g. all staff from a whole health facility).

### *5.1.2 Types of interventions*

We will include supply-side interventions to improve the health services provided by front-line workers during their interaction with users. Eligible interventions could aim to improve service delivery either by improving health workers' knowledge or skills, or by improving the availability of resources required by health workers (Table 1). Packages of interventions will be eligible, as long as a component of the package includes interventions to improve service delivery.

This review will be restricted to interventions that were delivered at scale. Specifically, we will include interventions that were implemented in at least one district (lowest level of health administration), where the comparison group(s) was at least one other district, or where the intervention was delivered in one district only and comparison and intervention areas or groups were at the sub-district level.

Interventions that targeted health services delivered by state providers will be included. This is because health services in many low or lower middle income settings are principally delivered at scale by state providers.

### *5.1.3 Types of study designs*

We will include: individually-randomized controlled trials (RCT); cluster randomized trials (CRT)- including randomized stepped wedge designs; non-randomized cluster trials (CT) with at least two intervention sites and two control sites; controlled before and after studies (CBA) with at least two intervention sites and two control sites; and interrupted time series studies (ITS) where the timing of the intervention was clear and at least three time points before and after the intervention were available (Higgins JPT and Green S 2011).

The inclusion of non-randomized designs will be important in this review that considers interventions delivered at scale, as randomizing large units- often whole administrative areas- is frequently impractical, and individual randomization has risks of contamination. Furthermore, closely controlled designs may have low external validity, i.e. generalisability, and there is a need to include study designs other than randomized controlled trials when assessing complex public health interventions at scale (Victora, Black et al. 2011).

We will include comparison groups that included usual or standard care, or an alternative strategy to improve health service delivery; this will include comparisons of multi- versus single-strategy interventions.

*Types of outcome measures*
To be included, studies will need to report at least one of the following outcomes: survival impact, coverage, access, quality, or equity.

The primary outcomes of preference to assess the effectiveness of interventions to improve health service delivery are measures of survival impact, such as under-five mortality rate or infant mortality rate. We anticipate that many studies will not have measured survival impact, and therefore we also included outcomes of coverage, access, and equity. These will be based on the WHO's 2011 Indicator compendium[1], and will be selected depending on availability across studies:

- Coverage of evidence-based interventions, that where possible include evidence of biologically-plausible mechanisms of effect on survival impact (e.g. coverage of DPT3 vaccination, proportion of deliveries with a skilled attendant, treatment of children under five with parasite-confirmed malaria with an appropriate anti-malarial within 24 hours of onset of fever).
- Access is a multi-dimensional concept as defined by McIntyre *et al.* (McIntyre D, M et al. 2009), and in this review we focus on the physical access to health services (e.g. access to a health facility within 5km, ratio of health professionals to population, availability of specific services such as the WHO's Essential Health Service Package).
- Quality (focusing on the process of care, as defined by Donabedian (Donabedian A. 2003), meaning the technical or interpersonal activities e.g. treatment provided to a defined standard that may be measured by an index or proportion of essential tasks completed). We did not include user satisfaction as a measure of quality within this review: this falls within the community level, constraints of Hanson *et al.*'s framework rather than the service delivery level (Table 1).
  Equity outcomes in this review included outcomes of coverage, access, or quality disaggregated by wealth quintiles, education, urban/ rural residence, and gender or gender of the household head.

## 5.2 Search strategy for identifying studies

### *5.2.1 Electronic searches*
We will search MEDLINE, CENTRAL and EMBASE electronic databases using a combination of broad search terms relating to health systems (health service delivery, health services, health workforce, quality assurance) AND developing countries AND study design. The complete planned MEDLINE is shown in Appendix 2. The final search strategy will be translated from MEDLINE to CENTRAL and EMBASE databases. In order to access grey literature, we will translate the MEDLINE search strategy to the Global Health database, and plan to browse studies listed under the health service delivery category within ELDIS.

