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Paying for performance to improve the delivery of health interventions in low- and middle-income countries (Review)

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[Intervention Review]

Paying for performance to improve the delivery of health interventions in low- and middle-income countries

Karin Diaconu[1], Jennifer Falconer[1], Adrian Verbel[2], Atle Fretheim[3,4], Sophie Witter[1]

[1]Institute for Global Health and Development, Queen Margaret University, Edinburgh, UK. [2]Research Group for Evidence Based Public Health, Leibniz Institute for Prevention Research and Epidemiology - BIPS, Bremen, Germany. [3]Faculty of Health Sciences, Oslo Metropolitan University, Oslo, Norway. [4]Norwegian Institute of Public Health, Oslo, Norway

Contact: Karin Diaconu, kdiaconu@qmu.ac.uk.

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ABSTRACT

Background

There is growing interest in paying for performance (P4P) as a means to align the incentives of healthcare providers with public health goals. Rigorous evidence on the effectiveness of these strategies in improving health care and health in low- and middle-income countries (LMICs) is lacking; this is an update of the 2012 review on this topic.

Objectives

To assess the effects of paying for performance on the provision of health care and health outcomes in low- and middle-income countries.

Search methods

We searched CENTRAL, MEDLINE, Embase, and 10 other databases between April and June 2018. We also searched two trial registries, websites, online resources of international agencies, organizations and universities, and contacted experts in the field. Studies identified from rerunning searches in 2020 are under 'Studies awaiting classification.'

Selection criteria

We included randomized or non-randomized trials, controlled before-after studies, or interrupted time series studies conducted in LMICs (as defined by the World Bank in 2018). P4P refers to the transfer of money or material goods conditional on taking a measurable action or achieving a predetermined performance target. To be included, a study had to report at least one of the following outcomes: patient health outcomes, changes in targeted measures of provider performance (such as the delivery of healthcare services), unintended effects, or changes in resource use.

Data collection and analysis

We extracted data as per original review protocol and narratively synthesised findings. We used standard methodological procedures expected by Cochrane. Given diversity and variability in intervention types, patient populations, analyses and outcome reporting, we deemed meta-analysis inappropriate. We noted the range of effects associated with P4P against each outcome of interest. Based on intervention descriptions provided in documents, we classified design schemes and explored variation in effect by scheme design.

Main results

We included 59 studies: controlled before-after studies (19), non-randomized (16) or cluster randomized trials (14); and interrupted time-series studies (9). One study included both an interrupted time series and a controlled before-after study.

Studies focused on a wide range of P4P interventions, including target payments and payment for outputs as modified by quality (or quality and equity assessments). Only one study assessed results-based aid. Many schemes were funded by national governments (23 studies) with the World Bank funding most externally funded schemes (11 studies). Targeted services varied; however, most interventions focused on reproductive, maternal and child health indicators. Participants were predominantly located in public or in a mix of public, non-governmental and faith-based facilities (54 studies). P4P was assessed predominantly at health facility level, though districts and other levels were also involved.

Most studies assessed the effects of P4P against a status quo control (49 studies); however, some studies assessed effects against comparator interventions (predominantly enhanced financing intended to match P4P funds (17 studies)). Four studies reported intervention effects against both comparator and status quo.

Controlled before-after studies were at higher risk of bias than other study designs. However, some randomised trials were also downgraded due to risk of bias. The interrupted time-series studies provided insufficient information on other concurrent changes in the study context.

P4P compared to a status quo control

For health services that are *specifically targeted*, P4P may slightly improve health outcomes (low certainty evidence), but few studies assessed this. P4P may also improve service quality overall (low certainty evidence); and probably increases the availability of health workers, medicines and well-functioning infrastructure and equipment (moderate certainty evidence). P4P may have mixed effects on the delivery and use of services (low certainty evidence) and may have few or no distorting unintended effects on outcomes that were not targeted (low-certainty evidence), but few studies assessed these. For secondary outcomes, P4P may make little or no difference to provider absenteeism, motivation or satisfaction (low certainty evidence); but may improve patient satisfaction and acceptability (low certainty evidence); and may positively affect facility managerial autonomy (low certainty evidence). P4P probably makes little to no difference to management quality or facility governance (low certainty evidence). Impacts on equity were mixed (low certainty evidence).

For health services that are *untargeted*, P4P probably improves some health outcomes (moderate certainty evidence); may improve the delivery, use and quality of some health services but may make little or no difference to others (low certainty evidence); and may have few or no distorting unintended effects (low certainty evidence). The effects of P4P on the availability of medicines and other resources are uncertain (very low certainty evidence).

P4P compared to other strategies

For health outcomes and services that are *specifically targeted*, P4P may make little or no difference to health outcomes (low certainty evidence), but few studies assessed this. P4P may improve service quality (low certainty evidence); and may have mixed effects on the delivery and use of health services and on the availability of equipment and medicines (low certainty evidence).

For health outcomes and services that are *untargeted*, P4P may make little or no difference to health outcomes and to the delivery and use of health services (low certainty evidence). The effects of P4P on service quality, resource availability and unintended effects are uncertain (very low certainty evidence).

Findings of subgroup analyses

Results-based aid, and schemes using payment per output adjusted for service quality, appeared to yield the greatest positive effects on outcomes. However, only one study evaluated results-based aid, so the effects may be spurious. Overall, schemes adjusting both for quality of service and rewarding equitable delivery of services appeared to perform best in relation to service utilization outcomes.

Authors' conclusions

The evidence base on the impacts of P4P schemes has grown considerably, with study quality gradually increasing. P4P schemes may have mixed effects on outcomes of interest, and there is high heterogeneity in the types of schemes implemented and evaluations conducted. P4P is not a uniform intervention, but rather a range of approaches. Its effects depend on the interaction of several variables, including the design of the intervention (e.g., who receives payments), the amount of additional funding, ancillary components (such as technical support) and contextual factors (including organizational context).

PLAIN LANGUAGE SUMMARY

Paying for performance to improve the delivery of healthcare services in low- and middle-income countries

The aim of this Cochrane Review was to assess the effects of 'pay for performance' on the delivery of healthcare services in low- and middle-income countries. The review authors collected and analysed all relevant studies to answer this question and found 59 studies.

Key messages

The studies included in this review looked at pay for performance approaches that varied in their design, setting and implementation. The review shows that pay for performance may have both positive and negative effects on the health services it targets. It may also have positive effects on other health services that are not directly targeted and may have no unintended negative effects on these services. However, most of this evidence is of low certainty and we need more, well-conducted studies on this topic.

What is 'pay for performance'?

In a 'pay for performance' approach, people are given money or other rewards if they carry out a particular task or meet a particular target. Pay for performance is usually directed at health workers or healthcare facilities. The health workers or healthcare facilities are rewarded if they offer particular services or deliver care that is of a certain quality, or if their patients use particular services and achieve better health as a result.

Pay for performance can be used to target specific health problems and services that need improvement. But pay for performance could also affect other services that are not specifically targeted. For instance, it could lead health workers to improve the quality of the other services they deliver. But it could also lead them to avoid services that don't lead to extra payment. To find out more, the review authors assessed the effects of paying for performance on both targeted and untargeted services. This included looking for any unintended effects.

What are the main results of the review?

The review included 59 relevant studies. Most were from sub-Saharan Africa and Asia. Most of the pay for performance schemes in the studies were funded by national Ministries of Health, also with support of the World Bank.

Forty-nine studies compared health facilities that used pay for performance with health facilities that were doing business as usual. Seventeen studies compared health facilities that used pay for performance with facilities that used other approaches. In most of these studies, these approaches involved giving similar amount of funds but without insisting on a pay for performance element.

The effects of paying for performance compared to business as usual

For health services that are *specifically targeted*, pay for performance:

- may improve some health outcomes, may improve service quality and probably increase the availability of health workers, medicines and well-functioning infrastructure and equipment; but

- may have both positive and negative effects on the delivery and use of health services.

For health services that are *untargeted*, pay for performance:

- probably improves some health outcomes;

- may improve the delivery, use and quality of some health services but may make little or no difference to others; and

- may have few or no unintended effects.

We don't know what the effects of pay for performance are on the availability of medicines and other resources because the evidence was of very low certainty

The effects of paying for performance compared to other approaches

For health outcomes and services that are *specifically targeted*, pay for performance:

- may improve service quality;

- may make little or no difference to health outcomes; and

- may have both positive and negative on the delivery and use of health services and on the availability of equipment and medicines.

For health outcomes and services that are *untargeted*, pay for performance:

- may make little or no difference to health outcomes and to the delivery and use of health services.

We don't know what the effects of pay for performance are on service quality, on the availability of resources, and on unintended effects because the evidence was missing or of very low certainty

How up to date is this review?

The review authors included studies that had been published up to April 2018.

SUMMARY OF FINDINGS

Summary of findings 1. Comparison 1: summary of findings on effects of paying for performance against standard care

Outcome	Summary of impacts	Certainty of the evidence (GRADE)[a]
Primary outcomes		
Health outcomes	When targeted, P4P may (low-certainty evidence): • reduce child mortality (range: 0.2–6.5% reduction); • slightly reduce the proportion of children with reported anaemia (range: 2–3% reduction); • increase the likelihood of tuberculosis treatment success (range: 12–20% improvement); • have inconsistent effects on neonatal mortality: 1 study showed that P4P may reduce neonatal mortality in implementing clinics by up to 22%; another study showed that P4P may increase neonatal mortality by approximately 6.5% across catchment areas of P4P-incentivized providers. When not targeted, P4P probably slightly reduces child mortality, and the proportions of children with anaemia and with wasting (moderate-certainty evidence).	⊕⊕⊖⊖ **Low**
Delivery and utilization of health services	When targeted, the effects of P4P on the delivery and utilization of services was inconsistent: the intervention may improve some delivery and utilization indicators but may lead to poorer results for other indicators. Specifically: • P4P may increase the proportion of people receiving HIV testing (range: 6–600%) and the delivery of PMTCT (range: 3.8–21%); may decrease the proportion of people receiving ART; may decrease the proportion of children (up to 120% decline) and households protected with bednets (up to 7.3%) (all low-certainty evidence); • We are uncertain of the effects on tuberculosis adherence as the certainty of the evidence was very low; • P4P probably increases family planning outreach (increase up to 300%; moderate-certainty evidence); • P4P may have mixed effects on mother and child immunizations and antenatal care utilization (low-certainty evidence). When not targeted, the effects may be inconsistent (low-certainty evidence).	⊕⊕⊖⊖ **Low**
Quality of care	Overall, P4P may improve the quality of targeted services (low-certainty evidence). In addition, P4P probably (moderate-certainty evidence): • improves quality of child healthcare scores (range: 5–300% relative increases); • improves the quality scores of available medicine and equipment (range: 2.7–220% increase); • improves the mean quality of service scores by specific departmental area/service in specific targeted areas (range: 39% to 15-fold increase in scores). We are uncertain of the effects of P4P on procedural quality of care as the certainty of the evidence was very low. P4P may make little or no difference to staff knowledge and skills (low-certainty evidence), and its effects on staff responsiveness were uncertain overall (very low-certainty evidence).	⊕⊕⊖⊖ **Low**

	When not targeted, the effects may be inconsistent (low-certainty evidence).	
Unintended effects	P4P may have few or no distorting unintended effects on outcomes that were not targeted (low-certainty evidence).	⊕⊕⊖⊖ **Low**
Resource use	Overall, P4P may have desirable effects on resource use when targeted (low-certainty evidence). In addition, P4P probably (moderate-certainty evidence): • has a positive effect on human resource availability (range: 19–44%); • has positive impacts on infrastructure functionality and medicine availability. When not targeted, we are uncertain of the effects as the certainty of the evidence was very low.	⊕⊕⊖⊖ **Low**
Secondary outcomes		
Provider motivation, satisfaction, absenteeism and acceptability	When targeted, P4P probably makes little or no difference to provider absenteeism (range: 0.7–2%; moderate-certainty evidence) and may make little or no difference to overall motivation scores and satisfaction (low-certainty evidence). When not targeted, the intervention may have desirable effects (low-certainty evidence).	⊕⊕⊖⊖ **Low**
Patient satisfaction and acceptability	When targeted, P4P may have desirable effects, with only two outcomes (satisfaction with care quality and provider communication) showing little to no difference in response to P4P (low-certainty evidence). When not targeted, P4P may have desirable effects, except for satisfaction with provider–patient contact time and facility opening hours (low-certainty evidence).	⊕⊕⊖⊖ **Low**
Impacts on management or information systems (if not a targeted measure of performance)	When targeted, P4P may positively affect facility managerial autonomy (low-certainty evidence), but probably makes little to no difference to management quality or facility governance (moderate-certainty evidence). When not targeted, effects are inconsistent.	⊕⊕⊖⊖ **Low**
Equity considerations: evidence of differential impacts on different parts of the population	When targeted, P4P may increase the proportion of poor people utilizing child immunization services, but may decrease the proportion of poor people utilizing antenatal care. P4P may make little to no difference to the utilization of institutional deliveries by the poorest groups (all low-certainty evidence). When not targeted, effects are inconsistent.	⊕⊕⊖⊖ **Low**

GRADE Working Group grades of evidence

High certainty: This research provides a very good indication of the likely effect. The likelihood that the effect will be substantially different* is low.
Moderate certainty: This research provides a good indication of the likely effect. The likelihood that the effect will be substantially different* is moderate.
Low certainty: This research provides some indication of the likely effect. However, the likelihood that it will be substantially different* is high.
Very low certainty: This research does not provide a reliable indication of the likely effect. The likelihood that the effect will be substantially different** is very high.

* Substantially different = a large enough difference that it might affect a decision

ART: antiretroviral therapy; P4P: paying for performance; PMTCT: prevention of mother-to-child transmission.

[a]GRADE assessments refer to summative judgements of the review authors across multiple outcomes. See Table 1 for a detailed account of all outcomes and relevant GRADE assessments.
A meta-summary for each outcome of the contributing indicators, including the direction of effect and certainty of the evidence, is available in Table 1.
The detailed data underlying these tables are available in Appendix 1.

Summary of findings 2. Comparison 2: summary of findings on effects of paying for performance against comparator interventions

Outcome	Summary of impacts	Certainty of the evidence (GRADE)[a]
Primary outcomes		
Health outcomes	P4P may make little to no difference to health outcomes, both when targeted and when not targeted (low-certainty evidence).	⊕⊕⊖⊖ **Low**
Delivery and utilization of health services	When targeted, P4P may (low-certainty evidence): • increase the probability of people utilizing care (range: 2–10% increase), but may make little or no difference, or have uncertain effects, on immunization uptake; • make little to no difference to the utilization of any family planning services or to overall rates of antenatal care utilization; however, P4P may positively affect the timeliness of antenatal care-seeking (range: 1–10% women accessing care earlier); • have inconsistent effects on the proportion of women utilizing institutional deliveries (range: –9% to 23% change in utilization); • decrease postnatal care utilization. Evidence on the effects of P4P on non-targeted utilization outcomes was sparse, and the available evidence suggests it may make little or no difference (low-certainty evidence).	⊕⊕⊖⊖ **Low**
Quality of care	When targeted, P4P may (low-certainty evidence): • improve quality of care in relation to family planning (up to 500% improvement) and antenatal care (up to 40% improvement); • increase procedural care quality (e.g., increasing the proportion of staff conducting appropriate patient background and physical assessments during consultations). When not targeted, we are uncertain of the effects as the certainty of the evidence was very low.	⊕⊕⊖⊖ **Low**
Unintended effects	No studies reported evidence on distorting unintended effects.	
Changes in resource use	When targeted, P4P may have mixed effects (low-certainty evidence): it may increase equipment availability by 75% but may reduce medicine availability by up to 160%. When not targeted, we are uncertain of the effects as the certainty of the evidence was very low.	⊕⊕⊖⊖ **Low**
Secondary outcomes		
Provider motivation, satisfaction, absen-	No studies assessed directly targeted indicators for provider motivation, satisfaction, absenteeism and acceptability.	⊕⊕⊖⊖

teeism and acceptability	When not targeted, P4P may make little or no difference to these outcomes (low-certainty evidence).	**Low**
Patient satisfaction and acceptability	No studies assessed directly targeted indicators for patient satisfaction and acceptability. When not targeted, P4P may have desirable effects (e.g., on cleanliness, waiting and contact time indicators), but may make little to no difference to overall patient satisfaction scores (low-certainty evidence).	⊕⊕⊖⊖ **Low**
Impacts on management or information systems (if not a targeted measure of performance)	When targeted, P4P may have desirable effects (low-certainty evidence). When not targeted, we are uncertain of the impacts as the certainty of the evidence was very low.	⊕⊕⊖⊖ **Low**
Equity considerations: evidence of differential impacts on different parts of the population	When targeted, P4P may make little or no difference to equity, or may worsen equity (low-certainty evidence). For example, P4P may increase utilization of family planning services and institutional deliveries among wealthier population groups. No studies assessed equity considerations for non-targeted outcomes.	⊕⊕⊖⊖ **Low**

GRADE Working Group grades of evidence

High certainty: This research provides a very good indication of the likely effect. The likelihood that the effect will be substantially different* is low.
Moderate certainty: This research provides a good indication of the likely effect. The likelihood that the effect will be substantially different* is moderate.
Low certainty: This research provides some indication of the likely effect. However, the likelihood that it will be substantially different* is high.
Very low certainty: This research does not provide a reliable indication of the likely effect. The likelihood that the effect will be substantially different** is very high.

* Substantially different = a large enough difference that it might affect a decision

P4P: paying for performance.
[a]GRADE assessments here refer to summative judgements of the authors across multiple outcomes. See Table 2 for a detailed account of all outcomes and relevant GRADE assessments.
A meta-summary for each outcome of the contributing indicators, including the direction of effect and certainty of the evidence, is available in Table 2.
The detailed data underlying these tables are available in Appendix 2.

BACKGROUND

Description of the condition

Improving the performance of healthcare delivery systems is an important objective, both in high-income settings and, even more critically, in low- and middle-income country (LMIC) settings, where resources for health are much more constrained. Performance-based payment (paying for performance; P4P) has received increased attention as a strategy for improving the performance of healthcare providers, organizations and governments since the early 2010s. It is also promoted as an important tool for wider health system reforms (Meessen 2011; Soucat 2017). However, the last Cochrane Review found limited rigorous evidence on its effectiveness (Witter 2012), and, while there has been a growth in studies of P4P since that review, there is a gap in relation to synthesised evidence of its effectiveness in different contexts and for different services in LMICs.

Description of the intervention

P4P refers to the transfer of money or material goods conditional on taking a measurable action or achieving a predetermined performance target (Eichler 2006). P4P is also referred to as results-based funding (RBF), performance-based funding (PBF) and output-based aid (OBA). While P4P is a relatively simple concept, it includes a wide range of interventions that vary with respect to the level at which the incentives are targeted (recipients of health care, individual providers of health care, healthcare facilities, private sector organizations, public sector organizations and national or subnational levels) and the type of reward (payment based on fee-for-service, other monetary payments and non-monetary rewards) (Musgrove 2011). P4P interventions can also reward a wide range of measurable actions, including health outcomes, delivery of effective interventions (e.g. immunization), utilization of services (such as antenatal visits or births at an accredited facility) and quality of care. P4P interventions typically also includes ancillary components such as increasing the availability of resources to health care, education, supplies, technical support or training, monitoring and feedback, increasing health worker pay, construction of new facilities, improvements in planning and management, or information systems (Oxman 2008).

While it is conceivable that pay increases designed to increase motivation and retention of staff might fall within this definition, in this review we focused on reforms that are explicitly linked to changing patterns of activity, output or outcome indicators (thus excluding routine changes to pay or public funding flows, or user fee regimens). Another systematic review has addressed the use of conditional cash transfers for service users (demand-side P4P) for improving the uptake of health interventions in LMICs (Lagarde 2011, currently being updated). Therefore, our review focuses on updating the evidence originally appraised by Witter and colleagues in 2012 of the impacts of supply-side P4P aimed at improving the delivery of health interventions (Witter 2012). In this review, P4P includes both P4P schemes (including ancillary components) and P4P per se (where any ancillary components are controlled for).

How the intervention might work

P4P by individuals is not new – it has taken the form of user fees, and in many LMICs it remains one of the main forms of health financing. However, public funding for health has commonly taken the form of budget flows, which are linked to indicators such as staffing levels or bed numbers (for facilities), inputs (such as estimated drug needs), population numbers (for regions and districts, in some cases) and also historical trends in expenditure (all modified by overall budget constraints).

These bureaucratic mechanisms offer the advantage of stability and predictability, and rely on local clinical judgement as to how and what services to offer. However, the disadvantage is that health systems based on budget funding and salaried staff can lack incentives to improve quality, increase outputs and improve outcomes. P4P aims to reintroduce those incentives by linking pay (at individual or facility level) to desired activities or outcome indicators, or both. It may in addition increase resources (by providing supplementary funding) or may be an alternative mechanism for channelling existing funding resources (substituting for existing funds).

In Organisation for Economic Co-operation and Development (OECD) countries, P4P is generally described as a tool for improving performance and accountability (Cashin 2014; Christianson 2007). However, in LMICs, it can have wider objectives (Witter 2009; Witter 2013). These include:

- increasing the allocative efficiency of health services (by encouraging the provision of high-priority and cost-effective services);
- increasing the technical efficiency (by making better use of existing resources such as health staff);
- improving equity of outcomes (e.g. by encouraging expansion of services to difficult-to-reach groups).

Other researchers emphasise the potential of P4P to transform health sectors, introducing client-oriented public finance models inspired by the new public management mode (Meessen 2011). A review of the potential mechanisms of change for P4P emphasises their complexity, the lack of consensus on how P4P might work, and the importance of local norms and values in how P4P will function (Renmans 2016).

Paying providers for performance is clearly premised on the assumption that a change in behaviour on the provider side is required for allocative and technical efficiency and equity of outcomes to change. However, if substantive demand-side barriers exist (such as low affordability of services), then P4P for providers alone will not be effective.

Paying providers for performance in LMICs can operate at several levels. It can be offered directly to community health workers or to professional health workers (in public, private or private not-for-profit sectors) or to facilities. It can be used to set budgets or supplement budgets at higher organizational units, such as health districts or regions. It can also be used at national level, in particular by donor organizations negotiating aid to a national health sector. Clearly, incentives would be expected to operate differently at these different levels: incentives to individuals are likely to be more directly motivating (incentives to organizations only affect behaviour indirectly, if passed on in some way to individuals), but may undermine co-operation (unlike organizational incentives, which might be expected to reinforce co-operation).

It seems intuitive that paying more money for the delivery of effective services will improve health care, but health care does

not operate like a classic free market. Human behaviour is complex and there are many theories that attempt to explain both health behaviour and professional behaviour. The principal-agent theory addresses relationships where one individual (the patient) cannot directly observe or know the level of skill or effort expended by the other individual (the professional) doing the contracted work. Patients do not have perfect knowledge of their medical condition, their need for care or the expected outcome of healthcare services. Therefore, they are willing to have healthcare professionals act as their agents in providing information and services and patient demand for health care may be unresponsive to technical quality. One theoretical advantage of performance pay is that explicit financial incentives are provided even when patient demand for health care is unresponsive to quality. In other words, professional effort in providing high quality is rewarded, regardless of whether patients recognize it. This theoretical advantage relies, however, on a host of assumptions, including the ability to assess quality, the linkage of P4P systems with quality measures and the absence of adverse consequences. Moreover, in LMICs in particular, P4P is being deployed for a wide range of reasons other than improving quality. It is envisaged more ambitiously as a tool to increase the responsiveness of staff and the health system generally to priority areas, and in some settings is the main funding mechanism for primary care (Witter 2019a).

It is also important to note that although financial incentives and healthcare payment systems are likely to have an important influence on professional behaviour, this influence is far from exclusive. In economic terms, professionals are viewed as maximizing their utility function (i.e. their well-being). Important factors in their utility function, besides income, include professional and social status (or self-image), altruism (doing what they perceive to be best for their patients), the burden of efforts to change their behaviour and their uncertainty about the benefits of changing their behaviour. Moreover, there may be other barriers to changing professional behaviour, even when professionals are motivated, including patient factors, lack of time, lack of technical skills, lack of resources and organizational constraints.

It is generally accepted that professionals are motivated by the satisfaction of doing their jobs well (intrinsic motivation). Indeed, it is doubtful whether some valued but difficult-to-observe dimensions of quality (such as empathy or listening in the medical encounter) would be provided at all if physicians were solely interested in income. Therefore, health professionals have both monetary and non-monetary incentives, all of which affect their performance. It is possible that financial incentives may dilute professionals' intrinsic motivation and this is the subject of widespread debate around public sector motivation in higher-income countries (Marquand 2004). Psychological studies also highlight the risks to intrinsic motivation of extrinsic rewards (Deci 1999). The risk of coercion for patients – for example, when specific family planning methods are incentivized – is also highlighted by some studies (e.g. Blacklock 2016). In contrast, where health workers' pay is low in absolute terms, incentives may be an important channel to improve motivation through increasing their income levels. There is a small but growing literature on the effects of P4P on provider motivation, the results of which are so far ambiguous (e.g. Dale 2014), highlighting the importance of understanding different contexts and models.

The timescale of evaluation is another important consideration. Financial incentives might be effective in the short run for simple and distinct, well-defined behavioural goals, but these are not necessarily sustained in the longer term. Some studies have now focused on the period after the end of P4P programmes, giving a longer-term perspective on their effects (Huillery 2014). P4P schemes are often accompanied by ancillary features, such as training initiatives and enhanced supervision arrangements. When P4P schemes including these features are compared to no intervention, it may be impossible to disentangle the impact of P4P per se from the impact of these ancillary components. It is also important to capture systemic effects, where possible: P4P is increasingly recognized to be a complex package of measures, influenced by and potentially influencing the wider health system (Witter 2013).

Why it is important to do this review

The first systematic review of the impacts of supply-side P4P in LMICs was published in 2012, and found the evidence base to be weak (Witter 2012). Since then, the number of P4P programmes in LMICs has expanded considerably, as have the number of studies examining different aspects of these programmes. In particular, the World Bank-managed Health Results Innovation Trust Fund has spent USD 307.1 million on programmes in 28 countries and supported 24 impact evaluations alongside these programmes (RBF Health 2020). With this growth in interest, funding and potentially robust studies, it is timely to review the evidence base.

While reviews of schemes in high-income countries can help to inform decisions in LMICs, there are several reasons for undertaking a review of the impacts of P4P in LMICs specifically. The potential benefits, harms and costs of P4P may be greater in LMICs, where there are fewer resources than in high-income countries, weak health systems, inadequate supplies, facilities and human resources, and greater inequities, and where P4P schemes are often introduced by donors and include ancillary components, such as increased resources and technical support.

P4P is a complex intervention with uncertain benefits and potential harms. It may, for example, lead to the concentration of resources in areas where targets are easier to meet (which typically are better served areas), thus increasing inequity of provision, or lead to neglect of unincentivized services. The extent to which benefits attributed to P4P in LMICs are attributable to conditionality (versus ancillary components of P4P schemes in LMICs, such as increased resources and technical support) is also uncertain. P4P may not be a good use of resources, even when it is effective, due to potentially small effects and high costs. For these reasons, an updated systematic review of evaluations of the impacts of P4P is needed to inform decisions about whether and when to use P4P, how to design these schemes, and how to monitor and evaluate them in LMICs.

OBJECTIVES

To assess the effects of paying for performance on the provision of health care and health outcomes in low- and middle-income countries.

METHODS

Criteria for considering studies for this review

Types of studies

A brief outline of inclusion and exclusion criteria follows; a full list of exclusion reasons is available in Appendix 3.

The review includes:

- randomized trials;
- non-randomized trials (experimental studies in which people were allocated to different interventions using methods that were not random);
- controlled before-after (CBA) studies where:
  - at least two clusters were included in each comparison group;
  - pre- and postintervention periods for study and control groups were the same;
  - choice of the control site was appropriate (i.e. sites had similar socioeconomic characteristics or there were no major differences evident in the baseline groups, or both);
- interrupted time series (ITS) studies with at least three measurements before and after introducing the intervention.

Well-designed cluster-randomized trials protect against selection bias and are likely to provide the most rigorous estimates of the impacts of P4P schemes. However, cluster-randomized trials may not be practical for evaluating some P4P schemes (e.g. when there is simultaneous system-wide implementation). Although CBA studies are often at high risk of bias, we believe it is important, at least at this time, to include these studies. ITS studies may be problematic due to changes in information systems and the reliability of information systems used in P4P schemes in LMICs. However, they potentially have a lower risk of bias than CBA studies. Other study designs may provide useful information about acceptability, potential effects or explanations for observed effects of P4P, but are unlikely to provide useful estimates of the impact of P4P on the main outcomes of this review.

Types of participants

Participants in P4P schemes include providers of healthcare services (health workers and facilities), subnational organizations (health administrations, non-governmental organizations or local governments), national governments and combinations of these. We included all sectors (public, private and private not-for-profit) in the review.

Types of interventions

P4P takes three main forms.

- Conditional cash payment.
- Conditional provision of material goods.
- Target payments (payments for reaching a certain level of coverage, which can be defined in absolute terms or relative to a starting point).

We have included evaluations of P4P schemes (including ancillary components) compared to any alternative (including non-conditional financial incentives and different levels of conditional financial incentives). We have included comparisons with alternatives where there may be differences in ancillary components, such as increased resources, as well as differences in P4P.

We excluded studies in which:

- the primary focus of the financing scheme was the demand-side of healthcare (e.g. conditional cash transfers targeted at specific population groups) or where demand-side interventions were purposefully run concurrently with a P4P intervention but effects of the latter could not be untangled;
- payment to health workers or facilities not explicitly linked to changing patterns of performance (e.g. for coming to work; salary increases; routine increases in activity-based payments such as diagnosis-related groups (DRGs) or fees for service; or changes to budget flows that were routine or intended to motivate, but without being conditional on specific activity or output measures).

We listed studies for which full-texts could not be obtained under Studies awaiting classification.

Types of outcome measures

Primary outcomes

To be included, a study must have reported at least one of the following outcomes:

- patient health outcomes (e.g. mortality rates, treatment success);
- changes in targeted measures of provider performance, such as the utilization, delivery or quality of healthcare services;
- unintended effects, including motivating unintended behaviours, distortions (ignoring important tasks that were not rewarded with incentives), 'cherry-picking'/'cream-skimming' (prioritizing patients that were most profitable over those who released fewer financial rewards), gaming (improving or cheating on reporting rather than improving performance), increased inequities and dependency on financial incentives;
- changes in resource use, including for incentives, administration and services.

Secondary outcomes

We included the following outcomes if reported in included studies or in publications or reports ancillary to the main impact evaluation:

- impacts on provider motivation, satisfaction, absenteeism and acceptability;
- impacts on patient satisfaction and acceptability (such as satisfaction scores);
- impacts on overall financing or resource allocation;
- impacts on management or information systems (if not a targeted measure of performance);
- equity consideration: evidence of differential impact on different parts of the population.

Given the focus on effectiveness, we excluded the results of qualitative studies conducted alongside impact evaluations. However, we included estimates of health economic evaluations conducted alongside impact evaluations as they report on changes in resource use linked to P4P schemes.

Search methods for identification of studies

Electronic searches

We conducted searches for all studies between April 2018 and June 2018 and updated them in 2020. Studies from the initial 2018 search are incorporated in this review. Studies identified in subsequent search updates have been marked as relevant and are listed under Studies awaiting classification.

We searched the following electronic databases.

- The Cochrane Central Register of Controlled Trials (CENTRAL) 2018, Issue 3, part of the Cochrane Library (searched 10 April 2018);
- MEDLINE Epub Ahead of Print, In-Process & Other Non-Indexed Citations, MEDLINE Daily and MEDLINE 1946 to present, Ovid (searched10 April 2018);
- Embase 1974 to 2018 April 09, Ovid (searched 10 April 2018);
- PsycINFO 1806 to April Week 1 2018, Ovid (searched 10 April 2018);
- EconLit 1886 to present, EBSCOhost (searched 27 April 2018);
- LILACS, Virtual Health Library (VHL) (searched 10 April 2018);
- WHOLIS, Virtual Health Library (VHL) (searched 10 April 2018).