[1] http://www.who.int/whosis/indicators/WHS2011_IndicatorCompendium_20110530.pdf

The health systems and contexts in many low and lower middle income countries have undergone substantial changes in recent times, therefore in order to synthesise recent evidence, we will limit the review to recent literature published between 2000 and 2011. No limits on language of publication will be applied.

Index papers will be classified as those reporting on the quantitative outcomes of intervention studies. Additionally, reference lists and citation searches on the index papers will be used to identify satellite papers, and as such, it will be possible to include more than one paper per study. Satellite papers are defined as publications from the same study as the index paper that reported qualitative data e.g. on implementation, inputs, processes, outputs and outcomes that may be found along the spectrum of the hypothesized pathway of influence between intervention and impact, and will be included in the analysis to extract this additional information that is not likely to be found in the index paper, but which will be relevant for policy makers.

Results from database and other searches will be downloaded and managed within EndNote, where duplicate records will be discarded.

### 5.3 Data collection and analysis

#### *5.3.1 Screening*

Two review authors (BW and LSP) will independently assess against inclusion criteria all the potential studies identified as a result of the search strategy. This process will be guided by the inclusion criteria and associated screening template, which are shown in Appendices 1.2 & 3.

Discrepancies in the selection of studies that cannot be reconciled by discussion will be resolved by referring to the full text, or as a final stage by review from a third review author (LM). We will describe reasons for exclusion, list excluded studies, and use a PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flow-chart to describe the study selection process (Higgins JPT and Green S 2011).

#### *5.3.2 Data extraction and management*

We have designed an extraction form, and two review authors (BW and LSP) will extract the data into Access. Categories of data extracted are listed in detail in Appendix 4, but briefly included details of the study design, intervention, results, study quality, and context.

#### *5.3.3 Analysis and Synthesis*

##### ***5.3.3.1 Narrative Synthesis***

In line with recommendations for systematic reviews of complex interventions (Petticrew and Roberts 2006), we will structure the analysis and synthesis of this review by using a narrative synthesis approach (Popay, Roberts et al. 2006). This approach to analysis will be used to frame the description of study designs, interventions, comparison groups and outcomes. We will summarize data using tables, and identified relevant themes from the included studies for analysis and discussion. The structure of the narrative synthesis will outline the direction of the effect, size of the effect and whether the effect was

consistent across studies. The narrative synthesis analysis will include comparisons across classifications of interventions, which will be guided by the Hanson *et al* framework (Hanson, Ranson et al. 2003) .

#### *5.3.3.2 Mapping the epidemiological evidence to a logic model of pathways of influence*

Figure 3, introduced earlier, shows a simple suggested logic model of anticipated pathways of influence between improvements to health service delivery and coverage, access, equity, and quality outcomes, and mortality impact. We plan to use evidence from the included studies to suggest a more comprehensive model of pathways of influence.

#### *5.3.3.3 Meta-analysis*

Where relevant, based on the study designs, interventions, comparison groups and outcomes of included studies we will carry out meta-analysis in order to estimate a pooled effect (Higgins JPT and Green S 2011).

##### 5.3.3.3.1 Assessment of heterogeneity

If meta-analysis is appropriate, and the assumption that the studies are estimating the same underlying effect is reasonable, we will use fixed effect meta-analysis. We will assess the assumption of homogeneity using the $x^2$ test, assess between study variance using the $T^2$ test, and quantify the statistical heterogeneity between studies using the the $I^2$ statistic. We will classify statistical heterogeneity as high if the p value associated with the $x^2$ test is <0.01, or if the $T^2$ is greater than zero and the $I^2$ value is greater than 30% (Higgins JPT and Green S 2011). If we assume that the underlying effect differs between studies, or if substantial statistically heterogeneity is detected, we will use random effects meta-analysis. An overall summary effect from meta-analysis will only be produced if this is considered to have a meaningful public health interpretation, and interpretation will focus on direction and consistency of the association, rather than overall effect size as interventions are anticipated to be diverse.

##### 5.3.3.3.2 Sensitivity analysis

We will carry out sensitivity analysis, restricting analysis by excluding studies with high risk of bias, or very low quality of the evidence, as well as investigating the influence of studies with clear outlying results, and limiting comparisons to a primary outcome (preferably one of impact such as under five mortality rate).

##### 5.3.3.3.3 Assessment of publication bias

We will investigate publication bias using funnel plots, where there are 10 or more studies in the meta-analysis.

#### *5.3.3.4 Assessment of risk of bias in included studies*

Two review authors (BW and LSP) will independently assess risk of bias for each study included using the criteria outline in the *Cochrane Handbook for Systematic Reviews of Interventions* and the Cochrane Effective Practice and Organisation of Care (EPOC) checklist. We will resolve disagreement by discussion, or by including a third review author (JS). Areas assessed will include reporting of appropriate sample size calculation, random sequence generation and allocation concealment, blinding of participants and personnel, blinding of main outcome assessment, incomplete outcome data, similarity of outcome and other characteristics at baseline between intervention and comparison groups, protection against contamination of comparison groups with the intervention, and selective outcome reporting. Each of the above domains will be assessed as 'done', 'not

done' or 'not clear' suggesting low, high or unclear risk of bias respectively (Higgins JPT and Green S 2011).

#### *5.3.3.5 Assessment of quality of the evidence of included studies*

We will use the GRADE (Grading of Recommendations Assessment, Development and Evaluation) system to assess the quality of the evidence for each individual outcome across studies and to produce a Summary of Findings table (Higgins JPT and Green S 2011). Preferred outcomes will include all-cause under five mortality rate or infant mortality rate, if available. Outcomes of coverage, access, quality and equity will be based on the World Health Organization's 2011 Indicator compendium and will be selected depending on availability across studies. The GRADE criteria will be used for assessing the quality of evidence of probability and plausibility study designs (Guyatt GH, Oxman AD et al. 2008).

*Sources of support*

UK Department for International Development through AUSAID/3ie/DfID call for systematic reviews.

# 6 References

Bosch-Capblanch, X. and P. Garner (2010). "Primary health care supervision in developing countries." Tropical Medicine & International Health **13**(3): 369-383.

Bosch-Capblanch, X., S. Liaqat, et al. (2011). "Managerial supervision to improve primary health care in low- and middle-income countries." Bosch-Capblanch Xavier, Liaqat Sajil, Garner Paul. Managerial supervision to improve primary health care in low- and middle-income countries. Cochrane Database of Systematic Reviews: Reviews 2011 Issue 9 John Wiley & Sons, Ltd Chichester, UK DOI: 10.1002/14651858.CD006413.pub2.

Briggs, C. J., P. Capdegelle, et al. (2001). "Strategies for integrating primary health services in middle- and low-income countries: effects on performance, costs and patient outcomes." Cochrane Database of Systematic Reviews(4): CD003318.

Briggs, C. J. and P. Garner (2006). "Strategies for integrating primary health services in middle- and low-income countries at the point of delivery." Cochrane Database of Systematic Reviews(2): CD003318.

Bryce, J., S. el Arifeen, et al. (2003). "Reducing child mortality: can public health deliver?" The Lancet **362**(9378): 159-164.

Claeson, M., D. Gillespie, et al. (2003). "Knowledge into action for child survival." Lancet **362**(9380): 323-327.

Darmstadt, G. L., Z. A. Bhutta, et al. (2005). "Evidence-based, cost-effective interventions: how many newborn babies can we save?" The Lancet **365**(9463): 977-988.

Donabedian A. (2003). An Introduction to Quality Assurance in Health Care, Oxford University Press.

Dudley, L. and P. Garner (2011). "Strategies for integrating primary health services in low- and middle-income countries at the point of delivery." Cochrane Database Syst Rev(7): CD003318.

Eldridge, C. and N. Palmer (2009). "Performance-based payment: some reflections on the discourse, evidence and unanswered questions." Health Policy & Planning **24**(3): 160-166.

Frenk, J. (2010). "The Global Health System: Strengthening National Health Systems as the Next Step for Global Progress." PLoS Med **7**(1): e1000089.