We revised the original review protocol to expand the number of databases searched. For this review update, we also searched:

- CINAHL 1981 to present, EBSCOhost (searched 10 April 2018);
- 3ie Database of Impact Evaluations (searched 7 June 2018);
- BLDS British Library for Development Studies (searched 18 June 2018);
- Global Health 1973 to present, Ovid (searched 27 April 2018).

We searched two grey literature databases in June 2018:

- The Grey Literature Report (www.greylit.org/);
- OpenGrey (www.opengrey.eu/).

We searched two trial registries in June 2018:

- International Clinical Trials Registry Platform (ICTRP), World Health Organization (WHO) (www.who.int/ictrp/en/);
- ClinicalTrials.gov, US National Institutes of Health (NIH) (clinicaltrials.gov/).

We did not search International Pharmaceutical Abstracts, so it is possible that studies relating to pharmaceuticals were missed. However, the general searches, including in websites focused on this topic, did not suggest that we had missed any relevant studies.

We developed strategies that incorporated the methodological component of the Effective Practice and Organisation of Care (EPOC) search strategy combined with selected index terms and free-text terms. The updated search strategy incorporated new terms recently cited in the literature to describe pay for performance interventions. We placed no language or date restrictions on the search strategy. We translated the MEDLINE search strategy into the other databases using the appropriate controlled vocabulary and applied filters related to study design and setting (LMICs).

See Appendix 4 for the full search strategies for all databases.

Searching other resources

We contacted international experts in the field, including the authors of relevant articles that were retrieved. We asked them to identify additional websites, experts, academic (or other) institutions active in this field, as well as additional relevant studies.

In addition, we searched the websites of organizations likely to be active in the field in May 2018 and June 2018 (and checked for update in November to December 2020), including: the World Bank; RBF Health; the African Development Bank; the Inter-American Development Bank; US Agency for International Development (USAID); CORDAID; Management Sciences for Health (MSH); Centre for Global Development; WHO; Swiss Tropical and Public Health Institute (Swiss TPH); Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ); KfW Entwicklungsbank; Department for International Development (DFID); The Global Alliance for Vaccines and Immunization (GAVI); The Global Fund to Fight AIDS, Tuberculosis and Malaria; Asian Development Bank and Pan American Health Organization (PAHO).

In 2018 (and for the 2020 update), we additionally searched the websites of academic institutions active in this field, such as the London School of Hygiene and Tropical Medicine, the Harvard School of Public Health, University of Cape Town, Institute of Policy Studies of Sri Lanka (IPS), the Kenya Institute of Policy Analysis and Research (IPAR) and Institute of Tropical Medicine, Belgium. Given the sparse results obtained from these sources, we revised the list of websites to be searched for updates in December 2019. Updated searches included websites of the University of Heidelberg, University of Bergen and University of Rotterdam.

We additionally conducted a Web of Science citation search in June 2019 for the studies included in the review and checked references from included studies and other relevant articles, to identify other relevant studies that met the inclusion criteria.

Data collection and analysis

Selection of studies

Two review authors independently screened abstracts to identify studies that met the inclusion criteria. We retrieved the full-text of studies selected as meeting or possibly meeting the criteria and two review authors independently rechecked them and produced a final list of included studies.

Data extraction and management

One review author carried out data extraction using a modified version of the Cochrane EPOC Group data collection checklist; a second review author independently verified all extractions. We resolved disagreements by discussion.

Appendix 5 shows the data extraction template. Among others, we extracted data on: the PBF scheme (including P4P scheme type, targeted sectors and levels, scope and funding source of the scheme, relative and absolute magnitude of incentives, verification mechanisms and ancillary components), study design and setting, study participants, study methods (including units of allocation and analysis, data sources, power calculations, analytic methods), outcome measures (as prespecified under Primary outcomes and Secondary outcomes) and associated results, and comments by authors on interpretation of findings.

Assessment of risk of bias in included studies

Two review authors independently used criteria recommended by the Cochrane EPOC Group to assess the risk of bias for each main outcome in all studies included in the review (EPOC 2017a).

Measures of treatment effect

For randomized trials, non-randomized trials and CBA studies, we recorded the effect estimates reported by the investigators. Most commonly reported were the relative effects of the intervention obtained from difference-in-difference regression models adjusting for multiple covariates and confounders. These relative effects were reported in the form of regression betas. For all such betas, we opted to recalculate a more easily interpretable relative effect measure denoting the effect that the authors of the included studies attributed to the intervention (i.e. the percentage change in an outcome indicator associated with the intervention), in comparison to the control group baseline mean. To calculate this, we divided the effect estimate beta by the control group mean and multiplied by 100 to obtain a percentage change in outcome attributable to the intervention. Therefore, we reported this relative effect measure throughout the review, rather than absolute percentage point differences. Precision measures (confidence intervals, standard errors or deviations) were frequently not reported across studies; we did not calculate or impute these and instead focused our reporting on the effect measure noted above.

If papers with CBA design did not provide an appropriate analysis or reporting of results, but presented the data for each district/region in the intervention and control groups respectively, we reanalyzed the data using a difference-in-difference design. We created a dataset with the same number of events and non-events per district/region before and after intervention as reported in the paper. We estimated the postintervention relative risk for the event (intervention relative to control), adjusted for the difference in risk between intervention and control preintervention, and pre- versus postintervention (underlying trend). In line with the above, we estimated the relative effect of the intervention.

For ITS studies, we recorded changes in level and slope. If studies with ITS design did not provide an appropriate analysis or reporting of results, but presented the data points in a graph or table that could be scanned or filed as supplied by authors, we reanalyzed the data using methods described in the Cochrane EPOC Group guidance (EPOC 2017b). Specifically, we used piecewise linear regression and estimated postinterruption changes in level and slope using the ITSA add-on command for STATA 15. For multiple-group designs, we adjusted as per Linden 2015. For all models fitted, we conducted robustness checks to assess whether autocorrelation considerably affected findings; if this was the case, we reported adjusted values of the ITS analyses. We used STATA 15 to conduct analyses and included results in 'Summary of findings' tables. All calculations use raw data as presented in reviewed studies.

Unit of analysis issues

For cluster-randomized trials and CBA studies, we appraised whether an appropriate analysis had been done that adjusted for clustering in calculating confidence intervals or P values. If the analysis did not appear to have adjusted for clustering appropriately, we considered whether the effect estimate was likely to be affected by such issues and appropriately noted this as a potential source of bias relating to the outcome in question.

Dealing with missing data

We contacted the authors of included studies where there were substantive concerns over missing data. We gave authors two weeks to reply and supply data for reanalysis; if we did not hear back from authors, we attempted to contact them a second time. If this was also unsuccessful, we did not include data provided by the study in our 'Summary of findings' tables but included the study in the review and described the study and intervention in principal descriptive tables.

Assessment of heterogeneity

Upon completion of data extraction, the author group considered the diversity in intervention designs and also the clinical and methodological diversity across studies as per the *Cochrane Handbook for Systematic Reviews of Interventions* (Deeks 2019). We noted high levels of diversity (see Description of studies) and also considered the limitations as a consequence of how data were reported in the studies (effect estimates not being accompanied by measures of precision). As we judged it to be uninformative to conduct statistical pooling of results across studies (see Data synthesis), it was not possible to conduct any statistical assessments of heterogeneity.

Assessment of reporting biases

Selective outcome reporting is a risk for P4P studies, where information on many indicators was recorded as being part of the intervention, but not all indicators were then reported in the studies. We assessed risks qualitatively: for each study, we considered the outcomes incentivized by P4P schemes, noted which outcomes were captured by the evaluations and identified outcomes that were not reported on. We additionally compared the stated aims of each evaluation with the outcomes reported on. If we suspected reporting bias, we logged this as appropriate in our assessment.

We also assessed publication bias qualitatively for each outcome and indicator reviewed, based on the results and characteristics of the included studies, including the extent to which only effects in favour of the intervention were reported, the extent to which funders or investigators were advocates of P4P or had a vested interest in the results, and the extent to which the authors' interpretations of the results were supported by the actual results.

Data synthesis

Studies of P4P are heterogeneous in relation to context, study design, characteristics of the participants and the interventions, follow-up periods and outcome measures. Therefore, we judged it to be uninformative to calculate mean effects across studies. We additionally noted substantive gaps in data reported by study authors, principally relating to precision measures (standard errors, standard deviation and confidence intervals), thus precluding any potential for data pooling or meta-analysis. Therefore, we decided to use a narrative synthesis and reported on this as per the SWiM (Synthesis Without Meta-analysis) guidelines (Campbell 2020).

Grouping of studies for main comparison

We aimed to review the evidence on P4P against the primary and secondary outcomes as formulated; however, upon initial review of included studies noted two sources of diversity that had not been prespecified in the study protocol (Witter 2009b), and which required us to deviate from initially specified analyses approaches.

Identifying main comparisons

First, some studies assessed intervention effects against either a standard care or status quo control group, whereas others assessed effects against a comparator intervention (usually enhanced financing). Other studies assessed effects against both a control and comparator. Therefore, we chose to report on P4P effects against control and P4P effects against comparator interventions, drawing on the information and effect data reported by studies against each comparison as relevant.

Defining level of synthesis

Second, effects of the intervention were reported at more granular level than anticipated. For example, we aimed to consider effects on utilization and delivery of care services; however, numerous individual indicators relating to this outcome were reported on, including: utilization of one or more antenatal care (ANC) visits, delivery of HIV testing and delivery of modern family services.

Therefore, we extracted data on each of these more granular indicators and established that when synthesizing and presenting evidence, we would do so at different hierarchical levels.

Specifically, we aimed to present the effects of P4P against a control or comparator at:

- indicator level: that is, summarizing range of effects for each indicator which was formulated and assessed in a comparable manner across studies (see Criteria used to prioritize results for synthesis below);
- clinical area level: that is, grouping clinically similar indicators to summarize the effects of the intervention on a clinical area (e.g. reviewing and grouping individual vaccination indicators for BCG (*Bacillus Calmette–Guérin*), DTP (diphtheria-tetanus-pertussis) and tetanus and narratively summarizing evidence against the area of vaccinations);
- outcome level: that is, reviewing effects across the different individual indicators and emerging patterns by clinical areas, summarizing how the intervention affects the macro-level outcomes as formulated in our initial study protocol.

Distinguishing between targeted and untargeted effects

At any of the above levels, and as per our original review protocol (Witter 2009b), we aimed to distinguish between effects of the intervention on targeted versus untargeted indicators. The need to distinguish between such effects relates to debates around the broader theory of change for the intervention. On the one hand, should P4P schemes directly incentivize an indicator, that is, by making payments conditional upon achieving a specified target or otherwise we would expect health professionals to change their practice and performance around this indicator to respond favourably. On the other hand, depending on design, overall budgets involved and wider inclusion of quality of carer indicators, P4P schemes are likely to contribute to broader health system strengthening, thus creating an environment where other indicators – even not targeted – respond positively.

Given the above, we decided to summarize intervention effects across targeted and untargeted indicators separately. Targeted specifically relate to indicators that P4P schemes include in their designs; that is, payments made to facilities and health workers are conditional based on performance for these specific indicators. We defined an indicator to be targeted if it was directly included among indicators specified by the scheme design, or indirectly targeted (e.g. if a scheme rewards four or more antenatal consultations, we considered the first three antenatal consultations were also targeted).

Indicators that are not targeted were those that were assessed by the evaluation and defined by authors of reviewed studies as not targeted or identified by the review team as not relating to targeted indicators.

For details on how we grouped studies and synthesized information for subgroup and sensitivity analyses, see Subgroup analysis and investigation of heterogeneity and Sensitivity analysis.

Standardized metric

At any of the above levels, we did not generate pooled estimates, given limited reporting of precision estimates, but instead reported the range of relative effects noted across reviewed studies. See Measures of treatment effect for further details.

Criteria used to prioritize results for synthesis

Given the volume of data retrieved and need to systematically and meaningfully compare effects, we restricted our synthesis only to those indicators that were comparable and reported in two or more studies. To be deemed comparable, indicators needed to be similarly specified (in terms of measurement instruments and time points) and appraised via similar means (in terms of data collection mechanisms).

Synthesis method and presentation of findings

For each comparison (P4P against control or comparator), and for each indicator, we reviewed the effect sizes noted to identify the range of relative effects of the intervention, noting at the same time whether these are predominantly suggestive of desirable, neutral, undesirable or uncertain effects. We presented this detailed information by indicator and clinical area-specific 'Summary of findings' tables in Appendix 1 and Appendix 2.

For each indicator, we deemed effects predominantly suggestive of benefits of introducing the intervention as desirable. This meant reviewing all the effects contributing to a comparison against a specific indicator and judging whether effects were consistently positive, or in cases where there were negative effects, whether these were small (under 5%) and presented in a minority of cases only. We judged undesirable effects as those where studies predominantly suggested the intervention may have implied more harms than benefits: this meant that effects were predominantly negative and positive effects relatively small (under 5%). To judge effects as suggestive of neutral, we applied a contextualized judgement dependent on outcome, however generally considered effects under 5% to be of this nature. For some indicators, where both the range of effects identified were suggestive of both

potential benefit and harm, and were beyond 5%, we classified the overarching effect of the intervention as uncertain.

To prepare summaries of findings across main outcomes – as presented in the main 'Summary of findings' tables – we first created meta-summary graphs, summarizing desirable, undesirable or neutral effects and certainty of the evidence against each indicator. We further summarized information narratively across all indicators associated with a specific outcome, offering a general overview of effects, commenting on whether these changes were based on whether indicators were targeted or not. We reached an overarching judgement on the certainty of the evidence against each outcome by considering the relative distribution of certainty ratings across an outcome.

Subgroup analysis and investigation of heterogeneity

For both comparisons of P4P effects against control and those against comparator interventions, we stated that we would explore the extent to which the magnitude of incentives or ancillary components (or both) might explain differences in the impacts of P4P, along with the level at which they were paid (Witter 2012). However, studies did not consistently report the magnitude of incentives and the presence of ancillary components. It was, therefore, impossible to conduct subgroup analyses based on magnitude of incentives.

However, we did conduct a subgroup analysis by level at which performance was assessed and paid, which links to the P4P scheme design and mechanism. We classified all studies according to their broad scheme design – distinguishing, for example, between performance-related pay, payment per output and target payments. For each of the indicators assessed (whether targeted or untargeted), we then set a minimum certainty threshold (i.e. we restricted subgroup analyses to indicators for which certainty in the evidence was assessed as being no less than 'low' across both targeted and untargeted outcomes). We then assessed whether the range of effects reported in the reviewed studies varied by classification of the P4P scheme. Against each indicator, we thus assessed whether any pattern was evident in relation to the scheme designs contributing information to the comparison. We noted indicators for which no pattern was evident and for those indicators where a pattern was distinguishable, we assigned the best-performing scheme (schemes securing positive and relatively high magnitude of effect) a rank of 1 and second-best performing scheme a rank 2 and so forth. We thus reached a qualitative judgement on the relative performance of diverse schemes types in comparison to one another. To comment on broader patterns across outcomes of the review, we then calculated a median rank for each scheme design, across the indicators associated with each outcome, to establish an overarching relative rank for each type of P4P scheme design. We then further reviewed the ranking patterns across schemes and commented on these.

Sensitivity analysis

For all indicators, we presented summaries across the whole body of evidence and separately summarized the evidence from randomized trials in the comments section and additional tables to probe whether results differed if less robust studies were excluded.

Summary of findings and assessment of the certainty of the evidence

We summarized the effects of P4P for each indicator and against each of the above comparators (control and comparator) in 'Summary of findings' tables, distinguishing principally between whether indicators were targeted or not, and further summarized interpretation of results against review outcomes in meta-summary tables and the overarching 'Summary of findings' tables. We provided the range of effects corresponding to intervention impacts noted across studies against each indicator. However, we did not calculate a single effect estimate of the intervention against either control or comparators.

We assessed the certainty of the evidence (high, moderate, low and very low) using the five GRADE considerations (risk of bias, inconsistency of results, imprecision, indirectness and publication bias) as per Section 77.6 and Chapter 14 of the Cochrane Handbook for Systematic Reviews of interventions (Higgins 2019), and the EPOC worksheets (EPOC 2017c). Given the absence of meta-estimates, our GRADE assessment corresponded to an assessment of certainty in the overall direction of effect of the intervention. We presented the range of effects noted by study authors across the reviewed literature and used the approach noted by Murad 2017 to consider methodological limitations of studies, issues of indirectness, imprecision, inconsistency, likelihood of publication bias and appropriateness of raising certainty ratings. Alongside 'Summary of findings' tables, we provided justification for decisions to downgrade or upgrade the ratings using notes in the table and make comments to aid readers' understanding of the review where necessary.

As per ongoing research and recommendations (Hultcrantz 2017), we assessed certainty in whether the intervention had a desirable (positive), neutral, undesirable (negative) or uncertain effect (see Data synthesis), and further referred readers to the identified range of effect sizes for interpretation (Hultcrantz 2017). To reach a judgement on certainty we proceeded stepwise. First, we considered all evidence to be of high quality (four-point GRADE rating). Second, we systematically appraised the evidence collated against each outcome in light of the five GRADE criteria, downgrading evidence as appropriate (EPOC 2017c; Higgins 2019). In relation to risk of bias criteria specifically and as per Murad 2017, this implied downgrading evidence by two points for indicators where the majority of evidence was from CBAs. In addition to the criteria listed, we further downgraded evidence provided by one study only (by one point). Third, we proceeded to upgrade evidence by one point if the magnitude of effect was particularly large (i.e. corresponding to a risk ratio of two or above) (as per Section 5.3.1 in Schünemann 2013). Fourth, we consistently reviewed judgements made on effects (whether they were desirable, undesirable, neutral or uncertain) in light of GRADE ratings. For all indicators where certainty of the evidence was deemed very low, we revised our assessment and noted effects as uncertain.

Given the diversity of study designs, we further reviewed the evidence across randomized trials only (see Sensitivity analysis) and applied GRADE again as per the above principles.

Two review authors independently performed GRADE assessments, with disagreements being resolved by discussion and in consultation with a third review author.

RESULTS

Description of studies

Results of the search

Searches yielded 11,535 unique references (see Figure 1). We excluded 10,623 records as irrelevant after reading the titles and abstracts, and retrieved the full text of 912 potentially relevant articles. We excluded 807 articles with reasons, including a sample of them in the Characteristics of excluded studies table. We included 59 studies in the review.

Figure 1. PRISMA flow chart. LMIC: low- to- middle-income countries; P4P: paying for performance.

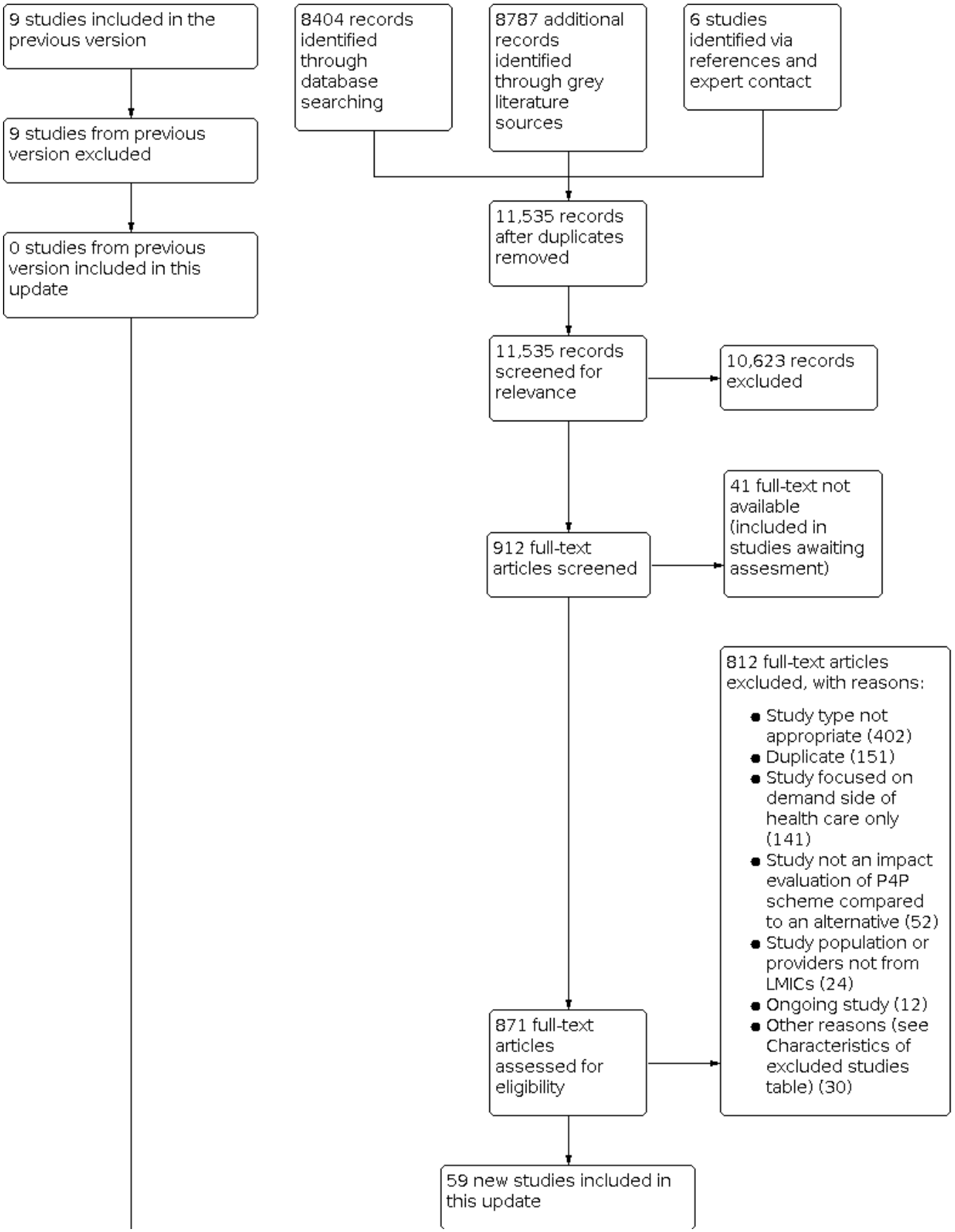
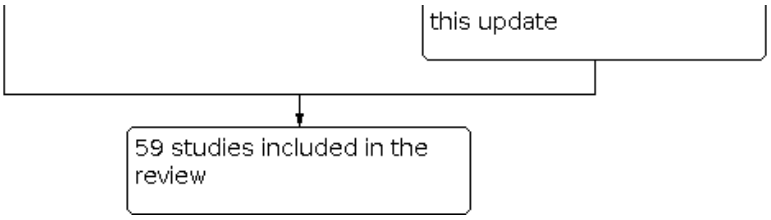


Figure 1. (Continued)



We reran all search strategies in 2020 and identified additional studies not incorporated in this review. These are listed under Studies awaiting classification and will be incorporated in the next review update.

Included studies

We included 59 studies (see Characteristics of included studies table; Table 3; and Table 4). Most studies assessed the effects of P4P against a control group. Fourteen (24%) were RCTs, 16 (27%) were non-randomized trials, 19 (32%) were CBAs, nine (15%) were ITS, and one included both an ITS and CBA analysis. Most studies followed up and assessed the effects of P4P schemes three years after initiation; however, this varied considerably across the reviewed literature, with some evaluations being conducted as soon as one-year after scheme start and others following up trends as long as 17 years after initial implementation.

Intervention characteristics

Geography, context and location of care

Interventions were implemented across 25 countries overall (see Characteristics of interventions Table 5 and Table 6); however, most studies were impact evaluations focused on the P4P schemes implemented in Rwanda (10 studies; 17%), China (seven studies; 12%) and Tanzania (five studies; 8.4%).

Studies predominantly considered interventions implemented across both urban and rural locations (18 studies; 29%); however, two focused specifically only on urban environments (Brock 2018; Wu 2014). Twenty-four studies (37%) provided no precise description of locations.

Over half of the reviewed studies described P4P schemes focused on reproductive, maternal and child health services only; eight schemes were more focused in relation to clinical area (e.g. as in Kliner 2015 and Yao 2008 where the focus was on tuberculosis).

Thirty-six studies (61%) reported on schemes operating at both inpatient and outpatient levels, nine (15%) focused on outpatient care, nine (15%) focused on inpatient care and two studies on community-based care exclusively (Kliner 2015; Witvorapong 2016).

Participants

Fifty-four studies (91%) reported on P4P schemes involving public or not-for-profit facilities (usually faith-based). Two studies included a mix of public, private and not-for-profit (Brock 2018; Huillery 2017), and one study focused on private health providers exclusively (Mohanan 2017).

Scheme funders

Overall, 22 studies described schemes funded by national governments or Ministries of Health, 20 studies described schemes funded by external agencies and 4 studies described schemes funded by external agencies in partnership with national entities. In the case of 14 studies, funding arrangements were unclear. As per Table 6 , none of the schemes were funded without some level of national support; no schemes were funded only by subnational or local funds. Three further studies (5%) noted that schemes were cofinanced by national governments and external donors or non-governmental organizations, and 13 studies (22%) provided no clear details on scheme funders. Across schemes funded by external agencies, the World Bank and Government of Norway were the main funders, having supported 11 (19%; the World Bank) and 5 (7%; Government of Norway) schemes. These were also the main funders of the impact evaluations included in the review (the World Bank contributed to about 17 (29%) studies and the Government of Norway five (10%)). Four studies (7%) were further funded by the US National Institute of Health and the remainder by a varied mix of funders, including the Bill and Melinda Gates Foundation, CORDAID and the EU.

Scale of intervention

The scale of implementation differed by country. Twenty-six studies (42%) focused on studying intervention effects across a range of districts (e.g. as de Walque 2017 in Cameroon). Twelve studies (20%) focused on one particular province (e.g. Yip 2014), eight studies (13%) on a particular facility (e.g. Wu 2014), 13 studies (21%) on national level rollout and implementation of P4P (e.g. Gertler 2013). For the majority of P4P schemes described across 45 studies (76%), purchasing arrangements were integrated into the national purchasing functions of the relevant Ministry of Health.

Target setting and incentive payments

Schemes targeted a wide range of indicators, which varied in number among schemes. Very few schemes focused on one indicator only (e.g. Celhay 2015, Argentina), while others noted that schemes had used as many as 42 indicators (e.g. as in Burundi as reported by Falisse 2015). On average, schemes targeted approximately eight to 12 core indicators, which related to the delivery or utilization of services.

Thirty-three studies (57%) included no details on why and how indicators were chosen and set. Studies which included details on these processes suggested that consultative processes between national Ministry of Health actors, non-governmental and aid organizations were employed to set targets based on emerging priorities or in line with best locally or internationally available evidence.

Magnitude of incentives

The absolute magnitude of incentives appeared to range between USD 0.5 and USD 10 per indicator. However, for some indicators that required repeat contact with the health service, or implied specialist skills, studies used capita costs. These were consistently priced at higher rates (e.g. correct tuberculosis patient management and skilled birth attendance were incentivized at USD 20/patient in Bonfrer 2014a and at USD 35.63 in Engineer 2016).

Thirty-two studies (54%) reported the relative magnitude of incentives. Of these, 10 studies noted the relative magnitude of incentives in relation to facility funding; most studies estimate that P4P incentives equated to 14% to 50% of funds available to facilities overall. Fourteen studies further noted the relative magnitude of incentives in relation to health worker salaries; incentives were estimated to equate to 1% to 78% of health worker salaries; however, most studies reported incentives equal to approximately 10% of overall annual pay.

Measurement and verification of performance

Thirty-eight studies (61%) assessed performance against incentivized indicators using data routinely reported by health facilities. Ten studies (16%) similarly noted using data captured by the national health management information systems or equivalent electronic health record systems as the basis for performance measurement. Thirty-two of these studies additionally described verification procedures, which included assessments by district level management teams, study teams active in assessing the effectiveness of P4P schemes or by teams including community and purchaser representatives.

Four studies (6.4%) described verification via national level statistics or via bespoke community and household surveys.

In 10 studies (16%) it was unclear how they measured and verified performance.

Assessment and purchasing arrangements

Thirty-three studies (55%) focused scheme assessment and payment at health facility level, seven studies at both district and health facility levels, and six studies at health worker level directly.

Fifty studies (85%) reported that P4P payments were additional to normal wages or funding received. Only two studies conducted in China, both focused on containment of unnecessary health-related services and expenditures, reported on schemes whereby health facilities or health workers may have been penalized (i.e. fines would need to be paid if outcomes were not achieved) as a result of P4P schemes.

Predominantly payments appear to be made to health facilities directly, which then cascaded payments to healthcare workers as agreed in the setup of the P4P scheme. This may have been at the discretion of the facility (e.g. as in Zeng 2013 in Haiti) or may have been according to an agreed principle whereby a proportion of the overall bonus was shared with staff and the remainder was reinvested (e.g. as in Steenland 2017 in Burkina Faso).

Intervention classification

Schemes operated according to an assortment of designs (see Intervention classification Table 7 and Table 8). Most schemes focused on assessing performance at facility level and on providing a payment per incentivized indicator. However, even within this group, some schemes focused on incentivizing both the volume and quality of outputs, while others focused on incentivizing outputs only. Other schemes operated on a payment to target principle; while in most cases this meant that bonuses were released upon targets being met, one scheme applied penalties if targets were not achieved and consequently withheld income (Wu 2014). A minority of studies focused on schemes that included assessments of performance at district or national levels. Only one study focused on assessing the effects of results-based aid (Bernal 2018).

Ancillary components

A third of all studies reported that P4P schemes had no ancillary outcomes. However, most schemes included multiple ancillary components. Among these, quality improvement strategies, training, enhanced supervision activities and technical support were noted most commonly. Other components, such as receiving additional funding or in-kind support (e.g. supplies), or putting in place strategies for consultation with other stakeholders to enhance the efficacy of processes needed to support P4P, were mentioned infrequently.

Comparator characteristics

Forty-two studies focused on assessing P4P against a control, usually described as standard care within the respective country and health facilities. Other studies reported against comparator interventions predominantly focused on providing facilities with enhanced financing (i.e. funding matched to what facilities in the P4P arm were due to receive was disbursed to comparator facilities to isolate the effect of incentivization and performance assessment; e.g. as in Friedman 2016a). In other cases, comparators included an existing P4P scheme (e.g. as in Celhay 2015 or Shapira 2017) or provision of in-kind support (e.g. as in Soeters 2011).

Outcomes reported

Schemes may target an indicator both directly, such as utilization of four or more ANC visits, as well as indirectly (e.g. by incentivizing four or more ANC visits, the area of ANC and care quality in general may in practice be incentivized). Therefore, studies predominantly reported on a range of both directly and indirectly targeted indicators to assess the effects of P4P. Some studies additionally focused on assessing the effects of P4P on explicitly untargeted indicators (e.g. Binyaruka 2015). Overall, studies reported a range of indicators; some reported specifically on one primary indicator (e.g. as Celhay 2015), while others included data on up to 386 indicators (e.g. as in Friedman 2016a).

Sources of heterogeneity and diversity

There were substantial sources of diversity in relation to study designs, clinical areas, patient groups studied, intervention designs and outcomes assessed. Because of this diversity, we did not conduct statistical pooling of results or formally assess statistical heterogeneity.

Excluded studies

We excluded 807 studies. A list of all excluded studies can be obtained from the authors upon request. A total of 402 studies was excluded due to study design issues. Full references of the

36 studies excluded due to other reasons are included in the Characteristics of excluded studies table.

Studies awaiting classification

We identified 60 studies (see Characteristics of studies awaiting classification table).

Ongoing studies

We identified 17 ongoing studies (see Characteristics of ongoing studies table).

Risk of bias in included studies

Drawing on assessments outlined in Appendix 6, we present a summary of the risk of bias assessment in the 'Risk of bias' graph (Figure 2) and in the 'Risk of bias' summary (Figure 3). While multiple studies may have reported on the same scheme, studies themselves frequently included diverse populations and we, therefore, assessed the risk of bias for each study. As expected, CBAs were at higher risk of bias than other study designs, particularly due to lacking randomization and allocation concealment. However, some RCTs were also downgraded on specific risk of bias criteria, predominantly due to differences in the baseline characteristics of P4P-implementing areas versus control sites. ITS studies provided insufficient information (or attempted to control for) other concurrent changes going on in the countries or sites where P4P was implemented.

Figure 2. Risk of bias graph.

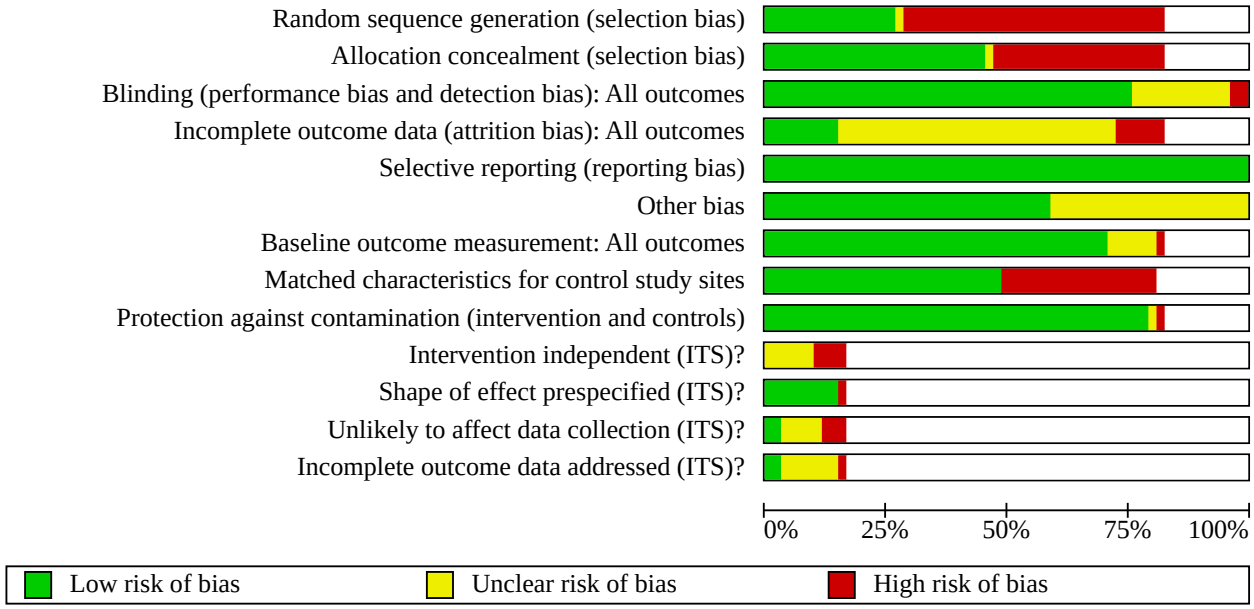


Figure 3. Risk of bias summary.

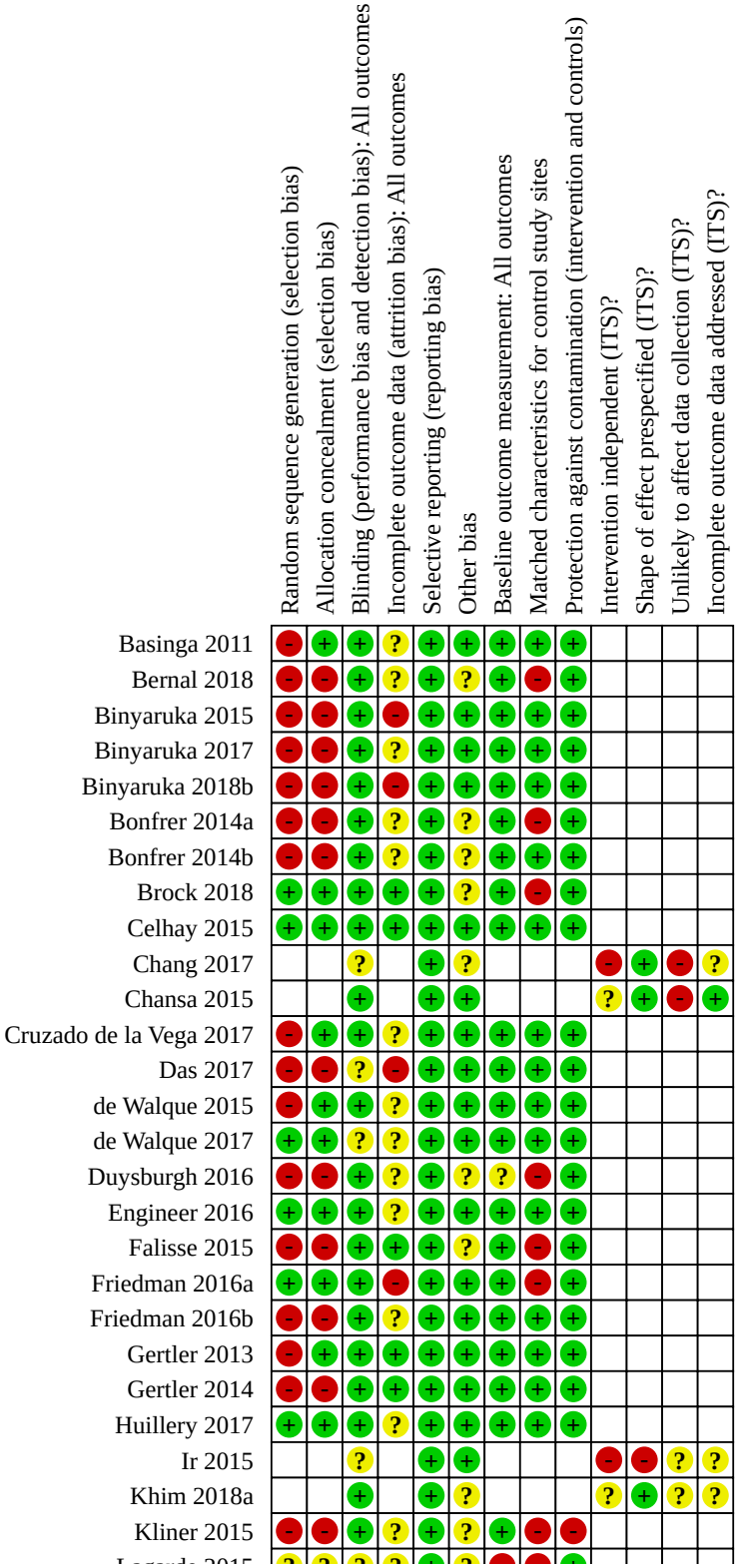
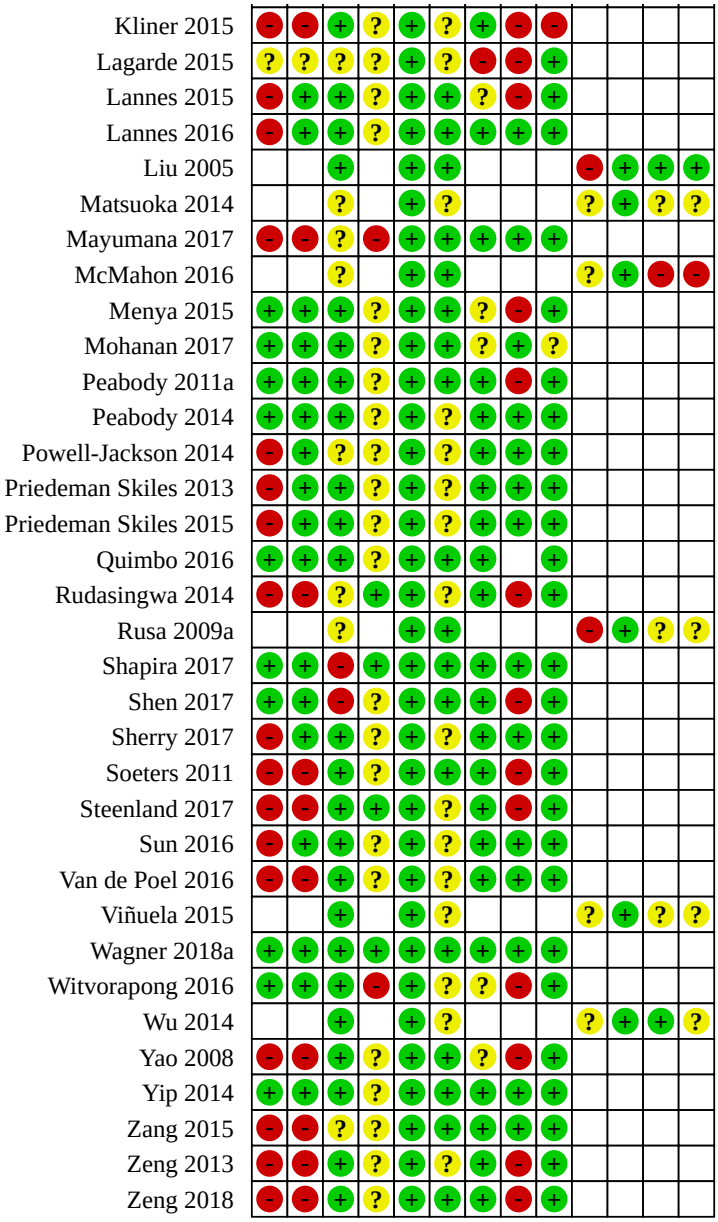


Figure 3. (Continued)



Overall, we noted that selective outcome reporting was low: study authors consistently reported the effects of P4P on the outcomes identified at the outset of their impact evaluations. However, most authors failed to provide clear reports on how missing or incomplete data were handled during their studies or analyses.

Other potential sources of bias

We considered the potential bias introduced by unit of analysis issues, more specifically where studies did not adjust for clustering or adjusted for clustering at a level different to allocation (e.g. clustering by region when allocation was at facility level). Most studies reported facility level clustered difference-in-difference regression models, thus appropriately accounting for unit of analysis issues. However, for a few studies, we noted potential high risk of bias due to clustering at different levels (see Appendix 6 for detailed judgements on risk of bias assessments).

Effects of interventions

See: **Summary of findings 1** Comparison 1: summary of findings on effects of paying for performance against standard care; **Summary of findings 2** Comparison 2: summary of findings on effects of paying for performance against comparator interventions

Within the 59 studies included in this review update, 42 reported the effects of P4P against a standard care or status quo control group, 13 reported the effects against an enhanced financing control or alternative financing intervention and four reported effects against both a control and matched or otherwise enhanced financing comparator. Forty-one studies noted that P4P schemes

were accompanied by a diverse range of ancillary components. Predominantly these components focused on training and supervision initiatives and, in some cases, increases in overall resources allocated to facilities to assist with the rollout of P4P schemes. Therefore, this must be considered when interpreting the estimates of the impact of P4P. We have highlighted differences in context, intervention design, resourcing and ancillary components in the Discussion.

Comparison 1: paying for performance versus standard care

Overarching trends

A meta-summary of the effects of P4P on individual indicators assessed against standard care, grouped by each of the primary outcomes of the review, is presented in Table 1 (Meta-summary: effects of P4P versus control) and Summary of findings 1. All individual 'Summary of findings' tables, by outcome, are available in Appendix 1. We extracted effects on indicators directly targeted by P4P schemes (see Appendix 1: Tables 1 to 23) and indicators not explicitly targeted (see Appendix 1: tables 24 to 45). It should be noted that the same indicator may have been directly targeted in one study but not explicitly targeted in another study. Some of the same indicators therefore appear below under both 'Effects on targeted outcomes' and 'Effects on untargeted outcomes.'

Comparison 1a: effects on targeted outcomes

Summary of findings tables 1 to 24 in Appendix 1 present the evidence collated for each of the primary and secondary outcomes.

1.1. Health outcomes

Few studies focused on assessing health outcomes. The available evidence suggests that overall P4P may improve some health outcomes (Table 1; Appendix 1: Tables 1 to 4):

- child mortality: P4P may reduce child mortality (range: 0.2–6.5%; low-certainty evidence; Appendix 1: Table 2);
- anaemia in children: P4P may lead to a modest reduction of 2% to 3% in the proportion of children with reported anaemia (low-certainty evidence; Appendix 1: Table 3);
- the likelihood of tuberculosis treatment success (range: 12% to 20% improvement in treatment success; low-certainty evidence; Appendix 1: Table 4).

Evidence of neonatal mortality was inconsistent: P4P may have desirable effects and ensure reduction in neonatal mortality in implementing clinics by up to 22% in one study; however, another study identified increases of about 6.5% across catchment areas of P4P incentivized providers (low-certainty evidence; Appendix 1: Table 2).

The effects of the intervention on outcomes such as unwanted pregnancies were uncertain because the certainty of the evidence was very low (Appendix 1: Table 3).

1.2. Targeted measures of provider performance

1.2.1. Utilization and delivery of services

Evidence on the effects of P4P on the utilization and delivery of services (Table 1; Appendix 1: Tables 5 to 12) was largely inconsistent across the indicators reviewed: the intervention may improve some utilization and delivery indicators but may lead to poorer results for other indicators (overall low-certainty evidence).

Effects on HIV/AIDS, malaria and tuberculosis services were overall mixed (low-certainty evidence; Appendix 1: Table 5): HIV testing and prevention of mother-to-child transmission delivery may be positively affected, however ART delivery may decline. P4P may have negative effects on the proportion of children and households protected by bednets (low-certainty evidence), and effects on tuberculosis treatment adherence were uncertain (very low-certainty evidence).

There was moderate-certainty evidence for improvements in indicators for the delivery of family planning services by health providers. P4P probably improves the number of outreach activities on family planning services offered by health providers and probably increases the likelihood of providers supplying contraception to clients (effects ranging between 10% and 300%, Appendix 1: Table 8).

There were undesirable effects for a minority of utilization and delivery indicators (low-certainty evidence).

Findings were inconsistent overall for two of the areas of service utilization and delivery most commonly targeted by P4P schemes: mother and child immunizations (Appendix 1: Table 6) and ANC (Appendix 1: Table 9) (low-certainty evidence).

1.2.2. Quality of care

Overall, the evidence suggests that quality of care indicators may improve where P4P is implemented (see Table 1 and Appendix 1: Tables 13 to 16). Across the indicators for which evidence was available, there were improvements for most and only one indicator suggested that quality of care may decrease (this was in relation to waiting times). Generally the evidence for this outcome was of low certainty. Further, the methods for quality of care assessment were inconsistent across studies; however, data were sourced predominantly from direct observation by scheme supervision teams or data collectors. In some cases (e.g. quality of child health care or quality of service by specific service area), data from structured patient exit interviews were also used.

Indicators for which there was moderate-certainty evidence included:

- quality of child health care: P4P probably improves quality of care scores (range: 6.1% to 300% relative increases; Appendix 1: Table 16);
- quality of medicine and equipment: P4P probably improves the quality scores of available medicine and equipment (range: 2.7% to 220%; Appendix 1: Table 16);
- quality of service by specific departmental area/service: P4P probably improves the mean quality of service scores in specific targeted areas (range: 39% to 15-fold increase in scores; Appendix 1: Table 16).

In general, the effects of P4P schemes on a range of procedural quality of care indicators was uncertain, including the likelihood of providers carrying out background and physical assessments, managing patients correctly or counselling patients appropriately (very low-certainty evidence; Appendix 1: Table 13). However, P4P may improve specific aspects of the quality of ANC, particularly the likelihood of receiving immunizations or being prescribed iron or folic acid in pregnancy (low-certainty evidence).

The intervention may make little or no difference to staff knowledge and skills (low-certainty evidence; Appendix 1: Table 14), and its effects on staff responsiveness (as observed by researchers/P4P scheme verifiers) were uncertain overall (range: –2% to 49% change in responsiveness; very low-certainty evidence).

1.3. Resource use

In relation to resource use, the intervention seems to predominantly affect indicators positively (Table 1; Appendix 1: Tables 17 and 18). P4P probably has a positive effect on human resource availability (range: 19% to 44%; moderate-certainty evidence; Appendix 1: Table 17). Effects on curative visits logged per healthcare professional are uncertain (very low-certainty evidence; Appendix 1: Table 17). P4P probably affects infrastructure functionality and medicine availability positively (moderate-certainty evidence; Appendix 1: Table 18).

1.4. Secondary outcomes

P4P may have neutral or positive effects on secondary outcomes (low-certainty evidence; Table 1; Appendix 1: Tables 19 to 23).

P4P probably makes little or no difference to provider absenteeism (range: 0.7% to 2%; low-certainty evidence; Appendix 1: Table 19). Effects on overall motivation scores and satisfaction are largely neutral (low-certainty evidence; Appendix 1: Table 19).

Overall, P4P may have little to no or positive impacts on measures of patient satisfaction (low-certainty evidence; Appendix 1: Table 20).

In relation to impacts on financing, there was limited evidence and all was sourced from one study exploring the impacts of a P4P scheme where income may have been withheld if targets were not achieved (Appendix 1: Table 21). Patient expenditure on medicine and equipment may increase by an estimated 2.5% for insured patients, but may decrease by an estimated 0.9% for uninsured patients, suggesting small positive redistributive effects (low-certainty evidence).

P4P may positively affect facility managerial autonomy (low-certainty evidence; Appendix 1: Table 22). However, the intervention probably makes little to no difference to management quality or facility governance, using the number of staff meetings held in the last three months as a proxy (low certainty evidence).

Effects on indicators focused on assessing care equity are predominantly neutral (Appendix 1: Table 23). P4P may increase the proportion of poor people utilizing child immunization services (low-certainty evidence); however, the intervention may potentially decrease the proportion of poor people utilizing ANC (low-certainty evidence). P4P may make little to no difference to the utilization of institutional deliveries by poorest groups (low-certainty evidence).

Comparison 1b: effects on untargeted outcomes

Evidence on the effects of P4P on untargeted outcomes is presented in Appendix 1: Tables 24 to 45 and Table 1 (Meta-summary: effects of P4P against control).

1.5. Untargeted health outcomes

The effects of P4P on health outcomes are largely consistent with those reported when indicators are targeted (moderate-certainty evidence; Table 1; Appendix 1: Tables 24 and 25). Moderate-certainty evidence suggests that P4P probably:

- reduces child mortality by up to 1% (Appendix 1: Table 24);
- reduces the proportion of children with anaemia (about 5%; Appendix 1: Table 25);
- reduces the proportion of children with wasting (range: 5.9–9.25%; Appendix 1: Table 25).

P4P probably has no important effect on the incidence of neonatal mortality or pregnancies recorded (effects under 1%, moderate-certainty evidence; Appendix 1: Tables 24 and 25).

1.6. Changes in untargeted measures of provider performance

1.6.1. Untargeted utilization and delivery

In relation to service utilization (Table 1; Appendix 1: Tables 26 to 32), P4P may improve the rate of HIV testing (low-certainty evidence), however probably has no important effect on bednet use (moderate-certainty evidence) (Appendix 1: Table 27). The former finding is inconsistent with when the same indicator was targeted; in the latter case, P4P had negative effects.

We further note that P4P:

- may make little to no difference to the probability of services being utilized and frequency of visits by elderly populations in particular (low-certainty evidence; Appendix 1: Table 27);
- has uncertain effects on the frequency of outpatient consultations overall (low-certainty evidence; Appendix 1: Table 27);
- probably makes little or no difference to utilization of modern family planning methods (moderate-certainty evidence), however may increase the rate of family planning outreach delivery by up to 10% (low-certainty evidence) (Appendix 1: Table 28);
- may have little to no effect on utilization of ANC (up to 5%; low-certainty evidence), with most other effects on ANC being uncertain (Appendix 1: Table 29);
- may have little to no effect on institutional deliveries (low-certainty evidence); effects on the delivery of caesarean sections are uncertain (very low-certainty evidence) (Appendix 1: Table 30);
- has overarchingly inconsistent effects on postnatal care: P4P may improve the delivery and coverage of postnatal care (low-certainty evidence), however probably slightly decreases the overall utilization of such services (moderate-certainty evidence) and may have desirable effects on the timeliness of postnatal care utilization (low-certainty evidence) (Appendix 1: Table 31).
- Effects on untargeted delivery of child consultations (in under 5s) are uncertain (very low certainty evidence)(Appendix 1: Table 32)

1.6.2. Untargeted quality of care

Overall, estimates presented on quality of care (Table 1; Appendix 1: Tables 33 to 37) indicate P4P may have neutral or uncertain impacts, suggesting that quality of care indicators must be explicitly targeted for outcomes to be achieved (overarching low-certainty evidence). Effects on total care quality scores are uncertain in relation to maternity care, outpatient services, and medicine and equipment

quality, however P4P probably has negative effects on general quality of care scores when such indicators are not explicitly targeted (moderate-certainty evidence).

1.7. Unintended effects

P4P may have little to no distorting unintended effects (Table 1; Appendix 1, Table 38), with studies suggesting that free riding and unwanted task shifting were slightly lowered (low-certainty evidence).

1.8. Untargeted resource use

Effects of P4P on non-targeted resource use indicators appear largely uncertain (very low-certainty evidence; Table 1; Appendix 1: Tables 39 and 40).

1.9. Untargeted secondary outcomes

Effects on the majority of secondary untargeted indicators are largely inconsistent (Table 1; Appendix 1: Tables 41 to 45). However, P4P may positively affect patient satisfaction scores on quality of care and provider communication, despite indicators not being directly targeted (low-certainty evidence). P4P probably has little to no impact on expenditure related to medicines and equipment (moderate-certainty evidence), however impacts on out-of-pocket payments are inconsistent across service areas (low-certainty evidence; Appendix 1: Table 43). In relation to impacts on facility governance and equity promoting distributive effects, evidence is overarchingly inconsistent (low-certainty evidence; Appendix 1: Tables 44 and 45).

Comparison 2: effects of P4P versus comparator interventions

Overarching trends

Table 2 (Effects of P4P versus comparator) and Summary of findings 2 outline the effects of P4P on individual indicators assessed against comparator interventions. Individual 'Summary of findings' tables by indicator are available in Appendix 2. Comparator interventions predominantly consisted of enhanced financing interventions within which comparator health facilities received funding matched to P4P groups. It should be noted that the same indicator may have been directly targeted in one study but not explicitly targeted in another study. Some of the same indicators therefore appear below under both 'Effects on targeted outcomes' and 'Effects on untargeted outcomes.'

Comparison 2a: effects on targeted outcomes

2.1. Health outcomes

Effects on health outcomes are suggestive of little or no impact (Table 2; Appendix 2: Table 46). P4P may have little to no impact on the proportion of breastfeeding among mothers seeking care in P4P implementing facilities versus comparator facilities (low-certainty evidence).

2.2. Targeted measures of provider performance

2.2.1. Utilization and delivery

In contrast to the findings on the effects of P4P against a pure control, P4P has largely neutral or desirable effects on utilization and delivery indicators (Table 2; Appendix 2: Tables 47 to 51).

P4P may positively affect the probability of people utilizing care (range: 1.5% to 10%; low-certainty evidence; Appendix 2: Table 51), however, evidence on immunization utilization is indicative of little to no effect or uncertain (Appendix 2: Table 47).

Evidence on family planning is largely consistent with that presented on the effects of P4P against standard care (Appendix 2: Table 48): P4P may have little to no important effect on the utilization of any family planning services (low-certainty evidence).

Effects on the overall rates of ANC utilization are indicative of little to no important effect (Appendix 2: Table 49), however, P4P may positively affect the timeliness of ANC care-seeking (range: 1.3% to 10% women accessing care earlier; low-certainty evidence).

Evidence on the effects of P4P on percentage of women utilizing institutional deliveries is mixed (range: –8.7% to 23.2%, low-certainty evidence, Table 50). However, P4P may have negative effects on postnatal care utilization (low-certainty evidence, Table 50).

2.2.2. Quality of care

Evidence on the effects of P4P on quality of care indicators is largely positive for specific clinical areas and overall quality (Table 2; Appendix 2: Tables 52 to 54). P4P probably leads to improved quality of care in relation to family planning or ANC (moderate-certainty evidence; Appendix 2: Table 54). P4P may also have positive effects on care processes, such as leading to increases in the proportion of staff conducting appropriate patient background and physical assessments during consultations, however effects on quality of counselling during consultations are uncertain (low-certainty evidence; Appendix 2: Table 52). P4P may slightly increase the quality of care of immunizations as well as staff knowledge and skills, however impacts on patient knowledge outcomes are uncertain (low-certainty evidence; Appendix 2: Table 53).

2.3. Resource use

In relation to resource-use indicators, the evidence is mixed (low-certainty evidence; Table 2; Appendix 2: Table 55). While P4P may increase equipment availability by 75%, medicine availability may be reduced by up to 160%. The latter effect is likely due to scheme design, as the Zambia scheme offered supplies as an ancillary component of the intervention but not medication.

2.4. Secondary outcomes

P4P seems to have mixed effects on secondary outcome indicators (Table 2; Appendix 2: Tables 56 to 58). Similar to the effects of P4P against a pure control, P4P may positively affect facility autonomy (low-certainty evidence; Appendix 2: Table 56); however, impacts on patient satisfaction and acceptability are uncertain (very low-certainty evidence; Appendix 2: table 57). P4P may have little to no effect on the equitable utilization of curative and ANC visits (low-certainty evidence), however may have negative redistributive effects in relation to institutional delivery utilization (i.e. utilization appears to increase in least-poor groups) and family planning (low-certainty evidence; Appendix 2: Table 58).

Comparison 2b: effects on untargeted outcomes

2.5. Untargeted health outcomes

In relation to untargeted health outcomes, P4P may have little to no effect on the proportion of women breastfeeding (low-certainty evidence; Table 2; Appendix 2: Table 59). P4P may positively affect

the incidence of reported illness in children (range: –5% to 10.5%; low-certainty evidence).

2.6. Untargeted measures of provider performance

2.6.1. Untargeted utilization and delivery

Evidence on the effects of P4P on untargeted utilization is only available for two indicators (Table 2; Appendix 2: Tables 60 and 61). For both, the evidence suggests P4P may make little to no difference (low-certainty evidence).

2.6.2. Quality of care

Effects of P4P on untargeted quality of care appear uncertain due to very low-certainty evidence (Appendix 2: Table 62).

2.7. Unintended effects

No study reported evidence on distorting unintended effects.

2.8. Untargeted resource use

In relation to both equipment and medicine availability, certainty of the evidence is very low and effects are therefore uncertain (Table 2; Appendix 2: Table 63).

2.9. Untargeted secondary outcomes

In relation to secondary outcomes, limited evidence is available (Table 2; Appendix 2: Tables 64 to 66). Effects of P4P on facility and managerial autonomy are uncertain (very low-certainty evidence; Appendix 2: Table 64). P4P may have largely positive effects on patient satisfaction and acceptability even when indicators are not explicitly targeted (low-certainty evidence; Appendix 2: Table 65). However, there may be little to no effect on staff motivation or satisfaction when not targeted (low-certainty evidence; Appendix 2: Table 66).

Sensitivity analyses

Across 'Summary of findings' Tables 1 to 66 in Appendix 1 and Appendix 2, we include comments on the range of the intervention's effects on each of the reviewed indicators based on RCTs only; where relevant, these findings are assessed using GRADE separately.

For a more complete overview, the sensitivity analyses summary tables illustrate the effects recorded in RCTs (Table 9; Table 10). Overall, the certainty of the evidence reviewed is assessed as low to moderate. Concerns over the risk of bias in individual studies and the limited availability of studies, with most indicators being reported on in only one study, were the primary reasons for downgrading evidence to 'low.'

Table 9 illustrates and comments on effects of P4P against a status quo control. Overall, effects were largely consistent, however some deviations were notable when appraising the effects of P4P against a control in relation to utilization and quality of care indicators (Table 9). In particular, effects on specific immunization and quality of care indicators are now more clearly distinguishable (and appear largely positive). However, in relation to ANC, the evidence from RCTs seems to indicate that P4P may have negative effects on utilization of such services. Only one study appraised a health outcome indicator, and here we note that P4P may have a very slight effect only. Further, RCT evidence suggests P4P may have only limited (less than 5%) effects on secondary outcomes such as provider motivation and patient satisfaction.

In relation to the effects of P4P as assessed against comparator interventions, there was relatively limited evidence, most of which was low certainty (Table 10). In relation to service utilization and delivery a mixed picture emerges. Evidence suggests effects on immunization are overall inconsistent, effects on utilization overall appear neutral, and effects on institutional delivery and postnatal care utilization seem negative. In relation to quality of care, mixed effects are also notable.

Subgroup analyses

Upon reviewing the characteristics of interventions in detail, we further classified the P4P schemes according to the design reported in reviewed documents (Table 7; Table 8; note that to ensure consistency, we chose to classify all studies based on descriptions provided in the reviewed documents). To investigate differences in impacts by scheme design, we reviewed Tables 1 to 45 of Appendix 1 given that most studies assessed effects of P4P against control designs.

Results of the subgroup analyses are presented in Table 11. Overall, results-based aid appears to be one of the top-performing scheme designs, however we noted that only a minority of studies used this design, so the effects observed may be spurious.

Payment per output designs were most commonly implemented, however, and clear patterns in relation to the relative effects of such schemes emerged. Overall, schemes adjusting both for quality of service as well as those rewarding equitable delivery of that service appeared to perform best, particularly in relation to service utilization and quality outcomes. Similarly, schemes employing payments per output with a quality adjustment, or combining a payment per output and target payment, appeared to outperform the simpler payment per output and target payment designs.

Differential effects by outcome were evident (Table 11): health outcome indicators, for example, appeared to respond best to target payment, and payment per output designs where adjustments for quality scoring took place. However, we caution that health outcome indicators were appraised in a minority of reviewed studies, therefore patterns observed here may be due to chance.

DISCUSSION

In recent years, the literature on the theory, effects and implementation of P4P programmes has expanded dramatically. Our search strategies retrieved over 11,000 results, of which 10% were of potential relevance to this review.

Increasingly, P4P is being framed not as one intervention, but as a class of interventions using a collection of mechanisms (Renmans 2016). Our intervention classification illustrates that a wide range of scheme designs are used with the fundamental idea to align the incentives of providers with those of the commissioners of care. However, our typology is necessarily simplified and the details and mechanisms by which results are achieved (or not) will vary. The effects and impacts of P4P likely depend on a range of factors, including how and why schemes are designed, the degree of participation in setting targets, what targets are used, how they are measured, the level of rewards they attract and

by the context in which the schemes take place, including the efficiency of implementation systems and underlying factors such as starting levels of pay and funding. For that reason, this review has presented considerable detail on the design and implementation of the P4P schemes, as these factors are key to interpreting results. Considering the intervention Complexity Assessment Tool for Systematic Reviews (Lewin 2017), P4P scores highly in every domain.

We note that while many details of schemes (e.g. funders, verification processes among others) are consistently reported on, some critical reporting gaps in relation to scheme design exist. For example, only 40% of studies described the location of care provision and a minority of studies reported on scheme costs. Further, explicit theories of change or programme theories detailing how and why schemes are designed, and how they are fit for specific contexts are often not provided. To illustrate this point, it is often unclear how schemes set their targets or choose indicators, including why some schemes would incorporate over 200 quality of care markers for assessment, while others include under 100. Similarly, it is not always clear what aspects of schemes are core mechanisms versus additional features (e.g. it is often unclear whether auditing processes and procedures are designed for verification only, as opposed to wider initiatives intended to strengthen managerial capacity and oversight). Setting of 'prices' of indicators is another area lacking clarity in relation to how these were calculated, and based on what rationale (e.g. to replace user fee revenues, or based on an understanding of facility cost structures, to give just two possible examples).

Summary of main results

This review included 59 studies for which evidence was of low-to-moderate certainty. Increasingly however, more robust study designs are being used to assess the effects of P4P, including, for example, controlled ITS and cluster-RCTs.

Findings identify some evidence of scheme success as well as evidence on some areas and indicators which appear to be less responsive to P4P. However, findings additionally indicate that the choice of comparator intervention (whether control or a different comparator intervention) and scheme design are critical in interpreting results.

In relation to utilization and service delivery outcomes, we identified inconsistent effects overall. P4P may have differential desirable and undesirable effects (e.g. while indicators relating to HIV testing, family planning and postnatal care appear to be positively impacted, evidence on the effects of P4P on indicators such as ART, ANC or immunization utilization is mixed). These findings are surprising as ANC and immunization are frequently targeted by P4P schemes. However, we noted that in the case of immunization, these effects may be due to broader circumstances surrounding vaccine availability. Overall, we noted that performance-based contracting, results-based aid and P4P designs including both payment per output and quality and equity adjustments performed best in relation to securing increased service utilization and delivery.