Fryatt, R., A. Mills, et al. (2010). "Financing of health systems to achieve the health Millennium Development Goals in low-income countries." The Lancet **375**(9712): 419-426.

Guyatt GH, Oxman AD, et al. (2008). "Rating quality of evidence and strength of recommendations GRADE: an emerging consensus on rating quality of evidence and strength of recommendations. ." British Medical Journal **336**: 924-926.

Hanson, K., K. Ranson, et al. (2003). "Expanding access to priority health interventions: A framework for understanding the constraints to scaling-up." Journal of International Development **15**: 1-14.

Hanson, K., M. K. Ranson, et al. (2003). "Expanding access to priority health interventions: a framework for understanding the constraints to scaling-up." Journal of International Development **15**(1): 1-14.

Higgins JPT and Green S (2011). Cochrane Handbook for Systematic Reviews of Interventions.

Jones, G., R. W. Steketee, et al. (2003). "How many child deaths can we prevent this year?" The Lancet **362**(9377): 65-71.

Lagarde, M., A. Haines, et al. (2007). "Conditional cash transfers for improving uptake of health interventions in low- and middle-income countries: a systematic review." JAMA **298**(16): 1900-1910.

Lagarde, M., A. Haines, et al. (2009). "The impact of conditional cash transfers on health outcomes and use of health services in low and middle income countries." Cochrane Database of Systematic Reviews(4): CD008137.

Lagarde, M. and N. Palmer (2009). "The impact of contracting out on health outcomes and use of health services in low and middle-income countries." Cochrane Database of Systematic Reviews(4): CD008133.

Lagarde, M. and N. Palmer (2011). "The impact of user fees on access to health services in low- and middle-income countries." Cochrane Database Syst Rev(4): CD009094.

Lancet (2010). "Evaluation: the top priority for global health." The Lancet **375**(9714): 526.

Lewin, S., S. Munabi-Babigumira, et al. (2010). "Lay health workers in primary and community health care for maternal and child health and the management of infectious diseases." Lewin Simon, Munabi-Babigumira Susan, Glenton Claire, Daniels Karen, Bosch-Capblanch Xavier, van Wyk Brian E, Odgaard-Jensen Jan, Johansen Marit, Aja Godwin N, Zwarenstein Merrick, Scheel Inger B. Lay health workers in primary and community health care for maternal and child health and the management of infectious diseases. Cochrane Database of Systematic Reviews: Reviews 2010 Issue 3 John Wiley & Sons, Ltd Chichester, UK DOI: 10.1002/14651858.CD004015.pub3.

Madon, T., K. J. Hofman, et al. (2007). "Implementation Science." Science **318**(5857): 1728-1729.

McIntyre D, T. M, et al. (2009). "Access as a policy-relevant concept in low- and middle-income countries." Health Econ Policy Law. **4**(Pt 2): 179-193. Epub 2009 Jan 2030.

Murray, C. J. and J. Frenk (2000). "A framework for assessing the performance of health systems." Bull World Health Organ **78**(6): 717-731.

Oliveira-Cruz, V., K. Hanson, et al. (2003). "Approaches to overcoming constraints to effective health service delivery: A review of the evidence." Journal of International Development **15**: 41-65.

Opiyo, N. and M. English (2010). "In-service training for health professionals to improve care of the seriously ill newborn or child in low and middle-income countries (Review)." Cochrane Database of Systematic Reviews(4): CD007071.

Petticrew, M. and H. Roberts (2006). Systematic reviews in the social sciences: a practical guide. Oxford, Blackwell.

Popay, J., H. Roberts, et al. (2006). Guidance on the Conduct of Narrative Synthesis in Systematic Reviews.

Remme, J. H. F., T. Adam, et al. (2010). "Defining Research to Improve Health Systems." PLoS Med **7**(11): e1001000.

Rowe, A. K., D. de Savigny, et al. (2005). "How can we achieve and maintain high-quality performance of health workers in low-resource settings?" Lancet **366**(9490): 1026-1035.

Sibley, L. M., T. A. Sipe, et al. (2007). "Traditional birth attendant training for improving health behaviours and pregnancy outcomes." Cochrane Database Syst Rev(3): CD005460.

Smith, L. A., C. Jones, et al. (2009). "Review: Provider Practice and User Behavior Interventions to Improve Prompt and Effective Treatment of Malaria: Do We Know What Works?" The American Journal of Tropical Medicine and Hygiene **80**(3): 326-335.

Travis, P., S. Bennett, et al. (2004). "Overcoming health-systems constraints to achieve the Millennium Development Goals." The Lancet **364**(9437): 900-906.

van Lonkhuijzen, L., A. Dijkman, et al. (2010). "A systematic review of the effectiveness of training in emergency obstetric care in low-resource environments." BJOG: An International Journal of Obstetrics & Gynaecology **117**(7): 777-787.

Victora, C. G., R. E. Black, et al. (2011). "Measuring impact in the Millennium Development Goal era and beyond: a new approach to large-scale effectiveness evaluations." Lancet **377**(9759): 85-95.

Witter, S., L. Kessy Flora, et al. (2012) "Paying for performance to improve the delivery of health interventions in low and middle-income countries." Cochrane Database of Systematic Reviews DOI: 10.1002/14651858.CD007899.

World Health Organization (2000). The World health report 2000 : health systems : improving performance. Geneva.

World Health Organization (2007). E V E R Y BODY ' S BUS I N E S S STRENGTHENING HEALTH SYSTEMS TO IMPROVE HEALTH OUTCOMES WHO'S FRAMEWORK FOR ACTION.

World Health Organization (2007). Everybody business : strengthening health systems to improve health outcomes : WHO's framework for action. Geneva.

World Health Organization (2009). Global Health Risks- Mortality and burden of disease attributable to selected major risks. Geneva.

World Health Organization (2009). Systems thinking for health systems strengthening. Geneva.

World Health Organization (2010). Countdown to 2015 decade report (2000–2010): taking stock of maternal, newborn and child survival. Geneva.

# Appendices

## Appendix 1.1: Authorship of this review

### Review Team

Barbara Willey [1]

Lucy Smith Paintain [1]

Lindsay Mangham [1]

Josip Car [2]

Joanna Armstrong Schellenberg [1]

1 London School of Hygiene and Tropical Medicine

2 Imperial College London

### Contact details

Barbara Willey

Barbara.Willey@lshtm.ac.uk

## Appendix 1.2: Inclusion and Exclusion criteria

**Inclusion criteria:**
Population:

- Low and lower middle income economies as defined by the World Bank as (Appendix 2);
- Front-line health workers i.e. health care personnel, including community health workers, delivering state-provided health care services to a targeted (e.g. child or maternal) or general population.

Interventions:

- Study described an intervention delivered at scale (in at least one district);
- Study included health services delivered by state providers in low or lower middle income countries;
- Study includes a supply-side intervention to improve the health services provided by front-line workers during their interaction with users. For example pre-service training, in-service training, supervision, guideline and protocol dissemination, reminders, quality improvement, quality assurance, audit and feedback, and checklists were included;
- Interventions which additionally addressed other constraints at the health service delivery level (i.e. shortage or distribution of staff; programme management and supervision; drug and medical supplies; equipment and infrastructure (Hanson, Ranson et al. 2003)), in addition to technical guidance were also included (Table 1).

Outcomes:

- Study reported at least one of the following outcomes: survival impact, coverage, access, quality, equity.

Study Design:

- Study was one of the following designs: RCT, CRT, CT, CBA or ITS.

**Exclusion criteria:**
Interventions:

- Interventions targeting the introduction of new services, or the testing of novel delivery strategies;
- Interventions addressing supervision alone, where supervision was not one element within a multi-faceted intervention to improve the process of delivery of health services that met inclusion criteria, as a comprehensive review of supervision in LMICs exists (Bosch-Capblanch, Liaqat et al. 2011).
- Interventions to strengthen health systems that were targeted at levels other than the service delivery level (i.e. community or household level; health sector policy and strategic management level; public policies cutting across sectors; or

environmental and contextual characteristics), except where these also included interventions targeted at the health services delivery level (Hanson, Ranson et al. 2003).