While health outcomes were appraised in a minority of studies, we noted interesting effects in relation to these. Whether targeted or not, P4P may have slight positive impacts on health outcomes appraised against a pure control or standard care; however, when compared against other interventions, such as enhanced financing, limited to no impacts were identifiable.

P4P probably increases quality of care overall, especially when directly targeted. However, indicators that are clinical-area specific (e.g. quality of ANC consultations) or that are broadly related to medicine and equipment quality appear to respond best. We noted limited to uncertain effects on general quality of care indicators such as providers conducting background or physical assessments, or people receiving counselling.

Further, P4P schemes may have positive impacts overall on the availability (and as relevant functionality) of medicines, equipment and infrastructure, and probably have limited to no negative distorting unintended effects.

In relation to secondary outcomes, we identified surprising results. The effects of P4P on provider satisfaction and motivation were overall mixed; however, the evidence suggests the intervention may increase managerial autonomy, but have limited effects on quality of management or governance in general. Equity effects are also uncertain: when assessed against a pure control, P4P may have largely beneficial redistributive effects, but when assessed against a comparator, the evidence appears mixed. We identified little to no effect or uncertain effects on user fees, which is disappointing as this is an important intended mechanism of change for P4P schemes.

Subgroup analyses

Subgroup analyses suggest that different scheme designs may be more effective than others in securing effects against assessed outcomes. Among promising scheme designs, we noted payment per output with quality or equity adjustment (or both) and results-based aid. We caution, however, that only one case implemented and studied results-based aid, therefore, effects observed may be due to contextual differences and drivers rather than scheme design.

We had expected to conduct subgroup analyses by magnitude of incentive (either absolute or relative) and to attempt to isolate the effects of ancillary components (such as supervision). However, given limited reporting on these characteristics, we were unable to conduct such analyses.

Overall completeness and applicability of evidence

This is an update of the original review published in 2012 on the effects of P4P in LMICs and, therefore, capitalizes on the additional research carried out between 2012 and 2019. As noted previously, this research area has seen an exponential increase in interest and the evidence base overall has been strengthened.

In comparison to the original review, which included nine studies, we included 59 studies. While the predominant focus of evaluations remains on the schemes from Rwanda, Tanzania and China, a broader range of country settings are represented, including increasingly studies from Latin America. Most studies continue to focus on schemes targeted at strengthening reproductive, maternal and child health services, but increasingly evidence on schemes focused on other areas, such as HIV and tuberculosis, is becoming available.

Overall, we noted a clear focus on evidence reflecting the effects of P4P implementation in the public sector; only one of the studies focused on the private sector only. However, we note a more heterogeneous picture emerging in terms of the types of P4P schemes being assessed (although we only found one eligible study on the effects of results-based aid), as well as the study types, comparators and time frames of assessment. While these developments are encouraging, and suggestive of a broader interest in P4P effects, both in the short- and long-term and on targeted and not-targeted outcomes, they imply added complexity for the synthesis of evidence and interpretation of effects. Further, both the proliferation and heterogeneity of evidence available makes it difficult to detect publication bias. Given that most studies reported more than 10 core outcomes each, from schemes that may target even more indicators (as illustrated in Josephson 2017), within varying population groups or clinical areas, it is difficult to assess whether reporting is purposefully restricted to positive effects or pragmatically restricted to indicators where data are available and analysable.

During searches we identified health economic evaluations estimating costs of P4P schemes in Tanzania (Borghi 2015), the Philippines (Peabody 2017), and Zambia (Zeng 2018a). These studies were not included in the review, however we present a brief overview of findings. Alongside information presented in Gertler 2014, these studies estimated the approximate expenditure per capita of the P4P programme to be USD 7 to USD 10; total costs per programme varied widely between approximately USD 2.6 million (2012) in Tanzania to USD 20.45 million in Argentina. We noted that when comparing the costs associated with intervention implementation, P4P appeared to incur slightly higher facility level costs compared to enhanced financing interventions. The increment ranged from USD 0.57 extra for consumables to 10% higher expenditure in the P4P groups (Lagarde 2015; Zeng 2018a). The only two studies providing a comprehensive breakdown of implementation expenditure within the P4P scheme indicated that 22% of scheme costs were spent on bonus payments in Tanzania and 52% in the Philippines (Borghi 2015; Peabody 2017). In Tanzania specifically, 37% of costs were spent on data generation, and 28% on management of the scheme, highlighting potentially high health system costs for implementation. Gertler 2014 estimated the cost-utility of programmes at USD 814 (ranging from USD 442 to USD 5086)/DALY averted and Peabody 2017 at 1.58 DALY/USD spent, further highlighting potentially high variability in cost-utility of schemes.

Similar to other research on the cost-effectiveness of P4P schemes (Turcotte-Tremblay 2016), we concluded that evidence on the costs and health economic impacts of P4P schemes is relatively scarce; this is something that other evaluators and future review updates should carefully consider. Similarly, evidence on health outcomes is also sparse (as also noted in .

Certainty of the evidence

The certainty of reviewed evidence differed by indicator; however, across most indicators, we downgraded evidence due to concerns related to risk of bias, indirectness or imprecision. In relation to risk of bias, we noted that most available studies were still of a CBA or quasi-randomized design. Across this body of evidence, lack of randomization and allocation concealment were the primary reasons for downgrading the quality of evidence. However, the increased availability of RCT and ITS designs meant the certainty of the evidence could be judged as moderate for a greater number of indicators in comparison to the original 2012 review (Witter 2012).

Potential biases in the review process

We identify two biases in the review process. First, given the volume of studies and indicators evaluated, we had to restrict the focus of the review and only report on those indicators that were comparable and assessed across two or more studies. Comparability of indicators is a subjective judgement, and while two review authors conducted this process and submitted all materials for review by the wider group, researcher bias may be present. We further noted that this will remain a potentially problematic area unless there is harmonization in reported indicators.

Second, we restrict reporting to relative effects and acknowledge a major limitation in being unable to supplement this with information on absolute effects. Most reviewed studies restricted their reporting to beta coefficients obtained from clustered regression, accounting for multiple covariates associated with both intervention and population characteristics. Given the clustered nature of the data and lack of reporting on cluster characteristics overall (e.g. coefficients of variation of cluster sizes and intracluster correlation coefficients), we could not redo analyses and instead opted to use the relative effect measures (as provided by study authors themselves, or recalculated).

Several other external limitations applied. First, we noted substantive lack of harmonization across schemes (e.g. several child immunization indicators were reported on, however utilization rates referred to different age groups), making synthesis difficult. Second, the assessment of effects on health outcomes is a clear gap area: it is unclear why such outcomes were assessed across a minority of studies, when data should have been more generally available given the wide range of indicators targeted. Third, we were unable to produce a meta-estimate on the effects of P4P against each of the assessed indicators as we judged this uninformative given the aforementioned comparability issues. While the studies used similar analyses techniques (principally difference-in-difference analyses), the effect estimates derived from equations adjusting for multiple covariates could not be meaningfully synthesized. Additionally, studies did not consistently report on measures of precision, thus precluding the possibility of comprehensively attempting pooling of estimates.

Fourth, we noted two further areas that demanded exploration via analyses which accounted for the inherent complexity of P4P scheme design. One area concerned itself with how P4P may have interacted with other ongoing interventions (e.g. the expansion of health insurance coverage); another related to accounting for the implementation of ancillary components alongside the main P4P scheme. To adequately assess the impacts of both of these on P4P effects, as well as impact of diverse contexts and scheme designs, complexity science methods may be required. Further, we restricted this review to evidence collated in quantitative impact evaluations only; qualitative and health economic studies conducted alongside these evaluations would need to be consulted to appropriately investigate variations in scheme design, rollouts and further implementation as well as explore how schemes were received by health and allied professionals at different system levels.

Fifth, we noted that it was difficult to conduct a comprehensive subgroup analysis given the data volume available and multitude of scheme designs implemented. We urge readers to consider our attempt here cautiously.

Last, we updated searches for this review in 2020; these identified a further 63 studies that may be eligible and are awaiting classification, although it is likely that the final number of new eligible studies will be smaller than this. Due to resource limitations, it was not possible to further screen these studies and incorporate them into the review update. These additional studies may lead to some changes in the review findings at a future update, but the current findings are a substantial step forward in understanding the impacts of pay for performance initiatives.

Agreements and disagreements with other studies or reviews

Several findings are of particular interest when compared with the original 2012 review on this topic (Witter 2012), and to other available evidence on the effects of P4P. First, in relation to the original 2012 review, we noted that available evidence has multiplied and somewhat improved in quality.

Our findings differed across several of the outcomes assessed. In the original review, evidence on quality of care was mixed; however, we currently assessed that P4P may have positive impacts on this outcome. This is particularly interesting as the general debate in the P4P community has focused on how to shift from volume to effective quality measures (Josephson 2017). A priori, we would, therefore, have expected the opposite patterns from the findings of this review, with utilization indicators responding more than quality ones. While the quality of care indicators assessed were numerous and diverse (Josephson 2017), and included both structural and process quality measures, we generally noted findings similar to those of Das, Gopalan and Chandramohan in their 2016 review on the topic (Das 2016).

Our findings suggest that P4P may have positive effects on health outcomes (relative to pure controls, if not matched comparators, similar to Ogundeji 2016) and on some utilization indicators, such as those related to modern family planning (Blacklock 2016), and postnatal care, which were previously noted to be unresponsive. In relation to the effects of P4P on the more commonly targeted utilization outcomes such as ANC and institutional deliveries, our findings were largely consistent with the 2012 review (Witter 2012).

In relation to motivation and satisfaction, we noted findings similar to those of Dale 2014. However, we acknowledged particular methodological challenges surrounding the appraisal of this evidence: certainty in our findings may be compromised by indirectness in particular. As Dale 2014 noted, motivation is often assessed and measured using different scales. Indeed, in our review, we attempted to synthesize information across a range of different outcomes and measurements.

AUTHORS' CONCLUSIONS

Implications for practice

The evidence around paying for performance (P4P) has grown considerably since the last review (Witter 2012), with researchers and practitioners gradually focused on unpacking the wider health system effects and impacts of P4P schemes. Study quality has gradually improved, with more use of randomized controlled trial (RCT) designs; however, the overarching evidence base to date is still dominated by controlled before-after studies. This, alongside the heterogeneity of schemes implemented and reviewed here, makes any conclusions and implications tentative.

Overall, this review suggests that, in comparison to a status quo control, P4P may have some positive effects on service utilization and delivery, for example in relation to family planning; however, impacts on other service areas (e.g. antenatal care, immunization, institutional delivery) may be difficult to secure. P4P may also have positive effects on health outcomes when compared to a status quo control, however limited evidence on health outcomes is available from comparisons of P4P against other interventions such as matched financing. We further note that technical inputs (e.g. infrastructure functionality, equipment and medicine availability) may be positively affected by the introduction of P4P schemes; facility autonomy may be fostered as well, although effects on procedural care and governance are uncertain.

Few studies focused on assessing P4P impacts against a comparator intervention, however our findings to date tentatively suggest that some indicators react to the influx of funding itself and not the performance-related conditionality of payment. Subgroup analyses additionally suggest that specific scheme designs may perform better at achieving targeted outcomes. For example, target payments outperformed other scheme designs in relation to health outcomes in particular (e.g. payments being conditional on tuberculosis success rates), whereas utilization and delivery outcomes seemed to increase most in schemes adjusting for both service quality and equity.

Implications for research

We acknowledge the exponential growth in studies focused on assessing and exploring the impacts of P4P schemes since the publication of the last review (Witter 2012). Conclusions presented here are limited as we focused on quantitative impact evaluations only; however, these are presented as complementary to the work of other groups focused, for example, on conducting realist syntheses of P4P schemes (Singh 2020a).

The evidence base has expanded to consider a greater range of P4P scheme designs and modalities, covering diverse scales of magnitude, levels of implementation within the health system, types of services and providers, comparator groups and contexts. Increasingly, cluster RCTs are used to assess the effects of P4P schemes: this is a welcome development; however, we caution that such studies must be complemented by thorough theory-based evaluations to understand how the schemes were designed (and by whom) and their ex ante (i.e. before the event) theory of change, compared with the mechanisms that were triggered ex post (i.e. after the event). It is also important to document the interaction of P4P with the wider health system (Witter 2013), how it affects components such as supervision, referrals and health information systems, and is affected by them in turn.

Multiarm or stepped wedge RCT designs, as well as controlled interrupted time series, may be needed to additionally unpack the effects of diverse P4P implementation pathways or alternative scheme designs going forward. This implies a shift in focus from research assessing whether P4P may or may not work, to research focused on both establishing P4P effects and identifying,

understanding and unpacking the contextualized pathways to scheme impact, using dynamic approaches.

Longer time frames of inquiry and diverse and alternative comparator groups would also be of particular interest. The evidence base on impacts of P4P is still dominated by studies assessing impacts after approximately three years. However, little is known on how schemes change once they are embedded in systems, how they are affected by their coherence (or lack of it) with wider health financing policies, and on whether they are sustainable and maintain impacts long term.

Few studies to date explored the equity effects of schemes and heterogeneity of P4P results for different provider types, areas and populations subgroups; when this was done, studies noted challenges in relation to study design and power as restricting their conclusions (e.g. as in Binyaruka 2018a).

Further, few studies to date purposefully assessed effects against a realistic enhanced financing comparator (such as direct facility financing embedded in routine planning and reporting systems) or demand-side interventions; given the drive to expand universal health coverage, these types of studies – when robustly designed and allowing for the isolation of P4P effects – are greatly needed.

Another important area for future research is that of the cost-effectiveness of P4P schemes. We have identified a small number of studies focused on this, which we have not been able to review; however, a comprehensive search for such evidence will be warranted in future. Similarly, the sustainability of schemes, as well as cost and budgetary implications, remains an under-researched topic.

To fully explore the impacts of P4P schemes, evaluations should continue to adopt rigorous research designs and take a broad perspective in considering wider intended or unintended system effects; the focus for research going forward should be on identifying for whom, under what conditions, via what mechanism, at what cost and compared to what other interventions does P4P work?

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CHARACTERISTICS OF STUDIES

Characteristics of included studies *[ordered by study ID]*

Basinga 2011

Study characteristics		
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.	
Participants		
Interventions		
Outcomes		
Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	High risk	Randomization compromised.
Allocation concealment (selection bias)	Low risk	Assignment by province/district/cluster.
Blinding (performance bias and detection bias) All outcomes	Low risk	Blinded assessments.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Not specified.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Low risk	No other apparent source of bias.
Baseline outcome measurement All outcomes	Low risk	Analysis methods adjusted for differences.
Matched characteristics for control study sites	Low risk	Comparable.
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

Bernal 2018

Study characteristics

Bernal 2018 *(Continued)*

Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.
Participants	
Interventions	
Outcomes	
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	As per guidance.
Allocation concealment (selection bias)	High risk	As per guidance.
Blinding (performance bias and detection bias) All outcomes	Low risk	Bernal 2018 Section 6 outlines sensitivity analyses and details quality checks on data.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Not specified.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Unclear risk	Reforms were taking place at the same time.
Baseline outcome measurement All outcomes	Low risk	Analysis methods adjusted for differences.
Matched characteristics for control study sites	High risk	Bernal 2018 Table 2 and page 9 highlight the differences between results-based aid provinces and those with national funding.
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

Binyaruka 2015

Study characteristics

Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.
Participants	
Interventions	
Outcomes	

Binyaruka 2015 *(Continued)*

Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	High risk	As per guidance.
Allocation concealment (selection bias)	High risk	As per guidance.
Blinding (performance bias and detection bias) All outcomes	Low risk	Unlikely outcome assessment affected by allocation knowledge.
Incomplete outcome data (attrition bias) All outcomes	High risk	Authors note that this may have biased results.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Low risk	No other apparent source of bias.
Baseline outcome measurement All outcomes	Low risk	Analysis methods adjusted for differences.
Matched characteristics for control study sites	Low risk	Low except for: ANC visits and IPT during ANC, outpatient visits per month under/over 5, patient assessments of staff kindness, probability of payment for delivery care, satisfaction with interpersonal care.
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

Binyaruka 2017

Study characteristics		
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.	
Participants		
Interventions		
Outcomes		
Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**

Binyaruka 2017 *(Continued)*

Random sequence generation (selection bias)	High risk	As per guidance.
Allocation concealment (selection bias)	High risk	As per guidance.
Blinding (performance bias and detection bias) All outcomes	Low risk	Unlikely outcome assessment affected by allocation knowledge.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Not specified.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Low risk	No other apparent source of bias.
Baseline outcome measurement All outcomes	Low risk	Analysis methods adjusted for differences.
Matched characteristics for control study sites	Low risk	Low except for: availability and stockouts of medicines and medical supplies.
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

Binyaruka 2018b

Study characteristics		
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.	
Participants		
Interventions		
Outcomes		
Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	High risk	As per guidance.
Allocation concealment (selection bias)	High risk	As per guidance.

Binyaruka 2018b *(Continued)*

Blinding (performance bias and detection bias) All outcomes	Low risk	Unlikely outcome assessment affected by allocation knowledge.
Incomplete outcome data (attrition bias) All outcomes	High risk	Authors note that this may have biased results.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Low risk	No other apparent source of bias.
Baseline outcome measurement All outcomes	Low risk	Analysis methods adjusted for differences.
Matched characteristics for control study sites	Low risk	Low except for: ANC visits and IPT during ANC, outpatient visits per month under/over 5, patient assessments of staff kindness, probability of payment for delivery care, satisfaction with interpersonal care.
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

Bonfrer 2014a

Study characteristics		
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.	
Participants		
Interventions		
Outcomes		
Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	High risk	As per guidance.
Allocation concealment (selection bias)	High risk	As per guidance.
Blinding (performance bias and detection bias) All outcomes	Low risk	Unlikely outcome assessment affected by allocation knowledge.
Incomplete outcome data (attrition bias)	Unclear risk	Not specified.

Bonfrer 2014a *(Continued)*

All outcomes		
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Unclear risk	Authors recognized they only assessed impacts of 6/23 targeted services.
Baseline outcome measurement All outcomes	Low risk	Analysis methods adjusted for differences.
Matched characteristics for control study sites	High risk	Bonfrer 2014a Appendix Table 6 suggests differences existed between the different districts, e.g. population characteristics (poverty) varied between 28.7% and 82.3%.
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

Bonfrer 2014b

Study characteristics		
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.	
Participants		
Interventions		
Outcomes		
Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	High risk	As per guidance.
Allocation concealment (selection bias)	High risk	As per guidance.
Blinding (performance bias and detection bias) All outcomes	Low risk	Blinded assessments.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Not specified.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Unclear risk	Authors recognized they only assessed impacts of 6/23 targeted services.

Bonfrer 2014b *(Continued)*

Baseline outcome measurement All outcomes	Low risk	Analysis methods adjusted for differences.
Matched characteristics for control study sites	Low risk	Comparable.
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

Brock 2018

Study characteristics		
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.	
Participants		
Interventions		
Outcomes		
Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Sequence described in sufficient detail.
Allocation concealment (selection bias)	Low risk	Assignment by healthcare professional after baseline assessment.
Blinding (performance bias and detection bias) All outcomes	Low risk	Blinded assessments.
Incomplete outcome data (attrition bias) All outcomes	Low risk	Dropout before assignment 12%, but after assignment only 3%.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Unclear risk	The initial design was changed given few clinicians saw sufficiently high number of patients to be of relevance. Initial provider pool convenience sample.
Baseline outcome measurement All outcomes	Low risk	Comparable.
Matched characteristics for control study sites	High risk	Brock 2018 Tables 2 and 3 suggested some differences between providers and patients.

Brock 2018 *(Continued)*

Protection against contamination (intervention and controls)	Low risk	Assignment by healthcare professional.

Celhay 2015

Study characteristics		
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.	
Participants		
Interventions		
Outcomes		
Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Sequence described in sufficient detail.
Allocation concealment (selection bias)	Low risk	Assignment by province/district/cluster.
Blinding (performance bias and detection bias) All outcomes	Low risk	Unlikely outcome assessment affected by allocation knowledge.
Incomplete outcome data (attrition bias) All outcomes	Low risk	Authors used routine data and performed robustness analyses.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Low risk	No other apparent source of bias.
Baseline outcome measurement All outcomes	Low risk	Comparable.
Matched characteristics for control study sites	Low risk	Comparable.
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

Chang 2017

Study characteristics		
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.	
Participants		
Interventions		
Outcomes		
Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not specified.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Unclear risk	3 PBF schemes were implemented, only 1 assessed.
Intervention independent (ITS)?	High risk	Other interventions concurrent (including further PBF + introduction of database).
Shape of effect prespecified (ITS)?	Low risk	Specified as per guidance.
Unlikely to affect data collection (ITS)?	High risk	Intervention introduced alongside an HMIS intervention.
Incomplete outcome data addressed (ITS)?	Unclear risk	Not specified.

Chansa 2015

Study characteristics		
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.	
Participants		
Interventions		
Outcomes		
Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**

Chansa 2015 *(Continued)*

Blinding (performance bias and detection bias) All outcomes	Low risk	Unlikely allocation affected data collection.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Low risk	No other apparent source of bias.
Intervention independent (ITS)?	Unclear risk	Not specified.
Shape of effect prespecified (ITS)?	Low risk	Specified as per guidance.
Unlikely to affect data collection (ITS)?	High risk	Intervention introduced alongside audits.
Incomplete outcome data addressed (ITS)?	Low risk	HMIS data.

Cruzado de la Vega 2017

Study characteristics		
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.	
Participants		
Interventions		
Outcomes		
Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	High risk	No randomization.
Allocation concealment (selection bias)	Low risk	Assignment by province/district/cluster.
Blinding (performance bias and detection bias) All outcomes	Low risk	Unlikely outcome assessment affected by allocation knowledge.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Not specified.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.

Cruzado de la Vega 2017 *(Continued)*

Other bias	Low risk	No other apparent source of bias.
Baseline outcome measurement All outcomes	Low risk	Analysis methods adjusted for differences.
Matched characteristics for control study sites	Low risk	Comparable.
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

Das 2017

Study characteristics		
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.	
Participants		
Interventions		
Outcomes		
Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	High risk	As per guidance.
Allocation concealment (selection bias)	High risk	As per guidance.
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not specified.
Incomplete outcome data (attrition bias) All outcomes	High risk	Subset analyses with particularly small samples.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Low risk	No other apparent source of bias.
Baseline outcome measurement All outcomes	Low risk	Analysis methods adjusted for differences.

Das 2017 *(Continued)*

Matched characteristics for control study sites	Low risk	Comparable.
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

de Walque 2015

Study characteristics		
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.	
Participants		
Interventions		
Outcomes		
Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	High risk	Randomization compromised.
Allocation concealment (selection bias)	Low risk	Assignment by province/district/cluster.
Blinding (performance bias and detection bias) All outcomes	Low risk	Blinded assessments.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Not specified.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Low risk	No other apparent source of bias.
Baseline outcome measurement All outcomes	Low risk	Analysis methods adjusted for differences.
Matched characteristics for control study sites	Low risk	Comparable.
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

de Walque 2017

Study characteristics		
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.	
Participants		
Interventions		
Outcomes		
Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Sequence described in sufficient detail.
Allocation concealment (selection bias)	Low risk	Assignment by province/district/cluster.
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not specified.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Not specified.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Low risk	No other apparent source of bias.
Baseline outcome measurement All outcomes	Low risk	Analysis methods adjusted for differences.
Matched characteristics for control study sites	Low risk	Comparable.
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

Duysburgh 2016

Study characteristics	
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.
Participants	

Duysburgh 2016 *(Continued)*

Interventions	
Outcomes	
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	As per guidance.
Allocation concealment (selection bias)	High risk	As per guidance.
Blinding (performance bias and detection bias) All outcomes	Low risk	Indicators assessed objectively by trained health workers not working in assessed facilities.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Not specified.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Unclear risk	This was reanalyzed because initial analyses were inappropriate and did not account for baseline differences.
Baseline outcome measurement All outcomes	Unclear risk	Paper reanalyzed; reanalyzed results noted as low (analysis methods adjusted for differences).
Matched characteristics for control study sites	High risk	Duysburgh 2016 Appendix Table S1 suggests differences between intervention and control sites but unclear what effect this would have on outcomes.
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

Engineer 2016

Study characteristics	
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.
Participants	
Interventions	
Outcomes	
Notes	

Engineer 2016 *(Continued)*

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Sequence described in sufficient detail.
Allocation concealment (selection bias)	Low risk	Assignment by province/district/cluster.
Blinding (performance bias and detection bias) All outcomes	Low risk	Blinded assessments.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Not specified.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Low risk	No other apparent source of bias.
Baseline outcome measurement All outcomes	Low risk	Analysis methods adjusted for differences.
Matched characteristics for control study sites	Low risk	Comparable.
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

Falisse 2015

Study characteristics	
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.
Participants	
Interventions	
Outcomes	
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	As per guidance.

Falisse 2015 *(Continued)*

Allocation concealment (selection bias)	High risk	As per guidance.
Blinding (performance bias and detection bias) All outcomes	Low risk	Blinded assessments.
Incomplete outcome data (attrition bias) All outcomes	Low risk	Authors noted outcomes to focus on chosen based on completeness and sensitivity analyses conducted.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Unclear risk	Authors chose which indicators to report on based on data availability.
Baseline outcome measurement All outcomes	Low risk	Analysis methods adjusted for differences.
Matched characteristics for control study sites	High risk	Data not presented.
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

Friedman 2016a

Study characteristics		
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.	
Participants		
Interventions		
Outcomes		
Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Sequence described in sufficient detail.
Allocation concealment (selection bias)	Low risk	Assignment by province/district/cluster.
Blinding (performance bias and detection bias) All outcomes	Low risk	Unlikely outcome assessment affected by allocation knowledge.

Friedman 2016a *(Continued)*

Incomplete outcome data (attrition bias) All outcomes	High risk	Authors noted that high data collection costs meant that population-based data were only included in 18/30 study districts.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Low risk	No other apparent source of bias.
Baseline outcome measurement All outcomes	Low risk	Analysis methods adjusted for differences.
Matched characteristics for control study sites	High risk	Not specified.
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

Friedman 2016b

Study characteristics		
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.	
Participants		
Interventions		
Outcomes		
Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	High risk	No randomization, though stratification and matching.
Allocation concealment (selection bias)	High risk	Allocation was done by MoH via matching.
Blinding (performance bias and detection bias) All outcomes	Low risk	Unlikely outcome assessment affected by allocation knowledge.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Not specified (authors noted that for household expenditure data there was high missingness).
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.

Friedman 2016b *(Continued)*

Other bias	Low risk	No other apparent source of bias.
Baseline outcome measurement All outcomes	Low risk	Analysis methods adjusted for differences.
Matched characteristics for control study sites	Low risk	Comparable (Friedman 2016b Appendix 3 tested parallel trends, though baseline characteristics were dissimilar at times).
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

Gertler 2013

Study characteristics		
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.	
Participants		
Interventions		
Outcomes		
Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	High risk	Randomization compromised.
Allocation concealment (selection bias)	Low risk	Assignment by province/district/cluster.
Blinding (performance bias and detection bias) All outcomes	Low risk	Unlikely outcome assessment affected by allocation knowledge.
Incomplete outcome data (attrition bias) All outcomes	Low risk	Authors noted similar levels of attrition.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Low risk	No other apparent source of bias.
Baseline outcome measurement All outcomes	Low risk	Analysis methods adjusted for differences.

Gertler 2013 *(Continued)*

Matched characteristics for control study sites	Low risk	Comparable.
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

Gertler 2014

Study characteristics		
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.	
Participants		
Interventions		
Outcomes		
Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	High risk	As per guidance.
Allocation concealment (selection bias)	High risk	As per guidance.
Blinding (performance bias and detection bias) All outcomes	Low risk	Indicators assessed objectively.
Incomplete outcome data (attrition bias) All outcomes	Low risk	Paper mentioned missingness of 3%, similar across groups. Complete-case analyses were conducted, which may have compromised results but no reporting of missingness by outcome.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Low risk	No other apparent source of bias.
Baseline outcome measurement All outcomes	Low risk	Analysis methods adjusted for differences.
Matched characteristics for control study sites	Low risk	Low except high for neonatal mortality (noted imbalance only for this outcome).
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

Huillery 2017

Study characteristics		
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.	
Participants		
Interventions		
Outcomes		
Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Sequence described in sufficient detail.
Allocation concealment (selection bias)	Low risk	Assignment by province/district/cluster.
Blinding (performance bias and detection bias) All outcomes	Low risk	Unlikely outcome assessment affected by allocation knowledge.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Not specified.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Low risk	No other apparent source of bias.
Baseline outcome measurement All outcomes	Low risk	Comparable (see Huillery 2017 Appendix).
Matched characteristics for control study sites	Low risk	Comparable (see Huillery 2017 Appendix).
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

Ir 2015

Study characteristics	
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.
Participants	

Ir 2015 *(Continued)*

Interventions	
Outcomes	
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Health workers themselves appeared to be reporting.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Low risk	No other apparent source of bias.
Intervention independent (ITS)?	High risk	Multiple PBF reforms introduced alongside voucher schemes, changes to health service delivery (more trained professionals) also occurred.
Shape of effect prespecified (ITS)?	High risk	As per guidance, effect shape not specified.
Unlikely to affect data collection (ITS)?	Unclear risk	Intervention may have affected data collected as same source was used for payments and for outcome assessment.
Incomplete outcome data addressed (ITS)?	Unclear risk	Not specified.

Khim 2018a

Study characteristics	
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.
Participants	
Interventions	
Outcomes	
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Blinding (performance bias and detection bias) All outcomes	Low risk	Unlikely allocation affected data collection.

Khim 2018a *(Continued)*

Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Unclear risk	Several other schemes were implemented at the same time and high variability in implementation of this scheme noted.
Intervention independent (ITS)?	Unclear risk	Not specified.
Shape of effect prespecified (ITS)?	Low risk	Specified as per guidance.
Unlikely to affect data collection (ITS)?	Unclear risk	Intervention may have affected data collection.
Incomplete outcome data addressed (ITS)?	Unclear risk	Not specified.

Kliner 2015

Study characteristics		
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.	
Participants		
Interventions		
Outcomes		
Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	High risk	No randomization.
Allocation concealment (selection bias)	High risk	Allocation was pragmatic.
Blinding (performance bias and detection bias) All outcomes	Low risk	Unlikely outcome assessment affected by allocation knowledge.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Not specified.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Unclear risk	We are unclear if this is a CBA study or a quasi-non randomized trial (the authors themselves described both as randomized and then as 'randomization

Kliner 2015 *(Continued)*

		not possible') + this is not going to be generalizable, given it was in 1 main hospital population.
Baseline outcome measurement All outcomes	Low risk	Analysis methods adjusted for differences.
Matched characteristics for control study sites	High risk	Kliner 2015 Table 2 suggested differences in populations and outcomes existed.
Protection against contamination (intervention and controls)	High risk	Allocation was pragmatic and unclear how patients moving would have been dealt with.

Lagarde 2015

Study characteristics		
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.	
Participants		
Interventions		
Outcomes		
Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Not specified.
Allocation concealment (selection bias)	Unclear risk	Not specified.
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not specified.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Not specified.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Unclear risk	Authors specified ceiling effects for some outcomes.
Baseline outcome measurement All outcomes	High risk	Analyses methods did not adjust for baseline differences in outcomes, but did adjust for facility and health worker differences.

Lagarde 2015 *(Continued)*

Matched characteristics for control study sites	High risk	Lagarde 2015 Appendix Table 6 suggests differences existed between the different districts, e.g. population characteristics (poverty) varied between 28.7% and 82.3%.
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

Lannes 2015

Study characteristics		
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.	
Participants		
Interventions		
Outcomes		
Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	High risk	Randomization compromised.
Allocation concealment (selection bias)	Low risk	Assignment by province/district/cluster.
Blinding (performance bias and detection bias) All outcomes	Low risk	Blinded assessments.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Not specified, using data from Basinga 2011.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Low risk	No other apparent source of bias.
Baseline outcome measurement All outcomes	Unclear risk	Not specified.
Matched characteristics for control study sites	High risk	Not specified.
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

Lannes 2016

Study characteristics		
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.	
Participants		
Interventions		
Outcomes		
Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	High risk	Randomization compromised.
Allocation concealment (selection bias)	Low risk	Assignment by province/district/cluster.
Blinding (performance bias and detection bias) All outcomes	Low risk	Blinded assessments.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Not specified.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Low risk	No other apparent source of bias.
Baseline outcome measurement All outcomes	Low risk	Analysis methods adjusted for differences.
Matched characteristics for control study sites	Low risk	Comparable.
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

Liu 2005

Study characteristics	
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.
Participants	

Liu 2005 *(Continued)*

Interventions	
Outcomes	
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Blinding (performance bias and detection bias) All outcomes	Low risk	Blinded and random assessments.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Low risk	No other apparent source of bias.
Intervention independent (ITS)?	High risk	Other changes in the country likely to affect trends.
Shape of effect prespecified (ITS)?	Low risk	Specified as per guidance.
Unlikely to affect data collection (ITS)?	Low risk	No effects on data collection.
Incomplete outcome data addressed (ITS)?	Low risk	Panel dataset.

Matsuoka 2014

Study characteristics	
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.
Participants	
Interventions	
Outcomes	
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not specified.

Matsuoka 2014 *(Continued)*

Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Unclear risk	Note: data reanalyzed.
Intervention independent (ITS)?	Unclear risk	Not specified.
Shape of effect prespecified (ITS)?	Low risk	Specified as per guidance.
Unlikely to affect data collection (ITS)?	Unclear risk	Intervention may have affected data collection.
Incomplete outcome data addressed (ITS)?	Unclear risk	Not specified.

Mayumana 2017

Study characteristics		
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.	
Participants		
Interventions		
Outcomes		
Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	High risk	As per guidance.
Allocation concealment (selection bias)	High risk	As per guidance.
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not specified.
Incomplete outcome data (attrition bias) All outcomes	High risk	Authors noted that this may have biased results.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Low risk	No other apparent source of bias.

Mayumana 2017 *(Continued)*

Baseline outcome measurement All outcomes	Low risk	Analysis methods adjusted for differences.
Matched characteristics for control study sites	Low risk	Low except for: medical supply stockouts, disruptions due to broken equipment, governance outcomes (committee meetings, content of supervision, existence of community health fund).
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

McMahon 2016

Study characteristics	
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.
Participants	
Interventions	
Outcomes	
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not specified.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Low risk	No other apparent source of bias.
Intervention independent (ITS)?	Unclear risk	Not specified.
Shape of effect prespecified (ITS)?	Low risk	Specified as per guidance.
Unlikely to affect data collection (ITS)?	High risk	Intervention directly targets improvements in data.
Incomplete outcome data addressed (ITS)?	High risk	Several indicators excluded due to missingness.

Menya 2015

Study characteristics	
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.
Participants	
Interventions	
Outcomes	
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Sequence described in sufficient detail.
Allocation concealment (selection bias)	Low risk	Assignment by province/district/cluster.
Blinding (performance bias and detection bias) All outcomes	Low risk	Unlikely outcome assessment affected by allocation knowledge.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	1 facility excluded due to discontinuation (no laboratory technician available).
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Low risk	No other apparent source of bias.
Baseline outcome measurement All outcomes	Unclear risk	Not specified.
Matched characteristics for control study sites	High risk	Menya 2015 Table 2 suggestive of differences between facilities and coverage.
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

Mohanan 2017

Study characteristics	
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.
Participants	
Interventions	

Mohanan 2017 *(Continued)*

Outcomes	
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Sequence described in sufficient detail.
Allocation concealment (selection bias)	Low risk	Assignment by healthcare professional.
Blinding (performance bias and detection bias) All outcomes	Low risk	Unlikely outcome assessment affected by allocation knowledge.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Not specified.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Low risk	No other apparent source of bias.
Baseline outcome measurement All outcomes	Unclear risk	Not specified.
Matched characteristics for control study sites	Low risk	Comparable (see Mohanan 2017 Appendix).
Protection against contamination (intervention and controls)	Unclear risk	Contamination could have occurred.

Peabody 2011a

Study characteristics

Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.
Participants	
Interventions	
Outcomes	
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement

Peabody 2011a *(Continued)*

Random sequence generation (selection bias)	Low risk	Sequence described in sufficient detail.
Allocation concealment (selection bias)	Low risk	Assignment by province/district/cluster.
Blinding (performance bias and detection bias) All outcomes	Low risk	Blinded assessments.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Not specified.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Low risk	No other apparent source of bias.
Baseline outcome measurement All outcomes	Low risk	Analysis methods adjusted for differences.
Matched characteristics for control study sites	High risk	Peabody 2011 Table 1 suggested differences in providers.
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

Peabody 2014

Study characteristics		
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.	
Participants		
Interventions		
Outcomes		
Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Sequence described in sufficient detail.
Allocation concealment (selection bias)	Low risk	Assignment by province/district/cluster.

Peabody 2014 *(Continued)*

Blinding (performance bias and detection bias) All outcomes	Low risk	Unlikely outcome assessment affected by allocation knowledge.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Not specified.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Unclear risk	Outcome specified as 'not wasting' affected by seasonal variations.
Baseline outcome measurement All outcomes	Low risk	Analysis methods adjusted for differences.
Matched characteristics for control study sites	Low risk	Comparable.
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

Powell-Jackson 2014

Study characteristics		
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.	
Participants		
Interventions		
Outcomes		
Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	High risk	No randomization, though matching occurred.
Allocation concealment (selection bias)	Low risk	Assignment by province/district/cluster.
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not specified.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Not specified.

Powell-Jackson 2014 *(Continued)*

Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Unclear risk	1 year into scheme so early impacts.
Baseline outcome measurement All outcomes	Low risk	Analysis methods adjusted for differences.
Matched characteristics for control study sites	Low risk	Comparable.
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

Priedeman Skiles 2013

Study characteristics		
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.	
Participants		
Interventions		
Outcomes		
Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	High risk	Randomization compromised.
Allocation concealment (selection bias)	Low risk	Assignment by province/district/cluster.
Blinding (performance bias and detection bias) All outcomes	Low risk	Unlikely outcome assessment affected by allocation knowledge.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Not specified.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Unclear risk	Rollout of community-based health insure may be affecting equity outcomes in particular.

Priedeman Skiles 2013 *(Continued)*

Baseline outcome measurement All outcomes	Low risk	Analysis methods adjusted for differences.
Matched characteristics for control study sites	Low risk	Comparable.
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

Priedeman Skiles 2015

Study characteristics		
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.	
Participants		
Interventions		
Outcomes		
Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	High risk	Randomization compromised.
Allocation concealment (selection bias)	Low risk	Assignment by province/district/cluster.
Blinding (performance bias and detection bias) All outcomes	Low risk	Unlikely outcome assessment affected by allocation knowledge.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Not specified.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Unclear risk	Assessment time may have been too short, seasonal variations also relevant.
Baseline outcome measurement All outcomes	Low risk	Analysis methods adjusted for differences.
Matched characteristics for control study sites	Low risk	Comparable.

Priedeman Skiles 2015 *(Continued)*

Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

Quimbo 2016

Study characteristics		
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.	
Participants		
Interventions		
Outcomes		
Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Sequence described in sufficient detail.
Allocation concealment (selection bias)	Low risk	Assignment by province/district/cluster.
Blinding (performance bias and detection bias) All outcomes	Low risk	Blinded assessments.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Not specified.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Low risk	No other apparent source of bias.
Baseline outcome measurement All outcomes	Low risk	Analysis methods adjusted for differences.
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

Rudasingwa 2014

Study characteristics		

Rudasingwa 2014 *(Continued)*

Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.
Participants	
Interventions	
Outcomes	
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	As per guidance.
Allocation concealment (selection bias)	High risk	As per guidance.
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not specified.
Incomplete outcome data (attrition bias) All outcomes	Low risk	Authors noted outcomes to focus on chosen based on completeness.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Unclear risk	Authors noted small facility sample size, resulting in "a higher probability of Type II error" (page 25). Authors had not considered that results may have been influenced by the removal of user fees from certain services at a similar time to when the PBF programme was introduced. Potential conflict of interest: funding for data collection by CORDAID, 1 of the implementing agents of the PBF scheme.
Baseline outcome measurement All outcomes	Low risk	Analysis methods adjusted for differences.
Matched characteristics for control study sites	High risk	Data not presented.
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

Rusa 2009a

Study characteristics

Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.

Rusa 2009a *(Continued)*

Participants	
Interventions	
Outcomes	
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not specified.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Low risk	No other apparent source of bias.
Intervention independent (ITS)?	High risk	Other changes in the country (user fee removal) likely to affect trends.
Shape of effect prespecified (ITS)?	Low risk	Specified as per guidance.
Unlikely to affect data collection (ITS)?	Unclear risk	Intervention may have affected data collection.
Incomplete outcome data addressed (ITS)?	Unclear risk	Not specified.

Shapira 2017

Study characteristics	
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.
Participants	
Interventions	
Outcomes	
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Sequence described in sufficient detail.

Shapira 2017 *(Continued)*

Allocation concealment (selection bias)	Low risk	Assignment by province/district/cluster.
Blinding (performance bias and detection bias) All outcomes	High risk	Outcomes were partly self-assessed.
Incomplete outcome data (attrition bias) All outcomes	Low risk	Unbalanced attrition addressed.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Low risk	No other apparent source of bias.
Baseline outcome measurement All outcomes	Low risk	Comparable, except for institutional deliveries and number of pregnancies.
Matched characteristics for control study sites	Low risk	Comparable.
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

Shen 2017

Study characteristics		
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.	
Participants		
Interventions		
Outcomes		
Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Sequence described in sufficient detail.
Allocation concealment (selection bias)	Low risk	Assignment by province/district/cluster.
Blinding (performance bias and detection bias) All outcomes	High risk	Outcomes are self-scored.

Shen 2017 *(Continued)*

Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Not specified.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Low risk	No other apparent source of bias.
Baseline outcome measurement All outcomes	Low risk	Analysis methods adjusted for differences.
Matched characteristics for control study sites	High risk	Shen 2017 Table 2 suggestive of differences between facilities and health worker characteristics.
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

Sherry 2017

Study characteristics		
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.	
Participants		
Interventions		
Outcomes		
Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	High risk	Randomization compromised.
Allocation concealment (selection bias)	Low risk	Assignment by province/district/cluster.
Blinding (performance bias and detection bias) All outcomes	Low risk	Unlikely outcome assessment affected by allocation knowledge.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Not specified.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.

Sherry 2017 *(Continued)*

Other bias	Unclear risk	Rollout of national immunization campaigns, increased HIV funding coincided with study periods and may have affected results.
Baseline outcome measurement All outcomes	Low risk	Analysis methods adjusted for differences.
Matched characteristics for control study sites	Low risk	Comparable.
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

Soeters 2011

Study characteristics		
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.	
Participants		
Interventions		
Outcomes		
Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	High risk	As per guidance.
Allocation concealment (selection bias)	High risk	As per guidance.
Blinding (performance bias and detection bias) All outcomes	Low risk	Low except concerns relating to patient-reported outcomes.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Not specified.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Low risk	No other apparent source of bias.
Baseline outcome measurement All outcomes	Low risk	Analysis methods adjusted for differences.

Soeters 2011 *(Continued)*

Matched characteristics for control study sites	High risk	Not specified.
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

Steenland 2017

Study characteristics		
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.	
Participants		
Interventions		
Outcomes		
Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	High risk	As per guidance.
Allocation concealment (selection bias)	High risk	As per guidance.
Blinding (performance bias and detection bias) All outcomes	Low risk	HMIS.
Incomplete outcome data (attrition bias) All outcomes	Low risk	See Steenland 2017 Appendix Table 4.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Unclear risk	Author raised concerns that PBF may have incentivized additional reporting, therefore, data were more available in intervention districts. Potential conflict of interest: funding for data collection by CORDAID, 1 of the implementing agents of the PBF scheme.
Baseline outcome measurement All outcomes	Low risk	Analysis methods adjusted for differences.
Matched characteristics for control study sites	High risk	Steenland 2017 Table 1 suggested differences between comparison and intervention existed, e.g. number of health facilities/100,000 people consistently higher in intervention group than in comparator group.

Steenland 2017 *(Continued)*

Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

Sun 2016

Study characteristics		
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.	
Participants		
Interventions		
Outcomes		
Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	High risk	Randomization compromised.
Allocation concealment (selection bias)	Low risk	Assignment by province/district/cluster.
Blinding (performance bias and detection bias) All outcomes	Low risk	Unlikely outcome assessment affected by allocation knowledge.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Not specified.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Unclear risk	Authors noted political interference in process.
Baseline outcome measurement All outcomes	Low risk	Analysis methods adjusted for differences.
Matched characteristics for control study sites	Low risk	Comparable.
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

Van de Poel 2016

Study characteristics	
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.
Participants	
Interventions	
Outcomes	
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	As per guidance.
Allocation concealment (selection bias)	High risk	As per guidance.
Blinding (performance bias and detection bias) All outcomes	Low risk	Indicators assessed objectively.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Not specified.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Unclear risk	Multiple PBF schemes that overlapped and potentially introduced alongside budget increases.
Baseline outcome measurement All outcomes	Low risk	Analysis methods adjusted for differences.
Matched characteristics for control study sites	Low risk	Comparable.
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

Viñuela 2015

Study characteristics	
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.
Participants	

Viñuela 2015 *(Continued)*

Interventions	
Outcomes	
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Blinding (performance bias and detection bias) All outcomes	Low risk	Unlikely allocation affected data collection.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Unclear risk	Data were aggregated at high level, which may impact analyses and findings.
Intervention independent (ITS)?	Unclear risk	Other reforms were happening in the education and justice sectors, which could have contributed.
Shape of effect prespecified (ITS)?	Low risk	Specified as per guidance.
Unlikely to affect data collection (ITS)?	Unclear risk	Intervention may have affected data collection.
Incomplete outcome data addressed (ITS)?	Unclear risk	Not specified.

Wagner 2018a

Study characteristics	
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.
Participants	
Interventions	
Outcomes	
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Sequence described in sufficient detail.
Allocation concealment (selection bias)	Low risk	Assignment by province/district/cluster.

Wagner 2018a *(Continued)*

Blinding (performance bias and detection bias) All outcomes	Low risk	Unlikely outcome assessment affected by allocation knowledge.
Incomplete outcome data (attrition bias) All outcomes	Low risk	2% of sample missing only.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Low risk	No other apparent source of bias.
Baseline outcome measurement All outcomes	Low risk	Analysis methods adjusted for differences.
Matched characteristics for control study sites	Low risk	Comparable.
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

Witvorapong 2016

Study characteristics		
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.	
Participants		
Interventions		
Outcomes		
Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Sequence described in sufficient detail.
Allocation concealment (selection bias)	Low risk	Assignment by province/district/cluster.
Blinding (performance bias and detection bias) All outcomes	Low risk	Unlikely outcome assessment affected by allocation knowledge.
Incomplete outcome data (attrition bias) All outcomes	High risk	408/7131 observations excluded due to missing data.

Witvorapong 2016 *(Continued)*

Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Unclear risk	Potential selection bias and additionally unclear if authors had access to baseline data.
Baseline outcome measurement All outcomes	Unclear risk	Baseline measurement not specified.
Matched characteristics for control study sites	High risk	Characteristics not specified.
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

Wu 2014

Study characteristics		
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.	
Participants		
Interventions		
Outcomes		
Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Blinding (performance bias and detection bias) All outcomes	Low risk	Unlikely allocation affected data collection.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Unclear risk	Not generalizable, study conducted in 1 setting.
Intervention independent (ITS)?	Unclear risk	Other reforms happening but robustness checks performed to ascertain impacts and effects were consistent.
Shape of effect prespecified (ITS)?	Low risk	Specified as per guidance.
Unlikely to affect data collection (ITS)?	Low risk	No effects on data collection.
Incomplete outcome data addressed (ITS)?	Unclear risk	Not specified.

Yao 2008

Study characteristics		
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.	
Participants		
Interventions		
Outcomes		
Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	High risk	As per guidance.
Allocation concealment (selection bias)	High risk	As per guidance.
Blinding (performance bias and detection bias) All outcomes	Low risk	Blinded assessments.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Not specified.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Low risk	Reanalysis could not be adjusted for the gross domestic product/country make-up.
Baseline outcome measurement All outcomes	Unclear risk	Paper reanalyzed; reanalyzed results noted as low (analysis methods adjusted for differences).
Matched characteristics for control study sites	High risk	Yao 2008 Table 1 suggested the intervention was performed in areas that were more populated and poorer compared to the control group.
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

Yip 2014

Study characteristics	
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.

Yip 2014 *(Continued)*

Participants	
Interventions	
Outcomes	
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Sequence described in sufficient detail.
Allocation concealment (selection bias)	Low risk	Assignment by province/district/cluster.
Blinding (performance bias and detection bias) All outcomes	Low risk	Unlikely outcome assessment affected by allocation knowledge.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Not specified.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Low risk	No other apparent source of bias.
Baseline outcome measurement All outcomes	Low risk	Constrained matched randomization.
Matched characteristics for control study sites	Low risk	Comparable (see Yip 2014 Appendix).
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

Zang 2015

Study characteristics	
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.
Participants	
Interventions	
Outcomes	
Notes	

Zang 2015 *(Continued)*

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	As per guidance.
Allocation concealment (selection bias)	High risk	As per guidance.
Blinding (performance bias and detection bias) All outcomes	Unclear risk	Not specified.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Not specified.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Low risk	We classified this as CBA; however, it could be non-randomized trial, but no allocation mentioned.
Baseline outcome measurement All outcomes	Low risk	Analysis methods adjusted for differences.
Matched characteristics for control study sites	Low risk	Comparable.
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

Zeng 2013

Study characteristics	
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.
Participants	
Interventions	
Outcomes	
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	As per guidance.

Zeng 2013 *(Continued)*

Allocation concealment (selection bias)	High risk	As per guidance.
Blinding (performance bias and detection bias) All outcomes	Low risk	Indicators assessed objectively.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Not specified.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Unclear risk	NGO facilities may not be a suitable comparator to public facilities.
Baseline outcome measurement All outcomes	Low risk	Analysis methods adjusted for differences.
Matched characteristics for control study sites	High risk	Data not presented.
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

Zeng 2018

Study characteristics		
Methods	For full details of this study, see Table 3; Table 4; Table 5; Table 6.	
Participants		
Interventions		
Outcomes		
Notes		
Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	High risk	As per guidance.
Allocation concealment (selection bias)	High risk	As per guidance.
Blinding (performance bias and detection bias) All outcomes	Low risk	Low except concerns relating to patient satisfaction and quality-reported outcomes.

Zeng 2018 *(Continued)*

Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Not specified.
Selective reporting (reporting bias)	Low risk	No evidence of selective reporting.
Other bias	Low risk	No other apparent source of bias.
Baseline outcome measurement All outcomes	Low risk	Analysis methods adjusted for differences.
Matched characteristics for control study sites	High risk	Zeng 2018 Table 3 suggested significant differences, e.g. in household size, daily spending and age of mother.
Protection against contamination (intervention and controls)	Low risk	Assignment by province/district/cluster.

ANC: antenatal care; CBA: controlled before-after; HMIS: Health Management Information System; IPT: intermittent preventive treatment; ITS: interrupted time series; MoH: Ministry of Health; NGO: non-governmental organization; PBF: performance-based funding.

Characteristics of excluded studies *[ordered by study ID]*

Study	Reason for exclusion
Aninanya 2016	Study did not include major outcomes of interest.
Anselmi 2017	Study complementary to, or superseded by, other included study.
Aung 2015	Study did not include major outcomes of interest.
Banerjee 2008	Study intervention did not cover relevant payments.
Basinga 2010	Study complementary to, or superseded by, other included study.
Biai 2012	Study focused only on payments that were not explicitly linked to changing patterns of performance.
Borghi 2015	Study was complementary to included evaluations, excluded based on study type.
Canavan 2008	Study design was not CBA/RCT/ITS.
Department for International Development 2017	CBA but choice of control not appropriate.
Kumar 2016	CBA but choice of control not appropriate.
Liu 2003	Study is an ITS but not have at least 3 data points before or after the intervention.
Morisky 1985	CBA but only 1 cluster/site in each comparison group.
Ngo 2017	Study complementary to, or superseded by, other included study.

Study	Reason for exclusion
Nguyen 2015	Study did not include major outcomes of interest.
Olken 2012	Study did not include relevant healthcare providers.
Peabody 2010	Study superseded by already included study.
Peabody 2017	Study was complementary to included evaluations, excluded based on study type.
Phillips 1975	Study did not include relevant healthcare providers.
Prakarsh 2017	Study did not include relevant healthcare providers.
Quy 2003	ITS but more time points for assessment needed.
Rahman 2017	Study focused only on payments that were not explicitly linked to changing patterns of performance.
RBF Health 2017	Study did not include relevant healthcare providers.
Rusa 2009b	Study complementary to, or superseded by, other included study.
Shen 2015	Study complementary to, or superseded by, other included study.
Singh 2015	Study did not include relevant healthcare providers.
Soeters 2005	CBA but insufficient clusters.
Soeters 2008	CBA but insufficient clusters.
Soeters 2009	CBA but had insufficient clusters.
Sylvia 2015	Study did not include relevant healthcare providers.
Valadez 2015	CBA but choice of control not appropriate.
Vergeer 2008	Study superseded by other included study.
World Bank 2015	Insufficient information available to determine inclusion.
Zeng 2018a	Study was complementary to included evaluations, excluded based on study type.
Zhang 2017	ITS but did not have ≥ 3 data points before or after the intervention.
Zhao 2013	CBA but only 1 cluster/site in each comparison group.

CBA: controlled before-after; ITS: interrupted time series; RCT: randomized controlled trial.

ADDITIONAL TABLES

Table 1. Meta-summary: effects of paying for performance versus control

Outcome	Indicator	Direction of relative effect and GRADE assessment for targeted and un-targeted outcomes

Table 1. Meta-summary: effects of paying for performance versus control *(Continued)*

		Targeted outcomes		Untargeted outcomes	
		Direction of effect	**Certainty of the evidence**	**Direction of effect**	**Certainty of the evidence**
Primary: health outcomes	Child mortality (per 1000 children born alive)	▲	⊕⊕⊖⊖	▲	⊕⊕⊕⊖
	Neonatal mortality (rate)	□	⊕⊕⊖⊖	▬	⊕⊕⊕⊖
	Incidence of sickness	No evidence		▲	⊕⊕⊖⊖
	Child wasting (%)	No evidence		▲	⊕⊕⊕⊖
	Unwanted pregnancy rate (targeted); overall pregnancy rate (non-targeted)	□	⊕⊖⊖⊖	▬	⊕⊕⊕⊖
	Reported illness in children: anaemia (%)	▲	⊕⊕⊖⊖	▲	⊕⊕⊕⊖
	TB treatment success rate	▲	⊕⊕⊖⊖	No evidence	
Primary: utilization and delivery	Provision of HIV testing (%)	▲	⊕⊕⊖⊖	▲	⊕⊕⊖⊖
	Provision of ART services (%)	▼	⊕⊕⊖⊖	No evidence	
	Provision of PMTCT (%)	▲	⊕⊕⊖⊖	No evidence	
	Bednet use (% of children and households using bednets)	▼	⊕⊕⊖⊖	▬	⊕⊕⊕⊖
	TB adherence rate	□	⊕⊖⊖⊖	No evidence	
	Child immunization: % ≥ 1 vaccine	▬	⊕⊕⊖⊖	No evidence	
	Child immunization: % fully vaccinate	□	⊕⊕⊖⊖	No evidence	
	Child immunization: % receiving BCG	▲	⊕⊕⊖⊖	No evidence	
	Child immunization: % receiving DTP	▼	⊕⊕⊖⊖	No evidence	
	Child immunization: % receiving measles vaccine	▲	⊕⊕⊖⊖	No evidence	
	Child immunization: % receiving polio vaccine	▲	⊕⊕⊖⊖	No evidence	
	Child immunization: % receiving pentavalent vaccine	▬	⊕⊕⊖⊖	No evidence	
	Mothers receiving immunizations (%)	▲	⊕⊕⊖⊖	No evidence	
	Probability of any utilization (%)	▬	⊕⊕⊖⊖	▬	⊕⊕⊖⊖
	Frequency of curative utilization (%)	▲	⊕⊕⊖⊖	□	⊕⊖⊖⊖
	Frequency of outpatient utilization (%)	▲	⊕⊕⊖⊖	▬	⊕⊕⊖⊖

Table 1. Meta-summary: effects of paying for performance versus control *(Continued)*

	Frequency – all visits (number of visits)	▬	⊕⊕⊖⊖	▬	⊕⊕⊖⊖
	Frequency – elderly visits	No evidence		▬	⊕⊕⊖⊖
	ANC (% of women utilizing ANC)	▲	⊕⊕⊖⊖	▬	⊕⊕⊖⊖
	Total number ANC visits	□	⊕⊕⊖⊖	No evidence	
	≥ 1 ANC (utilization rates)	▲	⊕⊕⊖⊖	□	⊕⊖⊖⊖
	≥ 2 ANC (utilization rates)	▬	⊕⊕⊖⊖	□	⊕⊖⊖⊖
	≥ 4 ANC (utilization rates)	▲	⊕⊕⊖⊖	□	⊕⊖⊖⊖
	ANC from qualified provider (utilization rate)	▬	⊕⊕⊖⊖	No evidence	
	Delivery of iron supplementation during ANC (% women receiving)	▼	⊕⊕⊖⊖	No evidence	
	Women accessing ANC in first trimester (% women receiving)	▲	⊕⊕⊖⊖	▲	⊕⊕⊖⊖
	Family planning (% using of any method)	□	⊕⊕⊖⊖	No evidence	
	Family planning (% women utilizing modern methods)	□	⊕⊕⊖⊖	▬	⊕⊕⊕⊖
	Family planning (% of services delivered)	▲	⊕⊕⊕⊖	▲	⊕⊕⊖⊖
	Institutional delivery (rates or coverage)	□	⊕⊖⊖⊖	▬	⊕⊕⊖⊖
	Institutional delivery: caesarean section (%)	▲	⊕⊕⊖⊖	□	⊕⊖⊖⊖
	Institutional delivery: skilled attendance	▲	⊕⊕⊖⊖	No evidence	
	Delivery and coverage of PNC	▲	⊕⊕⊖⊖	▲	⊕⊕⊖⊖
	PNC (overall utilization rate)	▲	⊕⊕⊖⊖	▼	⊕⊕⊕⊖
	PNC: skilled attendance (% women receiving)	▲	⊕⊕⊖⊖	No evidence	
	PNC: timely access (% women receiving)	▲	⊕⊕⊖⊖	▲	⊕⊕⊖⊖
	Utilization rate of consultations in children	▲	⊕⊕⊖⊖	□	⊕⊖⊖⊖
	Utilization rate of curative consultations in children	▼	⊕⊕⊖⊖	No evidence	
	Vitamin A supplementation in children (rate)	▲	⊕⊕⊖⊖	No evidence	
Primary: quality of care	Background and physical assessment (scores general, across ANC, PNC, childcare and for other consultations)	□	⊕⊖⊖⊖	No evidence	

Table 1. Meta-summary: effects of paying for performance versus control *(Continued)*

	Correct patient management by healthcare providers (scores in relation to ANC, child-care and PNC)	□	⊕⊖⊖⊖	▬	⊕⊕⊕⊖
	Patient counselling (scores on ANC- and PNC-related counselling)	□	⊕⊖⊖⊖	No evidence	
	Immunizations (score for receiving any tetanus and number of tetanus vaccinations)	▲	⊕⊕⊖⊖	▲	⊕⊕⊖⊖
	Women in ANC given or prescribed folic acid/iron	▲	⊕⊕⊖⊖	No evidence	
	Prescription quality of care (index score when targeted, % women receiving correct prescription in case of illness for non-targeted)	▲	⊕⊕⊖⊖	No evidence	
	Staff knowledge and skills (scores)	▬	⊕⊕⊖⊖	▬	⊕⊕⊖⊖
	Staff responsiveness (scores)	▲	⊕⊖⊖⊖	No evidence	
	Patient knowledge (score)	▲	⊕⊕⊖⊖	▬	⊕⊕⊕⊖
	Contact time (% change)	▬	⊕⊕⊖⊖	▬	⊕⊕⊖⊖
	Waiting time (% change)	▼	⊕⊕⊖⊖	□	⊕⊖⊖⊖
	Length of stay (% change)	No evidence		▼	⊕⊕⊖⊖
	Overall composite quality of care score	▲	⊕⊕⊖⊖	▼	⊕⊕⊕⊖
	Quality family planning (score)	▲	⊕⊕⊖⊖	No evidence	
	Quality of ANC (score)	□	⊕⊕⊖⊖	No evidence	
	Quality maternity care (score)	▲	⊕⊕⊖⊖	□	⊕⊖⊖⊖
	Quality of child health care (score)	▲	⊕⊕⊕⊖	No evidence	
	Quality of outpatient services (score)	□	⊕⊖⊖⊖	□	⊕⊖⊖⊖
	Quality of medicine and equipment (score)	▲	⊕⊕⊕⊖	□	⊕⊖⊖⊖
	Quality by department or service, or both (score)	▲	⊕⊕⊕⊖	No evidence	
Primary: unintended effects	Overall impacts on free riding and task shifting	No evidence		▬	⊕⊕⊖⊖
Primary: changes in resource use	Human resource availability (people available)	▲	⊕⊕⊕⊖	□	⊕⊖⊖⊖
	Curative health visits per healthcare professional	□	⊕⊖⊖⊖	□	⊕⊖⊖⊖

Table 1. Meta-summary: effects of paying for performance versus control *(Continued)*

	Equipment availability (index)	▲	⊕⊕⊖⊖	□	⊕⊖⊖⊖
	Equipment functionality (index)	▬	⊕⊕⊖⊖	□	⊕⊖⊖⊖
	Infrastructure functionality (index)	▲	⊕⊕⊖⊖	▬	⊕⊕⊖⊖
	Medicine availability (index)	▲	⊕⊕⊖⊖	▲	⊕⊕⊖⊖
	Vaccine availability (index)	□	⊕⊕⊖⊖	□	⊕⊖⊖⊖
	Stockout of equipment	▲	⊕⊕⊖⊖	□	⊕⊖⊖⊖
	Stockout of medicines	No evidence		□	⊕⊖⊖⊖
	Stockout of vaccines	▲	⊕⊕⊖⊖	No evidence	
Secondary: provider motivation, satisfaction, absenteeism and acceptability	Provider absenteeism (%)	▬	⊕⊕⊖⊖	▲	⊕⊕⊕⊖
	Provider motivation (score)	▬	⊕⊕⊕⊖	▲	⊕⊕⊖⊖
	Provider satisfaction (score)	▬	⊕⊕⊕⊖	□	⊕⊕⊖⊖
Secondary: patient satisfaction and acceptability (satisfaction scores)	Patient satisfaction with facility cleanliness (score)	▲	⊕⊕⊖⊖	□	⊕⊕⊖⊖
	Patient satisfaction with contact time (score)	□	⊕⊖⊖⊖	▼	⊕⊕⊖⊖
	Patient satisfaction with opening hours (score)	▲	⊕⊕⊖⊖	▼	⊕⊕⊖⊖
	Patient satisfaction with waiting time (score)	□	⊕⊖⊖⊖	□	⊕⊕⊖⊖
	Patient satisfaction with privacy (score)	▲	⊕⊕⊖⊖	No evidence	
	Overall patient satisfaction with quality of care (score)	▬	⊕⊕⊖⊖	▲	⊕⊕⊖⊖
	Overall patient satisfaction with welcome and reception at facility (score)	No evidence		▲	⊕⊕⊖⊖
	Patient satisfaction with staff: communication (score)	▬	⊕⊕⊖⊖	▲	⊕⊕⊖⊖
	Patient satisfaction with staff: trust (score)	No evidence		▲	⊕⊕⊖⊖
	Patient satisfaction with staff: attitude (score)	▲	⊕⊕⊖⊖	▲	⊕⊕⊖⊖
	Overall satisfaction (score)	▲	⊕⊕⊖⊖	▲	⊕⊕⊕⊖
Secondary: impacts on overall financing or	Fees	No evidence		▼	⊕⊕⊖⊖
	Expenditure on medicine and equipment	▬	⊕⊕⊖⊖	▬	⊕⊕⊕⊖

Table 1. Meta-summary: effects of paying for performance versus control *(Continued)*

resource allocation	Probability of payment for users	No evidence		□	⊕⊕⊖⊖
Secondary: impacts on management or information systems (if not a targeted measure of performance)	Facility or managerial autonomy	▲	⊕⊕⊖⊖	▲	⊕⊕⊖⊖
	Facility governance	▬	⊕⊕⊖⊖	▼	⊕⊕⊖⊖
	Quality of management	▬	⊕⊕⊖⊖	▼	⊕⊕⊖⊖
Secondary: equity-consideration: evidence of differential impact on different parts of the population	Equity of child immunization delivery (wealth-related)	▲	⊕⊕⊖⊖	□	⊕⊖⊖⊖
	Equity in ANC delivery (wealth-related)	▼	⊕⊕⊖⊖	No evidence	
	Equity in institutional delivery (wealth-related)	▬	⊕⊕⊖⊖	▼	⊕⊕⊖⊖
	Equity in institutional delivery (by educational status of mother)	▬	⊕⊕⊖⊖	□	⊕⊖⊖⊖

ANC: antenatal care; ART: antiretroviral therapy; BCG: *Bacillus Calmette–Guérin*; DTP: diphtheria-tetanus-pertussis; PMTCT: prevention of mother-to-child transmission; PNC: postnatal care; TB: tuberculosis.