**Appendix 2: MEDLINE search strategy**

1. "Delivery of Health Care"/ or delivery of health care, integrated/
2. health personnel/ or allied health personnel/ or community health aides/ or nurses/ or pharmacists/ or physicians/
3. health services/ or community health services/ or child care/ or infant care/ or intensive care, neonatal/ or perinatal care/ or child health services/ or exp maternal health services/ or immunization programs/ or mass vaccination/ or vaccination/ or rural health services/
4. quality assurance, health care/
5. or/1-4
6. (randomized controlled trial or controlled clinical trial or clinical trial or evaluation studies or comparative study or multicenter study).pt.
7. research design/ or follow-up studies/ or prospective studies/ or cluster analysis/ or longitudinal studies/ or intervention studies/
8. 6 or 7
9. (letter or editorial or comment or review or case study or news).pt.
10. 8 not 9
11. (animals not (humans and animals)).sh.
12. 10 not 11
13. Angola/
14. Armenia/
15. Belize/
16. Bhutan/
17. Bolivia/
18. Cameroon/
19. Cape Verde/
20. China/
21. Congo/ or "Democratic Republic of the Congo"/
22. Cote d'Ivoire/
23. Djibouti/
24. Ecuador/
25. Egypt/
26. El Salvador/
27. "Georgia (Republic)"/ or Georgia/
28. Guatemala/
29. Guyana/
30. Honduras/
31. Indonesia/

32. India/
33. Iraq/
34. Jordan/
35. Micronesia/
36. Lesotho/
37. Indian Ocean Islands/
38. Moldova/
39. Mongolia/
40. Morocco/
41. Nicaragua/
42. Nigeria/
43. Pakistan/
44. Papua New Guinea/
45. Paraguay/
46. Philippines/
47. Samoa/
48. Atlantic Islands/
49. Senegal/
50. Sri Lanka/
51. Sudan/
52. Swaziland/
53. Syria/
54. Thailand/
55. East Timor/
56. Tonga/
57. Tunisia/
58. Turkmenistan/
59. Ukraine/
60. Uzbekistan/
61. Vanuatu/
62. Vietnam/
63. Yemen/
64. 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54 or 55 or 56 or 57 or 58 or 59 or 60 or 61 or 62 or 63
65. Afghanistan/
66. Bangladesh/

67. Benin/
68. Burkina Faso/
69. Burundi/
70. Cambodia/
71. Central African Republic/
72. Chad/
73. Comoros/
74. congo/ or "democratic republic of the congo"/
75. Eritrea/
76. Ethiopia/
77. Gambia/
78. Ghana/
79. Guinea/ or Equatorial Guinea/
80. Haiti/
81. Kenya/
82. "Democratic People's Republic of Korea"/
83. Kyrgyzstan/
84. Laos/
85. Liberia/
86. Madagascar/
87. Malawi/
88. Mali/
89. Mauritania/
90. Mozambique/
91. Myanmar/
92. Nepal/
93. Niger/
94. Rwanda/
95. Sierra Leone/
96. Melanesia/
97. Somalia/
98. Tajikistan/
99. Tanzania/
100. Togo/
101. Uganda/
102. Zambia/
103. Zimbabwe/

104. 65 or 66 or 67 or 68 or 69 or 70 or 71 or 72 or 73 or 74 or 75 or 76 or 77 or 78 or 79 or 80 or 81 or 82 or 83 or 84 or 85 or 86 or 87 or 88 or 89 or 90 or 91 or 92 or 93 or 94 or 95 or 96 or 97 or 98 or 99 or 100 or 101 or 102 or 103
105. 64 or 104
106. developing countries/
107. 105 or 106
108. 5 and 12 and 107
109. limit 108 to yr="2000-2011"