Direction of effect key

▲: desirable; ▼: non-desirable; ▬: neutral; □: uncertain

Certainty of the evidence key

⊕⊕⊕⊖: moderate; ⊕⊕⊖⊖: low; ⊕⊖⊖⊖: very low

Data availability: for each of the above outcomes, details of the contributing studies and assessments are available in the secondary 'Summary of findings' tables in Appendix 1, as follows.

- Targeted health outcomes: Section 1.1.
- Targeted measures of provider performance (utilization and delivery, and quality of care): Section 1.2.
- Targeted changes in resource use: Section 1.3.
- Targeted secondary outcomes: Section 1.4.
- Untargeted measures of provider performance (utilization and delivery, and quality of care): Section 1.5.
- Untargeted health outcomes: Section 1.6.
- Unintended effects: Section 1.7.
- Untargeted resource use: Section 1.8.
- Untargeted secondary outcomes: Section 1.9.

Table 2. Meta-summary: effects of paying for performance against comparator

Outcome	**Indicator**	**Direction of effect and GRADE rating for targeted and untargeted outcomes**			
		Targeted	**GRADE rating**	**Not-targeted**	**GRADE rating**
Primary: health outcomes	Proportion of women breastfeeding	▬	⊕⊕⊖⊖	▬	⊕⊕⊖⊖
	Reported illness in children (%)	No evidence		▲	⊕⊕⊖⊖
Primary: utilization and delivery	Child immunization (likelihood of being vaccinated)	□	⊕⊕⊖⊖	No evidence	

Table 2. Meta-summary: effects of paying for performance against comparator *(Continued)*

	Child immunization: % receiving BCG	▬	⊕⊕⊖⊖	No evidence	
	Child immunization: % receiving DTP	▬	⊕⊕⊖⊖	No evidence	
	Child immunization: % fully vaccinated	□	⊕⊕⊖⊖	No evidence	
	Immunization during ANC: % receiving tetanus injection	▲	⊕⊕⊖⊖	▬	⊕⊕⊕⊖
	Probability of any utilization (generic)	▲	⊕⊕⊖⊖	No evidence	
	ANC: % receiving ≥ 1 ANC	▬	⊕⊕⊖⊖	No evidence	
	ANC: % receiving ≥ 4 ANC	▬	⊕⊕⊖⊖	No evidence	
	ANC: % receiving ANC in first trimester	▲	⊕⊕⊖⊖	No evidence	
	Child (aged < 5 years) curative visits (rates)	▬	⊕⊕⊖⊖	No evidence	
	Family planning: % using any method	▬	⊕⊕⊖⊖	No evidence	
	Family planning: % using modern methods	▬	⊕⊕⊖⊖	No evidence	
	Institutional delivery (rates and coverage)	□	⊕⊕⊖⊖	No evidence	
	Postnatal care (rates and coverage)	▼	⊕⊕⊖⊖	▬	⊕⊕⊖⊖
Primary: changes in resource use	Equipment availability (composite score)	▲	⊕⊕⊖⊖	□	⊕⊖⊖⊖
	Medicine availability (composite score)	▼	⊕⊕⊖⊖	□	⊕⊖⊖⊖
Primary: quality of care	Background and physical assessment (score)	▲	⊕⊕⊖⊖	No evidence	
	Knowledge outcomes (index)	▲	⊕⊕⊖⊖	No evidence	
	Counselling (score)	□	⊕⊕⊖⊖	No evidence	
	Immunizations quality (score)	▲	⊕⊕⊖⊖	No evidence	
	Staff knowledge and skills (score)	▲	⊕⊕⊖⊖	□	⊕⊖⊖⊖
	Total quality family planning (score)	▲	⊕⊕⊕⊖	No evidence	
	Total quality ANC (score)	▲	⊕⊕⊕⊖	No evidence	
	Total quality composite (score)	▲	⊕⊕⊖⊖	No evidence	
Secondary: equity-consideration: evidence of differential impact on different parts of the population	Wealth related: ANC (utilization)	▬	⊕⊕⊖⊖	No evidence	
	Wealth related: Curative visits (utilization)	▬	⊕⊕⊖⊖	No evidence	
	Wealth related: Family planning (utilization)	▼	⊕⊕⊖⊖	No evidence	

Table 2. Meta-summary: effects of paying for performance against comparator *(Continued)*

	Wealth related: Institutional delivery (utilization)	▼	⊕⊕⊖⊖	No evidence	
Secondary: impacts on management or information systems (if not a targeted measure of performance)	Facility and managerial autonomy (score)	▲	⊕⊕⊖⊖	□	⊕⊖⊖⊖
Secondary: patient satisfaction and acceptability	Cleanliness	No evidence		▲	⊕⊕⊖⊖
	Contact time	No evidence		▲	⊕⊕⊖⊖
	Waiting time	□	⊕⊖⊖⊖	▲	⊕⊕⊖⊖
	Patient satisfaction with staff communication (index)	□	⊕⊖⊖⊖	▬	⊕⊕⊖⊖
Secondary: provider motivation, satisfaction, absenteeism and acceptability	Motivation (score)	No evidence		▬	⊕⊕⊖⊖
	Satisfaction (score)	No evidence		▬	⊕⊕⊖⊖

ANC: antenatal care; BCG: *Bacillus Calmette–Guérin*; DTP: diphtheria-tetanus-pertussis.

Direction of effect key

▲: desirable; ▼: non-desirable; ▬: neutral; □: uncertain

Certainty of the evidence key

⊕⊕⊕⊖: moderate; ⊕⊕⊖⊖: low; ⊕⊖⊖⊖: very low

Data availability: for each of the above outcomes, details of the contributing studies and assessments are available in the secondary 'Summary of findings' tables in Appendix 2, as follows.

- Targeted health outcomes: Section 2.1.
- Targeted measures of provider performance: Section 2.2.
- Targeted changes in resource use: Section 2.3.
- Targeted secondary outcomes: Section 2.4.
- Untargeted measures of provider performance: Section 2.5.
- Untargeted health outcomes: Section 2.6.
- Untargeted resource use: Section 2.7.
- Untargeted secondary outcomes: Section 2.8.

Table 3. Characteristics of included studies – table A

Country	Study design	Study ID	Aim	Funders of study	Location of care	Urban or rural areas	Study population	Sample details	Intervention: type of P4P
Afghanistan	RCT	Engineer 2016	To evaluate the effectiveness of P4P on MCH	Ministry of Health Afghanistan and third party evaluation by John Hopkins	Mixed – inpatient and outpatient	Unclear	Women and children	Intervention group endline (baseline comparable): 81 facilities for exit interviews (727 patients), overall 285 health workers, 72 facilities for household interviews (3421 households). Control group: 81 facilities for exit interviews (727), overall 285 health workers, 71 facilities for household surveys (3427 households)	Payment per output modified by quality score
		Witvorapong 2016	To evaluate the impacts of P4P on non-targeted services	Unclear	Community based care	Rural	Women of reproductive age who had institutional delivery or brought a child to a BPHS facility for DPT-3 vaccination, and their families	Across all 4 study arms, 6649 women and their households. In the intervention group (CHW arm) 1556 women; in the control group 1571 women. Number of CHWs not specified	Payment per output
Argentina	CBA	Gertler 2013	To evaluate the impacts of P4P on birth outcomes and neonatal mortality	WB	Mixed – inpatient and outpatient	Unclear	Pregnant women, mothers and children	Varied across outcomes. Sample size from 108,535 for tetanus toxoid vaccine, to 282,042 for caesarean section. Sample constructed from medical records of beneficiaries and non-beneficiaries of Plan Nacer, across Argentina	Target payment
	RCT	Celhay 2015	To evaluate the effects of P4P on early initiation of ANC	WB	Outpatient	Unclear	Pregnant women accessing care in facilities in Misiones, who were beneficiaries of Plan Nac-	37 clinics including 1240 pregnant women accessing care	Payment per output

Table 3. Characteristics of included studies – table A *(Continued)*

							er at the time of their first visit		
Benin	Quasi/non-randomized trial	Lagarde 2015	To identify causal pathways of how P4Pmay work and evaluate impacts on range of outcomes	WB	Mixed – inpatient and outpatient	Mixed – urban and rural	Patient groups affected – appeared to be patients using RMCH services and other curative services (includes curative consultations, HIV treatment, TB detection and treatment)	135 health facilities including 433 providers and 3331 patients	Payment per output modified by quality score
Brazil	ITS	Viñuela 2015	To explore if any systematic change in outcome measures can be attributed to P4P	WB	Unclear	Mixed – urban and rural	Neonates	27 states plus the federal district. Other sample details unclear	Performance-related pay
Burkina Faso	CBA	Steenland 2017	To examine the effect of P4P pilot 2011–2013 in Burkina Faso	WB, through the Health Results Innovation Trust Fund	Mixed – inpatient and outpatient	Rural	Women accessing antenatal and postnatal care	186 health providers in the 3 districts, 8074 women in the analytic sample	Payment per output modified by quality and equity score
Burundi	CBA	Bonfrer 2014a	To examine the staggered rollout of P4P in Burundi	Unclear	Mixed – in and outpatient	Unclear	Women, infants and households; observations of care-seeking episodes	For studying incentivized outcomes, the population under study consists: phase 1 – 274 women who delivered in the preceding year, 265 infants, 1329 women 15–49 accessing FP, 1000 households, 49 health facilities; Phase 2: 715 women who delivered in the preceding year, 712 infants, 3690 women 15–49 accessing FP, 2700 households 130 health facilities; pooled: 845 women who delivered in the preceding year, 835 infants, 4341 women 15–49 access-	Payment per output modified by quality score

Table 3. Characteristics of included studies – table A *(Continued)*

								ing FP, 3200 households, 159 health facilities. For studying non-incentivized outcomes: phase 1: 1000 households, 1440 episodes of illness and 1291–1300 episodes of illness appraised for care; phase 2: 2700 households, 3770 illness episodes, between 3237–3259 episodes appraised for care; pooled: 3200 households, 4555 episodes of illness and 3928–3950 illness episodes appraised for care	
		Bonfrer 2014b	To examine the effect of P4P on utilization and quality of maternity care in Burundi	Unclear	Mixed – inpatient and outpatient	Unclear	Women accessing antenatal, MCH care services	4916 women, representative sample nationally overall: 3603 in no P4P, 1299 in P4P group	Payment per output modified by quality score
		Falisse 2015	To examine the effect of P4P on the use of health care services	CORDAID	Mixed – inpatient and outpatient	Mixed – urban and rural	Women accessing antenatal, MCH care services	68 (reported per 10,000)	Payment per output modified by quality score
		Rudasingwa 2014	To examine the effect of P4P on the quality of selected health services	CORDAID	Mixed – inpatient and outpatient	Unclear	Women accessing antenatal, MCH care services	16 facilities with P4P and 13 without – quality of care assessment	Payment per output modified by quality score
Cambodia	CBA	Van de Poel 2016	To identify the effect of P4P on utilization of MCH	EU Research Grant	Mixed – inpatient and outpatient	Mixed – urban and rural	Mothers and children – focus of most of the schemes	In 2010, 45 operational districts with no experience of P4P and 32 operational districts exposed to P4P	Performance-based contracting
	ITS	Ir 2015	To examine the effects of the Government Midwifery Incentive Scheme on deliveries	Funding from the Belgian Technical Cooperation and the	Inpatient	Mixed – urban and rural	Women giving birth at institutions	Nationwide rollout	Payment per output

Table 3. Characteristics of included studies – table A *(Continued)*

				Institute of Tropical Medicine in Antwerp. 2 co-authors benefited from the support of the Health Equity and Financial Protection in Asia project funded by the Seventh Framework Programme of the European Commission					
		Khim 2018a	To compare the effects and process of P4P implementation in 3 areas	The AusAid Australian Leadership Award Scholarship programme	Mixed – inpatient and outpatient	Rural	Patient groups affected are outpatients at primary care facilities, children aged < 1 year, newborns, and pregnant women	72 data points. No further information available	Performance-based service agreements
		Matsuoka 2014	To examine the effect of P4P in achieving intended goals	JICA	Mixed – in and outpatient	Unclear	Population coverage	Unclear	Payment per output
Cameroon	Quasi/non-randomized trial	de Walque 2017	To estimate impact of P4P on MCH service coverage, quality of services	WB	Mixed – inpatient and outpatient	Mixed – urban and rural	Pregnant women and mothers, children aged < 5 years	434 facilities, with 185 children, 187 caretakers and 258 pregnant women	Payment per output modified by quality

Table 3. Characteristics of included studies – table A *(Continued)*

									and equity score
	CBA	Zang 2015	To explore the effects of the P4P scheme in Littoral region	WB	Mixed – inpatient and outpatient	Mixed – urban and rural	Health facilities and pregnant women and children aged < 5 years – unclear if further inclusion/exclusion criteria apply	40 health facilities out of 52	Payment per output modified by quality and equity score
China	CBA	Yao 2008	To examine the effects of P4P on TB case detection and treatment	COMDIS – DfID	Outpatient	Rural	People with TB – suspected and diagnosed depending on outcome	Total sample not reported. New smear-positive cases in intervention group 3190 at baseline and 5449 during intervention. In control group, 1864 at baseline, and 3745 during intervention	Payment per output
	ITS	Chang 2017	To assess the effects of P4P on adverse drug reaction reporting	No funding	Inpatient	Unclear	All patients admitted to First Affiliated Hospital of Zhengzhou University (Henan Province)	Total patient reports included 2882. 128 in pre-intervention period (2006–2009); 753 in first intervention (2009–2011); 2001 in second intervention (2012–2014)	Payment per output
		Wu 2014	To examine the effects of P4P (with mismeasurement) in China	Unclear	Mixed – inpatient and outpatient	Urban	Patients attending the hospital under study	10 wards with 142 physicians and 5230 patients	Target payment
		Liu 2005	To assess the effects of P4P on productivity, cost recovery and hospital revenue	UNDP/WB/WHO Special Programme for Research and Training in Tropical	Inpatient	Unclear	People with appendicitis and pneumonia	6 hospitals, 2303 patients (1161 with appendicitis and 1142 with pneumonia)	Payment per output

Table 3. Characteristics of included studies – table A *(Continued)*

				Diseases + DfID					
	Quasi/non-randomized trial	Powell-Jackson 2014	To assess the impacts of a P4P policy experiment in Ningxia	Bill and Melinda Gates Foundation and EC grant	Mixed – in and outpatient	Rural	Patients, no further details	75 towns, 917 villages, 357,400 households and 30, 393 individuals included in surveys	Payment per output and for target
		Sun 2016	To test alternatives to fee-for-service to inform policy	EU Research Grant	Outpatient	Rural	Patients attending village clinics and township health centres	29 township health centres (14 intervention, 15 control); 3162 prescriptions (intervention: 572 township health centres, and 1040 village clinics; control: 527 township health centres, and 1023 village clinics)	Capitation and P4P
	RCT	Yip 2014	To assess the effects of reforming provider payments from fee-for-service to capitation with P4P on prescribing, health expenditure, outpatient visits and patient satisfaction	Bill and Melinda Gates Foundation; EU Health-F2-2009-223166-HEFPA; WB Strategic Impact Evaluation Fund provided seed funding at planning stage	Mixed – inpatient and outpatient	Rural	All patients requiring antibiotic-based care	16,866 patients, with 44,0473 episodes of care at township health centres, and 714,661 episodes of care at village posts	Capitation and P4P
Congo, Republic of the	CBA	Zeng 2018	To evaluate the impacts of P4P on reproductive, maternal and childcare	WB	Mixed – inpatient and outpatient	Mixed – urban and rural	Mothers with children aged < 2 years	100 enumeration zones, with 1325 households, 1307 mothers and 1859 children at endline (1349 households, 1344 mothers and 1841 children at baseline)	Payment per output modified by quality score
Congo, Democra-	CBA	Soeters 2011	To explore changes due to P4P in indicators between	Unclear	Mixed – inpatient	Unclear	Mothers and young children	240 households in intervention group and 200 in control group at baseline	Payment per output modified

Table 3. Characteristics of included studies – table A *(Continued)*

tic Republic of the			2005 and 2008 in the control and intervention groups		and outpatient				by quality score
	RCT	Huillery 2017	To evaluate impact of P4P scheme on utilization, efficiency	Unclear	Mixed – inpatient and outpatient	Mixed – urban and rural	Women and children	87 health areas, 123 facilities, 332 facility staff, 1014 patients and 9234 households	Payment per output
El Salvador	CBA	Bernal 2018	To identify the impacts of results-based aid on delivery of services and effectiveness	IADB	Mixed – inpatient and outpatient	Unclear	Low-income mothers and children	Unclear	Results-based aid
Haiti	CBA	Zeng 2013	To assess the impacts and costs of P4P delivery	MSH and USAID	Mixed – inpatient and outpatient	Unclear	Assumed patients using services at health facilities in study	4 departments, which covered 217 health facilities (of which 15 were implementing P4P)	Performance-based contracting
India	RCT	Mohanan 2017	To estimate impacts of different incentive models on maternal care	Unclear	Inpatient	Rural	Women who had recently given birth, and their newborns	135 providers (53 in output arm; 38 in input arm; 44 in control arm), and 2895 patients	Target payment or payment per input
Kenya	RCT	Menya 2015	To estimate the impacts of P4P on malaria prevention and care	National Institute of Health US	Outpatient	Unclear	Patients with a laboratory test for malaria, or who received artemether-lumefantrine	14,939 patient observations	Target payment
Malawi	CBA and ITS	McMahon 2016	To assess the fidelity and impacts of the P4P strategy in Malawi	USAID	Mixed – inpatient and outpatient	Unclear	Patients attending reproductive and child health services	17 health facilities in intervention group and 17 health facilities in control group	Payment per output modified by quality score
Multiple – Burkina Faso, Ghana and Tanzania	CBA	Duysburgh 2016	To document the effects of P4P on quality of antenatal and childcare	EU	Mixed – inpatient and outpatient	Rural	Mothers and neonates	Unclear	Financial and non-financial incentives + clinical

Table 3. Characteristics of included studies – table A *(Continued)*

									decision guide
Peru	Quasi/non-randomized trial	Cruzado de la Vega 2017	To estimate the effects of P4P on indicators of health service coverage and nutritional status in children	Self-funded	Outpatient	Unclear	Children aged 0–59 months; depending on the indicator in question, restricted to 0–36 months and 0–24 months, or pregnant women during 2010–2014	3 regions and 54 districts, no more detail provided	Payment per output and for target
Philippines	RCT	Peabody 2011a	To examine the effect of bonus payments on quality of care	US National Institutes of Health through an R01 grant (No. HD042117)	Inpatient	Unclear	Physicians active at hospitals in study – about 3 per hospital	30 hospitals overall in the study	Target payment
		Quimbo 2016	To investigate long-term effects of the QIDS intervention on quality of care	US National Institutes of Health through an R01 grant (No. HD042117)	Inpatient	Unclear	Health providers engaged in QIDS	81/89 doctors who previously participated, including 43 new doctors	Target payment
		Wagner 2018a	To estimate effect of QIDS bonus payment intervention in comparison to an increased access intervention and to a control	US National Institute for Child Health and Human Development	Inpatient	Unclear	Children affected by pneumonia and diarrhoea, followed up	3121 children affected, treated at 1 of the 30 facilities (10 per intervention and control) within. Study included 479 children in bonus intervention arm, 447 in expanded intervention and 467 in control	Target payment
		Peabody 2014	To assess the impact of a P4P programme on paediatric health	US National Institutes of Health	Inpatient	Unclear	All (caregiver consenting) children aged < 5 years treated	30 hospitals overall in the study	Target payment

Table 3. Characteristics of included studies – table A *(Continued)*

			outcomes in the Philippines	through an R01 grant (No. HD042117)			at hospitals in study and discharged. Intervention group: 61 physicians at baseline and follow-up; 496 children at baseline and 596 at follow-up. In control group: 58 physicians, 501 children at baseline and 560 at follow-up		
Rwanda	ITS	Rusa 2009a	To evaluate the effect of P4P on healthcare worker performance from 2005 to 2007	Unclear	Outpatient	Rural	Differed by indicator – women and children and those accessing curative consultations	6 districts initially rolling out in pilot, remaining districts in country later on	Payment per output modified by quality score
	Quasi/non-randomized trial	Basinga 2011	To assess the effect of performance-based payment of healthcare providers (P4P) on use and quality of child and maternal care services in healthcare facilities in Rwanda	WB, Bank of Netherlands Partnership Program, the British Economic and Social Research Council, the Government of Rwanda, and the WB's Spanish Impact Evaluation Fund	Mixed – inpatient and outpatient	Mixed – predominantly rural	Households with children aged < 5, for health facilities all 166 facilities	166 health facilities in 19 districts, allocated to intervention (80 facilities, 12 districts) vs- control (86 facilities, 7 districts) and conducting household surveys: intervention: 1002 at baseline vs 1007 at follow-up; control: 1114 at baseline and 1115 at follow-up	Payment per output modified by quality score

Table 3. Characteristics of included studies – table A *(Continued)*

Lannes 2016	To examine distributional impacts of P4P in Rwanda	WB, Bank of Netherlands Partnership Program, the British Economic and Social Research Council, the Government of Rwanda, and the WB's Spanish Impact Evaluation Fund	Mixed – inpatient and outpatient	Mixed – predominantly rural	Households with children aged < 5 years, for health facilities all 166 facilities	166 health facilities, 2145 households and person observations for 3 populations, which feed into diverse analyses: married women (aged 15–49 years) for FP analysis, women with pregnancies in last 2 years for maternal service analysis, children aged ≤ 5 years for child health services	Payment per output modified by quality score
Priedeman Skiles 2013	To examine the effects of P4P on equity in maternal health service use	Unclear	Mixed – inpatient and outpatient	Mixed – predominantly rural	Women aged 18–49 years	7899 women aged 15–49 years; 4477 in intervention group and 3422 in control group, across 12 intervention and 7 control districts, clustered into 86 intervention clusters and 64 control clusters	Payment per output modified by quality score
Priedeman Skiles 2015	To estimate the effects of Rwanda's P4P programme on the prevalence of childhood illness, care-seeking behaviours and treatments delivered	Unclear	Outpatient	Mixed – predominantly rural	Children aged < 5 years	5781 children aged < 5 years at the time of each survey who lived in either an intervention (3307) or comparison district (2474)	Payment per output modified by quality score
Sherry 2017	To estimate the impacts of P4P scheme in Rwanda	Unclear	Mixed – inpatient and outpatient	Mixed – predominantly rural	Women and children utilizing RMCH services	Across 19 districts (12 intervention and 7 control), 10,272 households at baseline and 7377 at endline, including data of 11,321 women at baseline and 7313 at endline	Payment per output modified by quality score

Table 3. Characteristics of included studies – table A *(Continued)*

Lannes 2015	To study the effects of P4P on patient satisfaction regarding quality assurance	Unclear	Unclear	Rural	Pregnant women and adults seeking care for themselves/children	Across 157 primary care facilities (77 intervention, 80 control) patients attending for ANC, child curative and adult curative care	Payment per output modified by quality score
Gertler 2013	To provide evidence on the effect of incentives on provider productivity and on health outcomes in Rwanda	WB, Bank of Netherlands Partnership Program, the British Economic and Social Research Council, the Government of Rwanda and the WB's Spanish Impact Evaluation Fund	Mixed – inpatient and outpatient	Mixed – urban and rural	Women giving birth during study periods and their children; health providers involved in study	Unclear	Payment per output modified by quality score
de Walque 2015	To evaluate the impact of Rwanda's national P4P scheme on individual and couple HIV testing and counselling	WB, Bank of Netherlands Partnership Program, the British Economic and Social Research Council, the Government of Rwanda, and the WB's Spanish Impact	Outpatient	Mixed – urban and rural	Facilities, households of HIV + patients and their couples tested for HIV and households randomly sampled from neighbour households in the catchment area of the facility	Across 9 intervention districts and 7 controls: 24 facilities in total (10 intervention, 14 control) associated with 675 households in intervention, 705 in control. Total number of observations: 1075 for individual testing and 287 observations for couple testing (intervention arm) and 1140 observations for individual and 285 observations for couple testing (comparator arm)	Target payment

Table 3. Characteristics of included studies – table A *(Continued)*

				Evaluation Fund					
	RCT	Shapira 2017	To evaluate the impact of tying payments to performance	WB	Mixed – community and health facility	Mixed – urban and rural	Mothers and CHWs	Baseline sample 2005 CHWs (84% of target). 2200 CHW at follow-up and 197 co-operative presidents. Baseline household sample 2376, follow-up sample included 2157 of original sample and additional 2343 newly sampled women with recent births or pregnancy in the village	Payment per output
Swaziland	Quasi/non-randomized trial	Kliner 2015	Compare outcomes for patients with a treatment supported receiving incentives vs those patients with a non-incentivized supported	Global Fund, COMDIS, DfID	Community-based care	Rural	People with TB	1077 people with TB (161 in intervention and 916 in control) diagnosed between study dates and living in the communities of treatment supporters	Payment per output
Tanzania	CBA	Binyaruka 2015	To examine the effect of a government P4P scheme on utilization, quality and user costs of health services in Tanzania	Government of Norway, grant numbers: TAN-3108 and TAN 13/0005	Mixed – inpatient and outpatient	Mixed – urban and rural	Patients and households of women accessing care in study health facilities	1500 patients and 3000 households surveyed across 11 districts, 150 health facilities	Target payment
		Binyaruka 2017	To evaluate the effects of P4P on the availability and stockout rate of RMNCH medical commodities in Tanzania and assess distributional effects	Government of Norway and the Research Council of Norway and the UK DfID as part of the Consortium for Research	Mixed – inpatient and outpatient	Mixed – urban and rural	Health facilities	75 intervention and 75 control facilities (in each arm: 6 hospitals, 16 health centres and 53 dispensaries)	Target payment

Table 3. Characteristics of included studies – table A *(Continued)*

			on Resilient and Responsive Health Systems supported the funding of the authors' time undertaking data analysis and writing					
	Binyaruka 2018b	To examine the heterogeneity of P4P effects on service utilization across population subgroups and its implications for inequalities in Tanzania	Government of Norway	Mixed – inpatient and outpatient	Mixed – urban and rural	Women having given birth in the last 12 months in catchment areas of included facilities	75 intervention and 75 control facilities (in each arm: 6 hospitals, 16 health centres and 53 dispensaries). 3000 households surveys of women giving birth in the last 12 months at baseline and follow-up	Target payment
	Mayumana 2017	To determine whether P4P improves internal and external accountability mechanisms	Government of Norway (research) and DfID RESYST consortium (publication)	Mixed – inpatient and outpatient	Mixed – urban and rural	Health facilities	75 intervention and 75 control facilities (in each arm: 6 hospitals, 16 health centres and 53 dispensaries)	Target payment
Quasi/non-randomized trial	Brock 2018	To compare the value of non-monetary gifts (immediate unconditional, delayed unconditional, conditional) to improve	Maryland Agricultural extension station grant – Government of	Outpatient	Urban	Health providers engaged in study and patients treated	Intervention group: 21 providers and 940 patients; unconditional gift: 23 providers, 1155 patients; delayed unconditional gift: 25 providers and 1167 patients; control: 25 providers and 1176 patients	Conditional provision of material goods

Table 3. Characteristics of included studies – table A *(Continued)*

			health worker performance	Norway, WB					
Zambia	ITS	Chansa 2015	To evaluate the effects of the P4P- prepilot in Katete district	WB	Mixed – inpatient and outpatient	Mixed – urban and rural	Women accessing RMNCH services and children	25 health facilities, including 6 health posts, 18 rural health centres and 1 urban health centre	Payment per output modified by quality score
	RCT	Friedman 2016a	To provide an estimate of P4P impacts vs input financing vs pure control	WB	Mixed – inpatient and outpatient	Unclear	Differed by outcome – mothers or children	10 P4P intervention districts, 10 matched financing and equipment districts, and 10 control districts	Payment per output modified by quality score
		Shen 2017	To estimate effects of P4P scheme on health worker motivation, job satisfaction and staff attrition	WB	Unclear	Unclear	3 different groups of providers: those in the P4P facilities, those in enhanced financing control and the pure control. Patients affected would be those attending the participating facilities	186 health centres (86 in P4P group, 49 in enhanced-financing group and 51 in pure control group) and 683 staff in total (baseline: 147 in P4P group, 87 in enhanced-finance group, 92 in pure control group; endline: 166 in P4P group, 92 in enhanced-financing group, 99 in- pure control group)	Payment per output modified by quality score
Zimbabwe	CBA	Das 2017	To establish impact of P4P on ANC service and process outcomes	No funding	Mixed – inpatient and outpatient	Rural	Mothers to be in facilities selected	705 total facilities (374 intervention: 105 baseline, 116 follow-up; 331 control: 84 baseline, 82 follow-up) and research set in 41 facilities in panel intervention, 36 facilities in panel control. 1011 clients total (intervention: 565 baseline, 414 follow-up; control: 446 baseline, 336 follow-up) and research set: intervention: 208 baseline, 200 follow-up; control: 177 baseline and 174 follow-up	Payment per output modified by quality and satisfaction score

Table 3. Characteristics of included studies – table A *(Continued)*

	Quasi/non-randomized trial	Friedman 2016b	To identify the effects of the RBF pilot programme on the utilization and quality of MCH services and its effects on health system functioning	WB	Mixed – inpatient and outpatient	Unclear	Households and patients seeking RMCH care	197 health facilities at baseline, 222 at follow-up. 597 health worker interviews at baseline, 415 at follow-up. Patient exit interviews: for ANC: 1864 at baseline and 550 at follow-up; for child health: 1865 at baseline and 844 at follow-up. 1610 household surveys at baseline and 1836 at follow-up	Payment per output modified by quality and equity score

ANC: antenatal care; BPHS: Basic Package of Health Services; CBA: controlled before-after; CHW: community health worker; COMDIS: https://comdis-hsd.leeds.ac.uk/; DfID: Department for International Development; DPT: diphtheria-tetanus-pertussis; FP: family planning; IADB: Inter-American Development Bank; ITS: interrupted time series; JICA: Japan International Cooperation Agency; MCH: maternal and child health; MSH: Management Sciences for Health; P4P: paying for performance; QIDS: Quality Improvement Demonstration Study; RCT: randomized controlled trial; RESYST: https://resyst.lshtm.ac.uk/; RMCH: reproductive, maternal and child health; RMNCH: reproductive, maternal, newborn and child health; TB: tuberculosis; UNDP: United Nations Development Programme; USAID: United States Agency for International Development; WB: World Bank; WHO: World Health Organization.

Table 4. Characteristics of included studies – table B

Country	Study design	Study ID	Intervention: type of P4P	Control or comparator intervention	Data collection methods	Time period	Analysis	Outcomes reported
Afghanistan	RCT	Engineer 2016	Payment per output modified by quality score	Control: standard care or status quo	Household surveys, health facility surveys, balanced scorecard assessments. Data collected by trained interviewers and data collection teams	Baseline: 2010. Endline: 2012. Follow-up: 23–25 months after initial rollout of P4P	ITT (Wilcoxon signed rank matched pair) and DID models as extended analyses. DID available for this outcome	28 outcomes reported – around RMNCH utilization and delivery, and quality of care
		Witvorapong 2016	Payment per output	Control: standard care or status quo	Surveys (assumed household). Collected by HOPE Worldwide	Baseline: 2009. Endline: 2011. Follow-up: unclear	Regression analysis (4 probit models). Sample-level analysis, exogeneity model, reported here. Control variables include wealth quartiles, age, race, ability to read, number of children, proportion of children	2 outcomes around unintended effects

Table 4. Characteristics of included studies – table B *(Continued)*

							still alive, proportion of children still alive and female, proportion of children delivered at facility, proportion of children having had DPT, distance to nearest BPHS facility, whether the respondent felt safe going to facility, awareness of reproductive health education programmes and of family planning programmes)	
Argentina	CBA	Gertler 2014	Target payment	Control: standard care or status quo	Database completed using birth and medical records, beneficiary status, pharmaceutical records, administrative records, population census	Baseline: 2004. Endline: 2008. Follow-up: NA	DID models – 1 ITT to estimate effect of Plan Nacer on all patients in relevant hospitals, the either treatment-on-treated to estimate effect on the beneficiaries only, or treatment-on-treated with spill over to estimate effect on beneficiaries AND non-beneficiaries. All models control for clinic fixed effects, time-province fixed effects, maternal age and number of previous births. SEs clustered at clinic level. ITT results extracted	6 RMCH outcomes and 9 further health economic outcomes
	RCT	Celhay 2015	Payment per output	Comparator: standard care under Plan Nacer	Patient records from clinics and hospitals	Baseline: 16-month preintervention period from January 2009 to April 2010, 8-month intervention period from May 2010 to December 2010, 15-month 'postintervention period I' from January 2011 to March 2012 and 9-month 'post-intervention period II' from April 2012 to December 2012. Endline: 15 months	ITT but reporting based on local average treatment. Clustered at the health clinic level. Given small number of clusters, Wild bootstrap method used, as a method that is robust to randomized assignment of treatment among a small number of clusters	7 outcomes around RMNCH utilization and delivery, RMNCH health outcomes, and unintended effects of incentives on immunizations and overall visits

Table 4. Characteristics of included studies – table B *(Continued)*

						after intervention and further 9 months. Follow-up: 24 months		
Benin	Quasi/non-randomized trial	Lagarde 2015	Payment per output modified by quality score	Control and comparator. Control: standard care or status quo. Comparator: additional funding matching core elements of P4P	Facility surveys, person questionnaires and exit interviews. Data collected by study field-workers	Baseline: 2011. Endline: 2015. Follow-up: 4 years	Econometric model. Health worker control variables covered role, level of experience, primary household income and household wealth. Facility control variables covered other nearby facilities, rural or non-rural, qualified staff, facility size and access to electricity	38 individual outcomes assessed against control and 28 against alternative comparator; covering quality of care, utilization and delivery, and facility management/resources
Brazil	ITS	Viñuela 2015	Performance-related pay	Over time: comparison over time	National registry data, obtained from routine sources	Baseline: 2002. Endline: 2011. Follow-up: 9 years	Regression models. Model without control variables, and model with control variables: state management reforms, sector expenditure per capita, poverty rate and GDP per capita, GDP per square kilometre, and population density	1 health outcome reported on child mortality
Burkina Faso	CBA	Steenland 2017	Payment per output modified by quality and equity score	Control: standard care or status quo	Data from HMIS.	Baseline: data set extracted started from January 2009. P4P was started in April 2011. Endline: extracted data ended in December 2012. Follow-up: April 2011 to December 2012	DID controlling for time trends, seasonal effects and clustering	4 utilization and delivery outcomes around RMNCH

Table 4. Characteristics of included studies – table B *(Continued)*

Burundi	CBA	Bonfrer 2014a	Payment per output modified by quality score	Control: standard care or status quo	Household surveys. Unclear who collected the data	Baseline: 2006. Endline: 2010. Follow-up: 4 years	DID controlling for time trends, seasonal effects and clustering; Bonferroni corrections applied	15 outcomes – utilization and delivery outcomes around RMNCH and immunizations; quality of care outcomes and health outcomes
		Bonfrer 2014b	Payment per output modified by quality score	Control: standard care or status quo	Data from Burundi Demographic and Health Survey 2010	Baseline: 2005. Endline: 2010. Follow-up: 5 years	DIDs. Investigating the effect of whether a province had or did not have P4P when an individual child was born. SEs were adjusted for at the province level. Control variable household size, wealth quintiles, whether child is first born, mother age at birth, age of household head in year, mother having primary education, male household head, access to safe drinking water, household having electricity. Robustness confirmed using ordinary least squares regression	11 outcomes on utilization and delivery of RMNCH, including RMNCH immunizations
		Falisse 2015	Payment per output modified by quality score	Control: standard care or status quo	Data from National Health Information System, and from CORDAID and the EU, who implemented P4P in 7 provinces	Baseline: 2005. Endline: 2009. Follow-up: 3 years	DID controlling for province and year trends, but no controls. A second model included controls; however, problematic as 32% missingness registered there, so more conservative model reported	12 outcomes, primarily around utilization and delivery of RMNCH and vaccinations, plus outpatient and malaria visits; 1 of these outcomes was perinatal deaths
		Rudasingwa 2014	Payment per output modified	Control: standard care or status quo	Administrative data review, med-	Baseline: 2006. Endline: 2008.	Differences in scores between 2006 and 2008 explored through descriptive statistics, paired non-parametric	8 general quality of care outcomes

Table 4. Characteristics of included studies – table B *(Continued)*

			by quality score		ical records review, documents and records review, direct observation. Data obtained from CORDAID Netherlands	Follow-up: 2 years	Wilcoxon Signed Ranks test and DID analysis at a significance level of 5%	
Cambodia	CBA	Van de Poel 2016	Performance-based contracting	Comparator: unclear	Cambodian DHS surveys. Data collected by national authorities	Baseline: 2000. Endline: 2005 and 2010. Follow-up: 5 and 10 years	DID. SE adjusted for clustering at the OD level (model 1). Extended model (model 2 – focused on in the results) also accounts for geographic variation in access to public services, which may constrain extent to which even incentivized providers can influence utilization rates. Covariates included in the model which contain child, mother and household characteristics such as birth interval < 24 months; mother's age at birth < 20 years; education level of mother and wealth index (see table II of Van de Poel 2016 for complete list)	5 RMCH outcomes
	ITS	Ir 2015	Payment per output	Over time: comparison over time	Data from existing National Health Information System database and DHS data	Baseline: January 2006. Endline: December 2011. Follow-up: 4 years and 3 months	Segmented linear regression to identify both level and trend changes, accounting for autocorrelation	1 principal outcome reported on
		Khim 2018a	Performance-based service agreements	Over time: comparison over time	Data exported from HMISs	Baseline: 2006. Endline: 2012. Follow-up: 2 or 3 years	ITS, using segmented linear regression, which estimated preintervention trend and level, and postintervention trend for each indicator. Changes in level and slope were calculated, controlling for preintervention level, trend, and autocorrelation. Autocorrelation and serial correlation corrected using Prais-Wisten transformation	4 RMCH outcomes

Table 4. Characteristics of included studies – table B *(Continued)*

		Matsuoka 2014	Payment per output	Over time: comparison over time	Data review of existing records obtained from Kroch Chhmar OD (health administration) office; interviews; focus groups; health centre visits. Data collected by study team	Baseline: January 2006/2007. Endline: June 2009. Follow-up: depending – 2 or 3 years	Descriptive data analysis. Outcomes compared before and after intervention using the Chi^2 test where appropriate	2 ANC and immunization indicators
Cameroon	Quasi/non-randomized trial	de Walque 2017	Payment per output modified by quality and equity score	Control: standard care or status quo	Interviews with household members, facility-based survey, patient-provider observations and client exit interviews. Data collected by Institut de Formation et de Recherche Démographiques and research team	Baseline: unclear – pre P4P start. Endline: 3 years. Follow-up: unclear	DID. Regression models adjusted for control variables. Facility level controls included type of health facility (public/religious/private) and location of health facility (urban/rural). Household level control variables included number of individuals in the household, housing type, house ownership, water source and type of sanitation. Individual level controls included age, marital status, education level, religion, ethnicity, working status and type of work	102 outcomes, around RMNCH, vaccination, HIV, malaria, financing, patient and provider satisfaction, equipment and medicine availability, and quality of care
	CBA	Zang 2015	Payment per output modified by quality and equity score	Control: standard care or status quo	Household and facility surveys	Baseline: January 2011. Endline: February 2013. Follow-up: unclear	Propensity score matching for (catchment area population size, square of catchment area population size, number of qualified health personnel, square of number of qualified health personnel and number of qualified health personnel to catchment area population size) and DID	21 outcomes. 9 around quality of care; 4 around number of staff; 6 around RMNCH utilization and delivery; 2 around utilization of

Table 4. Characteristics of included studies – table B *(Continued)*

								outpatient consultations, and drug availability
China	CBA	Yao 2008	Payment per output	Control: standard care or status quo	Data from county-based TB reporting data collected by healthcare workers	Baseline: January-September 2004. Endline: January-September 2005. Follow-up: 1 year	Comparison of proportions and "Descriptive analyses of independent t-tests, χ2 test and Kruskal-Wallis rank test were used when appropriate"	2 outcomes: treatment success and case notification
	ITS	Chang 2017	Payment per output	Over time: comparison over time	Adverse drug reaction reports from hospital pharmacovigilance programme database, collected from pharmacists and admissions	Baseline: 2006. Endline: 2014. Follow-up: 5 years	Time series analysis using autoregressive integrated moving average models	3 outcomes on adverse drug reactions
		Wu 2014	Target payment	Over time: comparison over time	Routine data from tertiary general hospital dataset	Baseline: July 2004. Endline: May 2006. Follow-up: about 2 years	DID and regression analysis to check for trends. All regressions control for patient age, gender, marriage, number of conditions, a dummy variable for whether the patient was in severe condition, length of stay and a set of principal diagnosis fixed effects	4 outcomes on expenditure and length of stay
		Liu 2005	Payment per output	Over time: comparison over time	Inpatient records from the 6 panel hospitals. Data collected by study team	Baseline: 1978. Endline: 1997. Follow-up: 17 years (first bonus payment made 1981)	Trend analysis, correlation and regression analysis; stepwise regression, with the following indicators entered in: "besides indicators of revenue, cost recovery, unnecessary care and productivity, the year, names of hospitals and bonus type were put into the regression models as independent variables"	4 revenue- and productivity-related outcomes

Table 4. Characteristics of included studies – table B *(Continued)*

	Quasi/non-randomized trial	Powell-Jackson 2014	Payment per output and for target	Control: standard care or status quo	2 rounds of household survey. Data collected by research teams	Baseline: February 2009. Endline: early 2011. Follow-up: about 2 years	DID approach – regression with treatment effects estimated by ordinary least squares, with clustered nature of data accounted for by clustering SEs at village level. Analysis controlled for individual chronic disease, age, age squared, gender, gender of the household head, household size, asset wealth, education, distance from the nearest health facility of each type, ethnicity, whether the individual is the household head and migrant status	14 outcomes on inpatient and outpatient care and processes
		Sun 2016	Capitation and P4P	Control: status quo (global capitated budget)	Routine monitoring and study-specific surveys. Data collected by study team	Baseline: April 2011. Endline: April 2012. Follow-up: 1 year	DID, fixed-effects, controlling for sex and gender	8 prescription and cost outcomes
	RCT	Yip 2014	Capitation and P4P	Control: standard care or status quo	Data from electronic management information system; household survey; township health centre and village after survey	Baseline: unclear. Endline: 30 January 2012. Follow-up: unclear	Logistic regression and least squares regressions for binary and continuous outcomes; report unadjusted estimates and those adjusted for sex, age and dummy variable for cluster-paired fixed effects. SE at town level. Subgroup analysis by sex. Also for patients with a cold for antibiotic use	11 prescription outcomes including expenditure per visits
Congo, Republic of the	CBA	Zeng 2018	Payment per output modified by quality score	Control: standard care or status quo	Household and health facility surveys. Data collected by study teams	Baseline: March 2012. Endline: March 2014. Follow-up: 2 years	DID – multivariate regression model, which controlled for characteristics which "measured financial and physical accessibility of households and respondents' awareness of and education on health care," which included the location of households, house ownership, household size, mother's age, education, status of living with a partner, status of having a regular job and distance of households from health facilities. Models adjusted for	22 variables around utilization of RMNCH, immunizations and quality of care

Table 4. Characteristics of included studies – table B *(Continued)*

							clustering at the village level. Results from model without village fixed effects. Bonferroni correction included	
Congo, Democratic Republic of the	CBA	Soeters 2011	Payment per output modified by quality score	Comparator: in-kind medicine and equipment donation, fixed bonuses	Stratified household cluster survey	Baseline: November 2005. Endline: February 2008. Follow-up: 2 years 2 months	DID. Logistic regression models; unclear whether adjusted	26 outcomes: RMNCH, quality of care, patient satisfaction, financial
	RCT	Huillery 2017	Payment per output	Control: other (some payment to facilities made based on staff numbers)	Surveys. Collected by study team	Baseline: September and November 2009. Endline: December 2012 and February 2013. Follow-up: 30 months	Regression model. "In all regressions we control for the health zone, and for whether the health facility is rural or urban, religious or non-religious, private or public, health post or health centre. At the individual level, we add controls for the sex and age of the individual, grade and experience if the respondent is a health worker, reason for visiting if the respondent is a patient, and whether the individual is literate if the respondent is an adult household member"	77 outcomes around general utilization and delivery, RMNCH, quality of care, patient satisfaction and provider motivation
El Salvador	CBA	Bernal 2018	Results-based aid	Control: standard care or status quo	Extraction from routine data sources; health visits; hospitals data; family records. Collected by hospitals and health workers	Baseline: depending on source – for health visits 2009; hospitals from 2005 and family records from 2010. Endline: depending on source – for health visits 2015, for hospitals 2015, for family records 2013. Follow-up: 3–6 years	DID – linear regression with time fixed effects, municipality fixed effects, and unobservable characteristics that vary within municipality and across time	36 outcomes. General utilization including preventive, curative, outpatient and family planning visits; plus outcomes around human resources

Table 4. Characteristics of included studies – table B *(Continued)*

Haiti	CBA	Zeng 2013	Performance-based contracting	Control: standard care or status quo	Routine health information system data. Collected by health workers	Baseline: 2008. Endline: 2010. Follow-up: 2 years	Random-effects regression model using quarterly observations and controlling for time effects + DID	7 outcomes around consultations for incentivized and non-incentivized services among different patient groups
India	RCT	Mohanan 2017	Target payment or payment per input	Control: other (payment for participation in study)	Interviews; provider and patient records. Data collected by study team	Baseline: 1st precontract data collection (provider and personnel surveys) October 2012 to January 2013. Endline: Postcontract visit 2 between August and November 2014. Follow-up: 19 months between introduction of intervention and beginning of postcontract visit 2	Regression analysis clustering at provider level. P values adjusted for multiple hypotheses tested and calculated using the free stepdown resampling method. Models include district and enumerator fixed effects. Models given with and without household-level control variables (mother's age and education; household's caste and house type; head of household's religion; mother's history of hypertension, diabetes, asthma, hyperthyroidism or hypothyroidism, and convulsions; whether mother has had a previous stomach surgery; whether it is the mother's first pregnancy, number of previous pregnancies, whether the mother has had a stillbirth or abortion, and number of previous children birthed; whether the household owns land, has no literate adults, and owns a Below Poverty Line care) and provider-level controls (primary provider's gender, professional qualifications, number of years in practice, and number of years that the facility has been in operation	18 RMCH outcomes
Kenya	RCT	Menya 2015	Target payment	Control: standard care or status quo	Data from facility registers	Baseline: September 2012 to October 2012. Endline: October	Mixed-effects logistic regression model of individual patients with random intercepts for each facility. Adjusted for quarter, age category (except for stratified analysis), gen-	2 malaria-specific outcomes

Table 4. Characteristics of included studies – table B *(Continued)*

						2012 to November 2013. Follow-up: 1 year	der, mode of diagnosis (rapid diagnostic test or microscopy), transmission zone (except for stratified analysis) and mean monthly volume of slides read in the facility in the preceding year	
Malawi	CBA and ITS	McMahon 2016	Payment per output modified by quality score	Control: standard care or status quo	Data from HMISs, President's Emergency Plan for AIDS Relief, Service Provision Assessment, and primary data collection	Baseline: "Performance-Based Incentive program officially started in August 2014". Primary data collected March 2016; secondary data collection began in Autumn 2015. Endline: unclear. Follow-up: 18 months	ITS analysis and DID analysis. Not specified whether analyses adjusted	17 outcomes around RMNCH, HIV and vaccination
Multiple – Burkina Faso, Ghana and Tanzania	CBA	Duysburgh 2016	Financial and non-financial incentives + clinical decision guide	Control: standard care or status quo	Health facility surveys; observation; patient satisfaction surveys; patient records review. Data collected by study team	Baseline: 2010. Endline: late 2013/early 2014. Follow-up: 4 years	Testing for pre–post via Wilcoxon Mann Whitney when comparing intervention with control and then for intervention and non-intervention paired signed rank when comparing at same facility	32 outcomes on antenatal and childbirth quality of care, including management of comorbidities and complications
Peru	Quasi/non-randomized trial	Cruzado de la Vega 2017	Payment per output and for target	Control: regions without the P4P support programme, but in a similar poverty quintile	Demographic and Family Health Survey 2008–2014 data	Baseline: 2008 and 2009. Endline: intervention in place between 2010 and 2012. Follow-up: 2013–2014	DID of the mean treatment effect of the treated	24 RMNCH outcomes, particularly around child vaccination, growth and malnutrition

Table 4. Characteristics of included studies – table B *(Continued)*

Philippine	RCT	Peabody 2011a	Target payment	Control: standard care or status quo	Clinical performance vignette assessments; physician survey. Collected by study teams	Baseline: 2003. Endline: 2007. Follow-up: 3 years (intervention introduced in 2004)	Descriptive statistics and DID models testing for intervention effects controlling for clustering at hospital level and size of facility; as relevant also for repeat testing and physician characteristics (age, gender, specialization)	4 outcomes: quality scores for 4 age groups
		Quimbo 2016	Target payment	Control: standard care or status quo	Clinical performance vignette assessments; physician survey. Collected by study teams	Baseline: 2003. Endline: 2013. Follow-up: 9 years (intervention introduced in 2004)	DID model across the 8 study periods, random effects, adjusting for clustering	1 quality score outcome
		Wagner 2018a	Target payment	Control: standard care or status quo	Patient exit survey; follow-home survey (4- to 6-weeks after discharge). Collected by QIDS investigators	Baseline: 2003/2004. Endline: 2007/2008. Follow-up: 2 years	Comparison of means and multivariate models (DID), including facility fixed effects and control variables. Include dependents (0–14 ratio, and 65+ ratio), duration of stay, child having pneumonia/diarrhoea, child being female, age. Of child, maternal education, per capita monthly income and household size	6 outcomes on medical expenditures
		Peabody 2014	Target payment	Control: standard care or status quo	Household surveys. Data collected by independent interview teams	Baseline: 2003. Endline: 2007. Follow-up: 3 years (intervention introduced in 2004)	Logistic difference in difference models adjusting for PhilHealth (insurance) membership, age of child (months), mother's education (years of schooling), household income (PhP), initially visited a lower-level facility prior to hospitalization and length of stay in hospital. The individual effects control for individual, household and area specific factors that are fixed over time. Clustering by facility	4 general health outcomes
Rwanda	ITS	Rusa 2009a	Payment per output modified by quality score	Over time: comparison over time	Routine health facilities reports and supervision logs	Baseline: 2005 (monthly basis). Endline: December 2007. Follow-up: depending on	Descriptive – graph only. Additional data requested; no data provided	8 outcomes around RMNCH and vaccinations – regarding utilization and

Table 4. Characteristics of included studies – table B *(Continued)*

					start – in pilot districts 3 years		delivery and quality of care
Quasi/non-randomized trial	Basinga 2011	Payment per output modified by quality score	Comparator: traditional input-based budgets allocated to the facilities in the control group were increased by the mean amount of P4P payments that facilities in the intervention group received every 3 months during the 23-month assessment window	Facility survey; household survey. Collected by trained enumerators hired by external firms	Baseline: unclear – P4P started in 2006. Endline: 25 months after baseline survey. Follow-up: maximum 25 months	Multivariate regression specification of the DID model in which an individual's outcome was regressed against a dummy variable, indicating whether the facility received P4P that year, a facility fixed effect, a year indicator, and a series of individual and household characteristics. Robust SEs, clustered at the district by year level to correct for correlation of the error terms across facilities within districts	8 RMNCH outcomes: 6 relating to utilization and delivery, and 2 to quality of care
	Lannes 2016	Payment per output modified by quality score	Comparator: traditional input-based budgets allocated to the facilities in the control group were increased by the mean amount of P4P payments that facilities in the intervention group received every 3 months during the 23-	Household survey. Database obtained from Basinga 2011	Baseline: 2006. Endline: 2008. Follow-up: 2 years (23 months)	Clustered T-tests and difference in difference models (linear probability, SURE, robustness checks with fixed effects and clustering) – reporting here on clustered fixed effects models	6 outcomes on equity of RMNCH services across different parts of the population

Table 4. Characteristics of included studies – table B *(Continued)*

		month assessment window				
Priedeman Skiles 2013	Payment per output modified by quality score	Comparator: traditional input-based budgets allocated to the facilities in the control group were increased by the mean amount of P4P payments that facilities in the intervention group received every 3 months during the 23-month assessment window	Survey. DHS data	Baseline: 2005. Endline: 2007–2008. Follow-up: 18 months	Bivariate descriptive analyses for outcomes by year/wealth quintile to capture inequity; difference in difference models. Cluster-robust SEs. Community fixed effects to control for time invariant unobserved community differences. For ANC visits, covariates included age, education, marital status, parity, insurance and prior facility birth. For facility delivery, covariates included education, marital status, parity, insurance, prior facility births and ANC. For modern contraception, covariates included age, education, marital status, parity, insurance, prior facility birth and previous child death	12 outcomes: RMNCH regarding utilization of services, with additional equity considerations
Priedeman Skiles 2015	Payment per output modified by quality score	Comparator: traditional input-based budgets allocated to the facilities in the control group were increased by the mean amount of P4P payments that facilities in the intervention group received every 3 months during the 23-	Collation of survey data from DHS survey	Baseline: 2005. Endline: 2008. Follow-up: between 1-2 years (early implementation between January 2006 and November 2007)	DID, fixed effects, and SEs clustered at district level. Reported illnesses DID adjusts for: child's age, birth order, gender and facility birth; mother's age, education, marital status; household wealth, toilet facilities, drinking water source and bednet use. Facility care-seeking and treatment received DIDs adjust for child's age, birth order, gender and facility birth; mother's age, education, marital status; household wealth, insurance status and previous child death (page 7)	10 outcomes: RMNCH regarding reporting of illness, care-seeking and treatment

Table 4. Characteristics of included studies – table B *(Continued)*

		month assessment window				
Sherry 2017	Payment per output modified by quality score	Comparator: traditional input-based budgets allocated to the facilities in the control group were increased by the mean amount of P4P payments that facilities in the intervention group received every 3 months during the 23-month assessment window	Routine DHS data	Baseline: February and July 2005. Endline: December 2007 and April 2008. Follow-up: 18–22 months after rollout	DID analysis among ITT lines, including adjustment for household and individual level control variables and fixed effects (including for birth years), SEs clustered at district levels	26 outcomes around RMNCH and vaccination, health outcomes, utilization and delivery outcomes and quality of care
Lannes 2015	Payment per output modified by quality score	Comparator: traditional input-based budgets allocated to the facilities in the control group were increased by the mean amount of P4P payments that facilities in the intervention group received every 3 months during the 23-	Data from original Basinga 2011 dataset	Baseline: 2006. Endline: 2008. Follow-up: varied scheme follow-up, maximum 23 months	Derivation of satisfaction measures using polychoric correlation; ordinary least squares regression used to regress satisfaction index on each sample	12 outcomes around satisfaction of care around curative, antenatal, and child curative services

Table 4. Characteristics of included studies – table B *(Continued)*

		month assessment window				
Gertler 2013	Payment per output modified by quality score	Comparator: traditional input-based budgets allocated to the facilities in the control group were increased by the mean amount of P4P payments that facilities in the intervention group received every 3 months during the 23-month assessment window	Surveys, conducted independently from the P4P programme	Baseline: 2006. Endline: 23 months later. Follow-up: maximum 18 months	DID methods including individual controls and facility fixed effects. Considered 2 age groups: children aged 0–11 months at endline, and children aged 24–47 months at endline. "We estimated 2 versions of equation (6): one without controls and a second with controls. The controls included the child's age and sex, maternal height, mother's age, whether the mother had completed primary school, whether the father lived in the household, whether the family was a member of a Mutuelle (health insurance fund), total number of household members, number of household members under the age of 6 years, whether the household owned land, and dummy variables for quartiles of the household asset value. The child's age was entered as a series of dummy variables that represent one-month increments"	7 RMNCH outcomes around growth, quality of care and efficiency
de Walque 2015	Target payment	Comparator: traditional input-based budgets allocated to the facilities in the control group were increased by the mean amount of P4P payments that facilities in the intervention group received every	Facility survey; household surveys. Collected by University of Rwanda School of Public Health	Baseline: August–November 2006. Endline: April–July 2008. Follow-up: unclear	Repeated cross-sections using DID analysis, facility fixed effects. "We compute robust standard errors using multiway cluster-adjustment by districts, survey year and their intersection following the method developed by Cameron et al. (2011) to account for potential correlation of the error terms at both the cross-section and the temporal level"	7 outcomes around utilization and delivery of HIV testing and counselling

Table 4. Characteristics of included studies – table B *(Continued)*

				3 months during the 23-month assessment window				
	RCT	Shapira 2018	Payment per output	Comparator: standard care – co-operatives were paid for reporting only, this was the background P4P programme	Household surveys. Surveys by CHWs	Baseline: February–May 2010. Endline: November 2013 to June 2014. Follow-up: payment started in October 2010, and continued until after follow-up survey, suggesting minimum 3.5 years' follow-up	Regression model including outcomes measured (either by woman, CHW or co-operative), sector assignment and error term clustering at the sector level	27 outcomes focused on utilization and delivery, co-operative functioning
Swaziland	Quasi/non-randomized trial	Kliner 2015	Payment per output	Control: standard care or status quo	Extraction from TB registry. Collected by study authors	Baseline: 1 January 2010. Endline: 30 September 2011. Follow-up: 21 months	Logistic regression with stepwise selection of covariates into models (age (0–14, 15–24 vs over 35 years reference category), TB (any new case or previously treated/TB with meningitis) with children under 8 years as reference), HIV status, being on ART)	8 TB-specific outcomes
Tanzania	CBA	Binyaruka 2015	Target payment	Control: standard care or status quo	Household surveys; exit interviews; facility surveys. Collection by study authors	Baseline: January 2012 (after P4P training took place in second half of 2011). Endline: March 2013. Follow-up: 13 months	DID, ordinary least squares, clustered at facility level or facility catchment area. Controlling for individual level characteristics (education, religion, marital status, occupation, age, number of pregnancies) and household characteristics (insurance, number of household members, household head education, wealth based on ownership of household assets and housing particulars)	146 outcomes around medicine and equipment resources, cost of care, patient satisfaction and RMNCH services
		Binyaruka 2017	Target payment	Control: standard care or status quo	Health facility surveys; household	Baseline: January 2012. Endline: March	DID regression models controlling for time invariant determinants, facility fixed effects	103 outcomes around medicine and

Table 4. Characteristics of included studies – table B *(Continued)*

					survey. Unclear who collected data	2013. Follow-up: 13 months		equipment resources, including equity consideration
		Binyaruka 2018b	Target payment	Control: standard care or status quo	Household surveys. Unclear who collected data	Baseline: January 2012. Endline: February 2013. Follow-up: 13 months	DID model controlling for time invariant characteristics including facility fixed effects and individual and household characteristics	20 outcomes around equity of immunization and RMNCH services
		Mayumana 2017	Target payment	Control: standard care or status quo	Interviews; focus group discussions; quantitative surveys at facility and health worker levels. Data collected by study team	Baseline: January 2012. Endline: February 2013. Follow-up: 13 months	DID, adjusted models for facility fixed effects	38 outcomes looking at management, medicine and equipment, and utilization and delivery of general outpatient services
	Quasi/non-randomized trial	Brock 2018	Conditional provision of material goods	Comparator: unconditional gifts (either immediate or delayed) as alternative interventions and control (all receive a standard encouragement intervention)	Patient survey. Data collected by study team	Baseline: November 2008. Endline: August 2010. Follow-up: 22 months	Multilevel regression models with nested random effects at patient and clinician level	1 quality of care outcome
Zambia	ITS	Chansa 2015	Payment per output modified by quality score	Over time: comparison over time	HMIS data export by study team	Baseline: January 2006. Endline: March 2012. Follow-up: 14 quarters (3.5 years)	ITS – simulated modelling analysis	4 outcomes looking at utilization and delivery of immunization, RMNCH and outpatient services

Table 4. Characteristics of included studies – table B *(Continued)*

	RCT	Friedman 2016a	Payment per output modified by quality score	Control and comparator. Control: standard care or status quo. Comparator: matched financing and equipment	Household and health facility surveys; process evaluation data; counter external evaluation. Enumerators hired as part of impact evaluation	Baseline: October–November 2011. Endline: November 2014 to January 2015. Follow-up: 3 years	DID and regression models – dependent on outcome, controls for district stratification or at province level, and errors clustered at the Primary Sampling Unit or district level	386 outcomes around staff satisfaction, management, patient satisfaction, quality of RMNCH care, utilization of RMNCH services, medicine and equipment resources, curative visits and immunization
		Shen 2017	Payment per output modified by quality score	Control and comparator. Control: standard care or status quo. Comparator: enhanced financing	Health worker surveys. Unclear who collected data	Baseline: October–November 2011. Endline: September–November 2014. Follow-up: 3 years	DID, facility fixed effects, with SEs clustered at district level. District grouping taken into account using stratification controls	38 outcomes around staff satisfaction and human resources
Zimbabwe	CBA	Das 2017	Payment per output modified by quality and satisfaction score	Control: standard care or status quo	Health facility assessments; patient exit interviews. Data collected by survey teams from local research firm	Baseline: December 2011 to February 2012. Endline: May–August 2014. Follow-up: 2.5 years of implementation	ITT with difference in difference estimates (through multilevel linear regression). Multilevel regression models accounted for clustered data	176 outcomes around total quality and patient satisfaction, with equity considered across subgroups. Included individual quality items, structural quality indices plus a composite structural quality index, process quality indices and a composite process qual-

Table 4. Characteristics of included studies – table B *(Continued)*

							ity index, individual satisfaction items and composite satisfaction index. Also above subgrouped by facility ownership, facility type, provider cadre, provider gender, patient characteristics and wealth quintile
Quasi/non-randomized trial	Friedman 2016b	Payment per output modified by quality and equity score	Control: standard care or status quo	Facility and household surveys; direct observations. Data from MoH, HMIS, DHS and collected by study team	Baseline: December 2011 to February 2012. Endline: Midline: May–August 2014. Follow-up: 2.5–3 years	DID and regression models – dependent on outcome, controls for district stratification or at province level, and errors clustered at the district level	354 outcomes including utilization outcomes, quality of care, facility management, patient and staff satisfaction

ANC: antenatal care; ART: antiretroviral therapy; BPHS: Basic Package of Health Services; CBA: controlled before-after; CHW: community health worker; DHS: Demographic and Health Survey; DID: difference-in-difference; DPT: diphtheria-tetanus-pertussis; GDP: gross domestic product; HMIS: Health Management Information System; ITS: interrupted time series; ITT: intention to treat; MoH: Ministry of Health; NA: not available; OD: operational district ; P4P: paying for performance; P4P: paying for performance; RCT: randomized controlled trial; RMCH: reproductive, maternal and child health; RMNCH: reproductive, maternal, newborn and child health; SE: standard error; SURE: seemingly unrelated regression equations; TB: tuberculosis.