## Appendix 3: Screening template

***Type of study***
Q1. Is this study any of:

- Individually-randomized controlled trials (RCT)
- Cluster randomized trials (CRT), (including randomized stepped wedge designs)
- Non-randomized cluster trials (CT) with at least two intervention sites and two control sites
- Controlled before and after studies (CBA), with at least two intervention sites and two control sites
- Interrupted time series studies (ITS) where the timing of the intervention is clear and at least three time points before and after the intervention are available

YES: GO TO NEXT QUESTION NO: EXCLUDE UNCLEAR: SEE NEXT QUESTION

***Participants***
Q2. Is this study set in a relevant country?

YES: GO TO NEXT QUESTION NO: EXCLUDE UNCLEAR: SEE NEXT QUESTION

Q3. Does this study include front-line health care workers from the public/ government sector?

YES: GO TO NEXT QUESTION NO: EXCLUDE UNCLEAR: SEE NEXT QUESTION

***Interventions***
Q4. Does the study include an intervention that aim to improve service delivery at the interface between front-line workers and health service users?

YES: GO TO NEXT QUESTION NO: EXCLUDE UNCLEAR: SEE NEXT QUESTION

Q5. Does the study include and intervention for front-line health workers from state-provided health care services?

YES: GO TO NEXT QUESTION NO: EXCLUDE UNCLEAR: SEE NEXT QUESTION

Q6. Does the study include an intervention that targets the supply side of service provision, delivered at the operational level of health service delivery?

YES: GO TO NEXT QUESTION NO: EXCLUDE UNCLEAR: SEE NEXT QUESTION

Q7. Is the intervention to improve delivery of health services implemented in at least one district (i.e. at scale)?

YES: GO TO NEXT QUESTION NO: EXCLUDE UNCLEAR: SEE NEXT QUESTION

***Outcomes***
Q8. Does this study report at least one of the following outcomes:

- Impact (mortality or disease prevalence/ incidence)
- Coverage
- Access
- Quality
- Equity

YES: INCLUDE NO: EXCLUDE UNCLEAR: REFER TO FULL PAPER FOR CLARIFICATION

## Appendix 4: Data to be extracted

- Details of the publication;
- Study design, sample size, duration, timing of assessment;
- Country, scale of implementation;
- Characteristics of the study population, health workers and recipient population;
- Characteristics of the intervention and comparison groups, including: co-interventions, other health system strengthening interventions, health system level of implementation, front-line workers receiving intervention, implementers delivering the intervention, duration of intervention, length between intervention and evaluation, style & content of training, reported fidelity of implementation;
- Reported outcomes of survival impact, coverage, access and quality, including stratification of these by socioeconomic status and other measures of equity where available;
- Risk of bias and quality of the evidence.

**First produced in 2012 by:**

**Evidence for Policy and Practice Information and Co-ordinating Centre (EPPI-Centre)**
**Social Science Research Unit**
**Institute of Education, University of London**
**18 Woburn Square**
**London WC1H 0NR**

**Tel: +44 (0)20 7612 6367**

**http://eppi.ioe.ac.uk/**
**http://www.ioe.ac.uk/ssru/**

The **Evidence for Policy and Practice Information and Co-ordinating Centre** (EPPI-Centre) is part of the Social Science Research Unit (SSRU), Institute of Education, University of London.

The EPPI-Centre was established in 1993 to address the need for a systematic approach to the organisation and review of evidence-based work on social interventions. The work and publications of the Centre engage health and education policy makers, practitioners and service users in discussions about how researchers can make their work more relevant and how to use research findings.

Founded in 1990, the Social Science Research Unit (SSRU) is based at the Institute of Education, University of London. Our mission is to engage in and otherwise promote rigorous, ethical and participative social research as well as to support evidence-informed public policy and practice across a range of domains including education, health and welfare, guided by a concern for human rights, social justice and the development of human potential.



This document is available in a range of accessible formats including large print. Please contact the Institute of Education for assistance:

telephone: +44 (0)20 7947 9556 email: info@ioe.ac.uk