Table 5. Characteristics of interventions – table A

Country	Study ID	Intervention – P4P type	Scale	Source of funding for P4P scheme	Purchasing arrangement	Sectors contracted	Primary clinical or population group targeted	Level at which P4P performance was as-	Indicators incentivized

Table 5. Characteristics of interventions – table A *(Continued)*

								sessed and paid	
Afghanistan	Engineer 2016	Payment per output modified by quality score	11/34 provinces	World Bank	NGOs managing facilities were contracted by the MOPH to provide services. Funds channelled to health workers through the NGOs, whose central offices retained 10% of performance payment	Public and NGO	RMCH	Facilities	9 performance indicators incentivized, and 20 quality indicators included on Balanced Scorecard, along with contraceptive prevalence rates as an additional measure of equity
	Witvorapong 2016	Payment per output	4 rural provinces in the North and Central region	MOPH and GAVI	Unclear	Public	RMCH	Community health workers	2 indicators: institutional delivery and third dose of DPT-3 vaccination
Argentina	Celhay 2015	Payment per output	1 province (for this experiment)	Plan Nacer – national insurer	Integrated – Plan Nacer	Public	RMCH	Facilities	1 – early initiation of ANC
	Gertler 2014	Target payment	National roll-out	National MoH	Integrated – Plan Nacer	Public	RMCH	Province	10 indicators focused on reproductive maternal and child health and inclusion of indigenous populations
Benin	Lagarde 2015	Payment per output modified by quality score	8/34 districts	World Bank	Integrated – MoH	Public and not-for-profit (including faith-based)	RMCH	Facilities	28 service indicators around RMCH and other curative services (HIV/TB) and quality of care indicators (124 items)
Brazil	Viñuela 2015	Performance-related pay	2 states within the country	Federal/local government	Unclear – appeared integrated	Public	RMCH	Facility- or team-based for assessment but	Unclear – depended on mutually agreed targets

Table 5. Characteristics of interventions – table A *(Continued)*

								paid to staff	
Burkina Faso	Steenland 2017	Payment per output modified by quality and equity score	3 districts	World Bank	Integrated – health facilities signed contracts with the central level of the Ministry to provide packages of services in line with incentivized targets	Public	RMCH; HIV/TB	Facilities	17 indicators incentivized for primary care facilities; 21 for secondary care facilities; 7 for community health workers. Indicators primarily focused on RMNCH and TB/HIV
Burundi	Bonfrer 2014a	Payment per output modified by quality score	3 provinces in 2006; 6 more in 2008; further 9 in 2014. As of 2014, implemented in almost 700 health facilities	Unclear	Management responsibility transitioning out from NGO to Ministry	Public and not-for-profit (including faith-based)	RMCH	Facilities	Quantity measured through 23 output indicators, focused on RMNCH, TB/HIV and malaria. Quality checklist included 220 items
	Bonfrer 2014b	Payment per output modified by quality score	3 provinces in 2006; 6 more in 2008; further 9 in 2014. As of 2014, implemented in almost 700 health facilities	Unclear	Management responsibility transitioning out from NGO to Ministry	Public and not-for-profit (including faith-based)	RMCH	Facilities	Quantity measured through 23 output indicators, focused on RMNCH, TB/HIV and malaria. Quality checklist included 220 items (from Bonfrer 2014a)
	Falisse 2015	Payment per output modified by quality score	17 provinces of Burundi	MoH in collaboration with international NGOs, such as CORDAID and	Management responsibility transitioning out from NGO to Ministry	Public and not-for-profit (including faith-based)	RMCH	Facilities	Noted that over 42 different indicators were used (Table 1 listed 18 key indicators around curative services, reproductive health, preventive health and HIV/AIDS)

Table 5. Characteristics of interventions – table A *(Continued)*

				HealthNet TPO					
	Rudasingwa 2014	Payment per output modified by quality score	Unclear	MoH in collaboration with international NGOs, such as CORDAID and HealthNet TPO	Management responsibility transitioning out from NGO to Ministry	Public and not-for-profit (including faith-based)	General	Facilities	Example of 20 output indicators covering RMCH, TB, HIV and malaria and noted that 58 indicators for quality assessment were used
Cambodia	Ir 2015	Payment per output	National roll-out from October 2007	Royal Government of Cambodia	Integrated – MoH	Public	RMCH	Health workers	10 RMCH indicators
	Khim 2018a	Performance-based service agreements	National roll-out	Unclear	External contracting with aid agencies	Public	General; RMCH	Facilities	4 RMCH indicators
	Matsuoka 2014	Payment per output	10 districts	GAVI	External contracting with GAVI and internal purchasing supplementing	Public	RMCH	Facilities	2 ANC and immunization indicators
	Van de Poel 2016	Performance-based contracting	Depended on period of roll-out – most of Cambodia	Unclear	Management responsibility transitioning out from NGO to Ministry	Public	RMCH	District	Unclear – different types of targets noted for the different schemes
Cameroon	Zang 2015	Payment per output modified by quality and equity score	1 region	World Bank	Unclear – precursor of programme de Walque assesses, so likely similar purchasing through autonomous pur-	Unclear	Unclear	Health workers	Unclear

Table 5. Characteristics of interventions – table A *(Continued)*

					chasing agencies				
	de Walque 2017	Payment per output modified by quality and equity score	26 districts	World Bank	Autonomous purchasing agencies with contractual agreement to MoH and government	Public	Unclear	Facilities	23 indicators; 7 around curative care; 10 around preventive services – vaccinations, HIV and TB, STIs etc.; 6 around reproductive health
China	Chang 2017	Payment per output	Hospital	Unclear	Integrated – hospital level	Public	General	Health workers and facilities	Reporting of adverse drug reactions
	Yao 2008	Payment per output	1 province	Fidelis project	Integrated – MoH	Public	TB	Health workers and village leaders	2 TB outcomes
	Powell-Jackson 2014	Payment per output and for target	1 region – Ningxia province	Unclear	Integrated – MoH	Public	Unclear	Facilities	Multiple antibiotic prescription indicators, patient satisfaction indicators and process of care measures for common acute and chronic conditions
	Yip 2014	Capitation and P4P	1 region	New Cooperative Medical Scheme	Integrated – MoH	Public	General	Facilities	Unclear – see Powell-Jackson 2014
	Wu 2014	Target payment	Hospital	Unclear	Integrated – hospital level	Public	General	Health workers	1 drug sale ratio to revenue related indicator
	Liu 2005	Payment per output	National roll-out	MoH	Integrated – MoH	Public	General	Health workers	Under flat bonus – no indicators incentivized. Under quantity-related bonus 7 indicator areas around service provision. Under revenue-related bonus, bonus for revenue over a revenue target (revenue from provision of services and drugs)

Table 5. Characteristics of interventions – table A *(Continued)*

	Sun 2016	Capitation and P4P	2 provinces	New Co-operative Medical Scheme	Integrated – MoH	Public	General	Facilities	10 prescription-related quality of care indicators
Congo, Republic of the	Zeng 2018	Payment per output modified by quality score	3 regions	World Bank	External purchaser – CORDAID	Unclear	General	Facilities and district	25 indicators covering general population services, HIV/AIDS, RMNCH
Congo, Democratic Republic of the	Huillery 2017	Payment per output	Unclear	Unclear	Integrated – MoH	Mixed – public, private and faith-based	RMCH	Facilities	10 RMCH indicators
	Soeters 2011	Payment per output modified by quality score	2 districts	CORDAID	Unclear	Public and not-for-profit (including faith-based)	RMCH	Facilities	Unclear – appeared 9 indicators for RMCH and malaria
El Salvador	Bernal 2018	Results-based aid	14 municipalities	Salud MesoAmericana	External purchaser – Salud Mesoamericana, via MoH channels	Public	RMCH	Municipality	10 or 11 indicators on delivery of RMCH care and quality
Haiti	Zeng 2013	Performance-based contracting	All NGOs supported by USAID	USAID via MSH	External NGO management and purchasing	NGO	RMCH; HIV/TB	Facilities	14 potential indicators covering RMCH, TB/HIV services and their quality
India	Mohanan 2017	Target payment or payment per input	Karnataka state	Unclear	External – study authors	Private	RMCH	Health workers	Inputs for offering care or 4 outputs related to minimizing adverse events during pregnancy/child birth
Kenya	Menya 2015	Target payment	1 city and 18 health centres	Unclear	Unclear – presumably via routine mechanism	Public	RMCH	Facilities	7 malaria-specific indicators

Table 5. Characteristics of interventions – table A *(Continued)*

Malawi	McMahon 2016	Payment per output modified by quality score	3 districts	USAID, with JPHIEGO as implementer	Integrated – MoH	Public	RMCH; HIV/TB	Facilities	13 RMCH indicators and 13 quality dimensions
Multiple – Burkina Faso, Ghana and Tanzania	Duysburgh 2016	Financial and non-financial incentives + clinical decision guide	6 rural districts, 2 each of 2 countries	Unclear	Unclear	Unclear	RMCH	Book awards to health workers; health facilities received money (Burkina); others were unclear	Unclear – likely to differ by country
Peru	Cruzado de la Vega 2017	Payment per output and for target	Subnational 3 regions in Peru with the highest rates of chronic malnutrition in children in 2008 – apurimac, Ayacucho and Huancavelica	Peruvian government	Integrated nationally – contracting with regional governments and Ministry of Finance	Public	RMCH	Subnational organizations (health administrations, NGOs or local governments)	12 RMCH indicators, focus on child health
Philippines	Peabody 2011a	Target payment	10 hospitals	PhilHealth	Integrated – National Health Insurance	Public	RMCH	Facilities	Vignette scores focused on common childhood conditions
	Quimbo 2016	Target payment	10 hospitals	PhilHealth	Integrated – National Health Insurance	Public	RMCH	Facilities	Vignette scores focused on common childhood conditions
	Wagner 2018a	Target payment	10 hospitals	PhilHealth	Integrated – National Health Insurance	Public	RMCH	Facilities	Vignette scores focused on common childhood conditions

Table 5. Characteristics of interventions – table A *(Continued)*

	Peabody 2014	Target payment	10 hospitals	PhilHealth	Integrated – National Health Insurance	Public	RMCH	Facilities	Vignette scores focused on common childhood conditions
Rwanda	Basinga 2011	Payment per output modified by quality score	National roll-out (expansion to 19 districts which did not have P4P yet)	Governmental organization	Integrated – MoH	Public and not-for-profit (including faith-based)	RMCH	Facilities	7 outreach indicators, 7 content of care indicators, 13 quality domains
	Lannes 2016	Payment per output modified by quality score	National roll-out (expansion to 19 districts which did not have P4P yet)	Governmental organization	Integrated – MoH	Public and not-for-profit (including faith-based)	RMCH	Facilities	7 outreach indicators, 7 content of care indicators, 13 quality domains
	Priedeman Skiles 2013	Payment per output modified by quality score	National roll-out (expansion to 19 districts which did not have P4P yet)	Governmental organization	Integrated – MoH	Public and not-for-profit (including faith-based)	RMCH	Facilities	7 outreach indicators, 7 content of care indicators, 13 quality domains
	Priedeman Skiles 2015	Payment per output modified by quality score	National roll-out (expansion to 19 districts which did not have P4P yet)	Governmental organization	Integrated – MoH	Public and not-for-profit (including faith-based)	RMCH	Facilities	7 outreach indicators, 7 content of care indicators, 13 quality domains
	Sherry 2017	Payment per output modified by quality score	National roll-out (expansion to 19 districts which did not have P4P yet)	Governmental organization	Integrated – MoH	Public and not-for-profit (including faith-based)	RMCH	Facilities	7 outreach indicators, 7 content of care indicators, 13 quality domains
	Lannes 2015	Payment per output modified by quality score	National roll-out (expansion to 19 districts which	Governmental organization	Integrated – MoH	Public and not-for-profit (includ-	RMCH	Facilities	7 outreach indicators, 7 content of care indicators, 13 quality domains

Table 5. Characteristics of interventions – table A *(Continued)*

			did not have P4P yet)			ing faith-based)			
	Shapira 2018	Payment per output	19 districts	MoH	Integrated – MoH	Public and not-for-profit (including faith-based)	RMCH	Co-operatives and community health workers	5 RMCH indicators as primary focus of scheme, later supplemented with HIV/TB indicators
	Rusa 2009a	Payment per output modified by quality score	Eventual national rollout, reporting here on pilot in 5 rural and 1 semi-rural district	MoH in Rwanda and the Belgian Technical Cooperation	External NGO management and purchasing	Public	RMCH	Facilities	6 RMCH indicators
	Gertler 2013	Payment per output modified by quality score	National roll-out	MoH	Integrated – MoH	Public	RMCH	Facilities	7 outreach indicators, 7 content of care indicators, 13 quality domains
	de Walque 2015	Target payment	National roll-out	MoH	Integrated – MoH	Public and not-for-profit (including faith-based)	RMNCH; HIV/TB	Facilities	10 HIV-specific indicators
Swaziland	Kliner 2015	Payment per output	Hospital	Unclear	Integrated – National TB programme	Public	TB	Community health workers	Support of directly observed treatment
Tanzania	Brock 2018	Conditional provision of material goods	1 region	Unclear	External – study authors	Mixed – public, private and faith-based	General	Health workers	Adherence to guidelines
	Binyaruka 2015	Target payment	1 region	Government of Norway	Integrated – MoH	Public and not-for-profit (includ-	RMCH	Facilities and district	7 outreach indicators, 7 content of care indicators, 13 quality domains

Table 5. Characteristics of interventions – table A *(Continued)*

						ing faith-based)			
	Binyaruka 2017	Target payment	1 region	Government of Norway	Integrated – MoH	Public and not-for-profit (including faith-based)	RMCH	Facilities and district	7 outreach indicators, 7 content of care indicators, 13 quality domains
	Binyaruka 2018b	Target payment	1 region	Government of Norway	Integrated – MoH	Public and not-for-profit (including faith-based)	RMCH	Facilities and district	7 outreach indicators, 7 content of care indicators, 13 quality domains
	Mayumana 2017	Target payment	1 region	Government of Norway	Integrated – MoH	Public and not-for-profit (including faith-based)	RMCH	Facilities and district	7 outreach indicators, 7 content of care indicators, 13 quality domains
Zambia	Friedman 2016a	Payment per output modified by quality score	Prepilot in 1 district; following this P4P expanded to 10 additional districts. By end of project, 203 health centres covered	World Bank – Health Results Innovation Trust Fund	Integrated – MoH	Public	RMCH	Facilities and district	9 directly incentivized services via unit payments (RMCH indicators) and 10 areas for quality assessment (RMCH care, HIV services, general management and information systems, community participation)
	Shen 2017	Payment per output modified by quality score	Prepilot in 1 district; following this P4P expanded to 10 additional districts. By end of project, 203	World Bank – Health Results Innovation Trust Fund	Integrated – MoH	Public	RMCH	Facilities and district	9 directly incentivized services via unit payments (RMCH indicators) and 10 areas for quality assessment (RMCH care, HIV services, general management and information systems, community participation)

Table 5. Characteristics of interventions – table A *(Continued)*

			health centres covered						
	Chansa 2015	Payment per output modified by quality score	Katete district prepilot	World Bank through the Health Results Innovation Trust Fund	Integrated – MoH	Public	RMCH	Facilities	9 indicators incentivized around RMCH, and 10 incentivized areas for quality assessment
Zimbabwe	Friedman 2016b	Payment per output modified by quality and equity score	Initially in 2 districts in 26 RHCs, then scaled up to 18 districts	World Bank and cofunding from the Ministry of Finance and Economic Development	Integrated into MoH, with CORDAID technical support	Public and not-for-profit (including faith-based)	RMCH	Facilities + district + provincial	17 indicators in rural health centres and 6 in hospitals, focused on RMCH; quality scorecard
	Das 2017	Payment per output modified by quality and satisfaction score	18 districts	World Bank and cofunding from the Ministry of Finance and Economic Development	Integrated – MoH	Public and not-for-profit (including faith-based)	RMCH	Facilities + district + provincial	17 indicators overall for facilities and 134 quality indicators

ANC: antenatal care; DPT: diphtheria-tetanus-pertussis; MoH: Ministry of Health; MOPH: Ministry of Public Health; MSH: Management Sciences for Health; NGO: non-governmental organization; P4P: paying for performance; RMCH: reproductive, maternal and child health; RMNCH: reproductive, maternal, newborn and child health; STI: sexually transmitted infection; TB: tuberculosis; USAID: United States Agency for International Development.

Table 6. Characteristics of interventions – table B

Country	Study ID	Design of P4P scheme	How are the P4P incentives used and cascaded?	Who set the target and how were the targets set?	Measurement of targets: how and where from? Verification procedures	Magnitude of incentives	Relative size of incentive	Are bonuses additional to normal wages or funding?

Table 6. Characteristics of interventions – table B *(Continued)*

Afghanistan	Engineer 2016	Payment per output modified by quality score (payment per output, additional payment based on balanced scorecard and contraceptive prevalence rates, all adjusted by a quality score – details of adjustment not provided)	Bonuses quarterly to health workers, based on volume of 9 health services. Additional annual payments based on quality, equity and contraceptive prevalence rates. Health workers funds channelled through NGOs. Total payments adjusted by quality score	Unclear though negotiation of targets allowed for balanced scorecard. NGOs and MOPH negotiated to adjust payments taking into account baseline conditions and expected improvements	Monthly reports from health facilities verified quarterly by independent monitors, record-matching and random patient home visits	USD 1.30–10.37 per unit (initial); USD 2.67–35.63 per unit (revised)	6–11% above salary (2011), increasing to 14–28% (cadre dependent)	Yes
	Witvorapong 2016	Payment per output	Unclear	Unclear	Unclear	AFN 150 (about USD 3) per referral	Unclear	Unclear
Argentina	Celhay 2015	Payment per output – in addition to Plan Nacer, the experiment pays financial incentives to clinics at 200% premium for early initiation (pre-13 weeks) of ANC	Bonuses to providers set by national government according to services in the benefits package. Health facilities choose how to use revenues – some pay bonuses to personnel	National government according to clinical guidelines based on international evidence	Electronic record management system	Unclear	Unclear	Unclear
	Gertler 2014	Target payments for enrolments and specific indicators, including health outcomes	National government reimburses provinces every 4 months, on per capita basis, to maximum USD 8 per person per month – USD 5 per eligible individual enrolled in Plan Nacer, plus USD 3 if health targets achieved. Provinces pay clinics for RMCH services on fee-for-	Targets set with provinces in annual agreements between parties, based on indica-	National statistics resources	Unclear	1.4–3.5% increase in public health expenditure	Yes

Table 6. Characteristics of interventions – table B *(Continued)*

			service basis. Payments used at discretion of providers, within guidelines	tors from best practice clinical protocols				
Benin	Lagarde 2015	Payment per output modified by quality score (quality score index with 124 quality criteria bounded between 0 and 1)	Unclear	Unclear	Facility reports subject to verification by MoH	From 340 CFA francs (malaria cases detected and treated with RDT in children aged < 5 years) to 19,250 CFA francs (HIV-positive children initiated on ARV in last month)	Unclear	Yes
Brazil	Viñuela 2015	Performance-related pay (results-based management) involving different types of agreement. In Minais Gerais between governor and secretaries to follow strategic priorities of multi-annual plans and second-level agreements between secretaries and implementing teams with self-defined targets. Bonuses constitute sizeable incentives, up to 1-month salary. In Pernambuco	In relation to health sector, rewards group based at level of the hospital. Portion of employees pay lined to achievement of goal set for the group	Targets set by level, in discussion, and based on priorities	Unclear	Unclear	As large or higher than 1 month's salary (per year)	Yes

Table 6. Characteristics of interventions – table B *(Continued)*

		description not available						
Burkina Faso	Steenland 2017	Payment per output modified by quality (range 0–1) and equity adjustment (range 1–1.75) – all multiplicative	60% of payment given to healthcare providers, 40% for facility improvements. Allocation of payments between staff was weighted according to level of responsibility, training, absenteeism and individual evaluation	Unclear	Teams performed quarterly site visits	Primary care facilities: XOF 75 (well-child visits for children aged < 5 years) to XOF 1000 (children aged < 5 years with malnutrition) per service. Secondary care facilities: XOF 1125 (smear-positive TB cases treated) to XOF 20,000 (caesarean sections) per service. Community health workers: XOF – 50 (number of patients who did not return to facility for vaccination) and XOF 400 (number of patients diagnosed with malaria referred to CSPS)	For nurses, about 16% of mean government salary. Otherwise unclear	Unclear
Burundi	Bonfrer 2014a	Payment per output and quality adjustment (range 1–1.25) – multiplicative	Payments made to facilities	Unclear	Health facilities report monthly to MoH. Local regulatory authorities did quarterly checks of quality on a random day	From USD 0.05 (per child receiving vitamin A) to USD 20 (per person with TB correctly treated for 6 months)	About 40% of the total health facility budget	Yes
	Bonfrer 2014b	Payment per output and quality adjustment (ranges 1	Health facilities allocate P4P revenue between staff remuneration (up to 50%) and service quality improvements	Presumed MoH	Health facilities report monthly to MoH. Local regulatory authorities did quarterly	From USD 0.05 (per child receiving vitamin A) to USD 20 (per person with TB cor-	About 40% of the total health facility budget	Yes

Table 6. Characteristics of interventions – table B *(Continued)*

		– 1.25) – multiplicative			checks of quality on a random day	rectly treated for 6 months)		
	Falisse 2015	Payment per output and quality adjustment (range 1–1.25) – multiplicative	Unclear	Appeared to be set by NGOs or MoH	Unclear	Unclear	Unclear	Yes
	Rudasingwa 2014	Payment per output and quality adjustment (range 1–1.25) – multiplicative	Facility managers distributed bonuses to staff of facilities included in P4P scheme, based on profile and performance criteria of each staff member, e.g. qualifications, experience, years of employment, responsibility and worked hours	Unclear	Quality assessed quarterly by evaluation team from district and provincial health authorities	From USD 0.05 (per child receiving vitamin A) to USD 20 (person with TB correctly treated for 6 months)	About 20% of health facilities total revenues	Yes
Cambodia	Ir 2015	Payment per output	Incentives paid to health facility through public financial reimbursement channels, who then distributed to midwives, physicians and other trained health personnel attending deliveries in public health facilities. Of this up to 30% had to be shared further with other health personnel in the facility, and workers such as traditional birth attendants	Set by government (MoH)	Monthly reports from health facility through routine health information system	USD 15 (per live birth attended in health centre) and USD 10 (per live birth in hospitals)	Unclear	Yes
	Khim 2018a	P4P (other) – service agreement	Unclear	Initially meant to be performance agreements between MoH and PHD, service delivery agreement between PHD and SOAs,	Unclear	USD 1.18–1.24 (district dependent) per capita Service Delivery Grant allocation	Unclear	Yes

Table 6. Characteristics of interventions – table B *(Continued)*

				and agreements between Director of SOA, heads of facilities and individual staff members. However, enforcement was actually weak, so this did not happen				
	Matsuoka 2014	Payment per output	Unclear	Unclear	Appeared to be nationwide statistics	USD 0.5 (per outpatient consultation visit to each health centre), USD 1 (per ANC visit; per immunization dose)	Unclear	Yes
	Van de Poel 2016	Performance-based contracting	Unclear	Appeared to be donor and government	Unclear	Unclear	Unclear	Yes
Cameroon	Zang 2015	P4P (unclear) – though the same scheme was covered by de Walque 2017	Unclear	Unclear	Unclear	Unclear	Unclear	Unclear
	de Walque 2017	P4P (combined CCP and quality bonus and equity adjustment)	Payment at discretion of facility	Unclear	Facility reports submitted, and then verified by purchasing agency; purchaser and district assess quality scores	From 20 CFA francs (distribution of vitamin A supplementation) to 20,000 CFA francs (cases of TB treated and healed)	Unclear	Yes

Table 6. Characteristics of interventions – table B *(Continued)*

China	Chang 2017	Payment per output (income withheld)	Bonuses were paid for reporting of adverse drug reactions, fines if reports withheld; bonuses applied to both physicians and wards but unclear how distributed to each	Unclear	Routine retrospective review of charts by pharmacists	RMB 20 for a spontaneous adverse drug reaction report; fine of RMB 5 for a withheld report	< 1% of physician's salary	Unclear
	Yao 2008	Payment per output	Incentives provided to doctors, and to village leaders for disseminating TB knowledge – further details not specified	Unclear	Appeared to be routine data	USD 3 (for doctors for referral of new smear-positive person with TB), USD 8 (for village doctors for DOT for 6 months to new smear-positive patient), USD 1 (village leaders to disseminate TB knowledge)	Unclear	Yes (assessed by review authors but not explicitly stated)
	Powell-Jackson 2014	Payment reform: CCP and target payment	Unclear, however Yip 2014 suggested that the health centres were paid and they then cascaded payments to village clinics	Appeared to be researchers with Ningxia province decision makers	Unclear	RMB 2 (for village doctors per visit at clinic) or RMB 4 (per home visit). Amounted to mean 12,000 per village doctor	Unclear	Yes (assessed by review authors but not explicitly stated)
	Yip 2014	Payment reform to capitation with P4P)	Township health centres and village posts underwent performance assessments twice yearly – NCMS dispersed 70% of budget to health centres based at the beginning of the year and withheld the remaining 30% pending the results of these assessments. Health centres disbursed a share of this funding to village posts. Centres obtaining higher than average performance scores received more than the 30% of the budget that had been withheld; centres scoring below average received	Targets set by NCMS	Representatives of the supervising township health centre, the county department of health and the county NCMS office	Unclear	Unclear	Yes

Table 6. Characteristics of interventions – table B *(Continued)*

		less than this 30%. Village post performance affected health centre performance					
Wu 2014	Target payment (negative)	Specialties required to keep drug percentage below a certain threshold. Physician's compensation was deducted if their drug percentage exceeded the threshold, with greater excess resulting in greater punishment. If exceeded threshold by < 20%, deduction of CNY 100 (about USD 15) per percentage point over threshold; if exceeded threshold by > 20%, punishment was CNY 150 (about USD 22) per percentage point over. No financial reward for being below threshold	Initially Chinese government, as well as hospital from July 2004 to May 2005	Hospital records	Deduction of CNY 100 (USD 15) per percentage point over threshold if actual drug percentage exceeded threshold by < 20%; Deduction of CNY 150 (about USD 22) per percentage point over threshold if actual drug percentage exceeded threshold by > 20%	About 2.5% decrease in attending physician's official income (1.4% decrease in total income) for each percentage above drug prescription threshold	No
Liu 2005	Payment per output (including revenue)	3 types of bonus system: 1. Flat bonus distributed among hospital staff about equally, with the amount depending on overall financial status of hospital; 2. quantity-related bonus according to quantity of services provided, usually with a target above which the bonus was paid; 3. revenue-related bonus, depending on revenue generated by doctors through provision of services and drugs over a revenue target	Unclear	Unclear	Unclear	About 10% of salary	Yes
Sun 2016	Payment reform: capitation with negative performance payments	Township health centres received 80% of CGB quarterly. Quality of care assessment taken at beginning of next quarter, and report sent to payer – portion of remaining 20% of CGB paid based on assessment performance	Appeared to have been set through discussions between providers, research team, provincial	Study team via structured observation	Unclear	20% of operating budget of clinic	No

Table 6. Characteristics of interventions – table B *(Continued)*

				and county officials, and NCMS officials				
Congo, Republic of the	Zeng 2018	Payment per output modified by quality score	Unclear	Unclear	Facility registers, with verification by CORDAID, who also carried out quarterly quality checks	From USD 0.40 (curative visits; HIV/AIDS cases with opportunistic infections treated), to USD 60 (TB and leprosy cases cured)	Unclear	Yes
Congo, Democratic Republic of the	Huillery 2017	CCP	Unclear	Unclear	Facility registers	From USD 0.6 (curative care visit) to USD 5 (complex case referral)	Total incentives represented about half of facilities' budget	Yes (assessed by review authors but not explicitly stated)
	Soeters 2011	Payment per output modified by quality score	Unclear	Targets appeared to have been set by external consultants. Health facilities submitted business plans quarterly outlining strategies for delivering health packages	Unclear	USD 200–4000 per facility per month – variation between facilities according to quality and remoteness	Unclear	Yes (assessed by review authors but not explicitly stated)
El Salvador	Bernal 2018	P4P (fixed element alongside a targeted element)	Specification that 25% bonus received upon achieving a weighted 80% of targets was to be spent in the health sector	Targets agreed between government and Salud Mesoamerica Initia-	Independent third-party household survey	Total incentive trance USD 1,625,000 for first phase	25% of total value of funding envelope offered to governments	Yes

Table 6. Characteristics of interventions – table B *(Continued)*

				tive based on indicators around inputs and quality of care, service utilization and health outcomes				
Haiti	Zeng 2013	Performance-based contracting, with indicators for performance chosen at year end to avoid distortion	Facility given autonomy on use of money	MSH worked to set targets with NGO each year based on historical performance	Monthly reports by health facility	Unclear	5–10% of budget, depending on performance	Yes
India	Mohanan 2017	Payment for health outcome targets (combining negative target payments and incremental payments for lower levels of maternal mortality from specific causes); second arm tested payment for adherence to WHO protocols for maternal health care (payment according to score against 5 domains of care)	2 payment mechanisms in intervention arms. In both arms, providers given incentive payment only at end of study period, with no interim payments. For output-based arm, payment based on rewards for each of 4 outcomes. For input-based arm, payment based on rewards for each of 5 domains of care	All incentives and contracts were set to allow equal maximum level of payment + to ensure that the project could afford it all	Experimental setting; measured through household surveys and repeated provider surveys	Maximum of INR 150,000 (USD 2700 at time of contract) for doctors	About 15% of specialist doctor salary	Yes
Kenya	Menya 2015	Target payments (positive and negative)	Intervention facilities received payments based on 7 performance indicators. Incentives	Study team – to foster co-oper-	Appeared to be from facility reg-	Maximum USD 1175 (KES 100,000) per	About equivalent to mon-	Yes

Table 6. Characteristics of interventions – table B *(Continued)*

			had to be used for equipment, supplies, repairs and basic labour, rather than payments to employees or clinicians	ation between departments and harmonize their working	isters during study team visits	quarter per facility	ey saved if overuse of ACT curbed	
Malawi	McMahon 2016	Payment per output modified by quality score	Rewards paid to facilities based on achievement of set targets. Rewards used for facility improvements or other strategies outlined in annual business plans developed by facility staff and Support for Service Delivery Integration staff. Rewards could not be redistributed to health workers as performance bonuses	Unclear	Quality was measured by communities and patient interviews. Further details unclear	Unclear	Unclear	Yes
Multiple – Burkina Faso, Ghana and Tanzania	Duysburgh 2016	Clinical decision guide + P4P (financial and non-financial incentives)	Unclear	Based on qualitative research with stakeholders involved, for instance health workers and policy makers	Emphasis on routine measurement of indicators	Unclear	Unclear	Unclear
Peru	Cruzado de la Vega 2017	Appeared to be a mix of CCP and target payment	Agreements used to transfer resources to the budgets of these regions with the condition of fulfilling management commitments and coverage goals with a view toward improving the nutritional status of children	Programme based on agreement made between the national and regional governments	Unclear	Unclear	Unclear	Unclear
Philippines	Peabody 2011a	Target payment (quality scores)	The total bonus payments received by the hospital were distributed among physicians and other hospital staff and were paid quarterly	Unclear	Measured using CPV scores (focused on dermatitis, diarrhoea and pneumo-	PHP 100 (USD 49 in 2006) per patient per day of confinement (eli-	5% of total physician salaries	Yes

Table 6. Characteristics of interventions – table B *(Continued)*

				nia) plus quarterly caseload scores and patient satisfaction scores. Biannually 2 trained physician abstractors scored 3 CPVs from randomly selected physicians at each hospital	gible intervention B hospitals)		
Quimbo 2016	Target payment (quality scores)	The total bonus payments received by the hospital were distributed among physicians and other hospital staff and were paid quarterly	Unclear	Measured using CPV scores (focussed on dermatitis, diarrhoea and pneumonia) plus quarterly caseload scores and patient satisfaction scores. Biannually 2 trained physician abstractors scored 3 CPVs from randomly selected physicians at each hospital	PHP 100 (USD 49 in 2006) per patient per day of confinement (eligible intervention B hospitals)	5% of total physician salaries	Yes
Wagner 2018a	Target payment (quality scores)	The total bonus payments received by the hospital were distributed among physicians and other hospital staff and were paid quarterly	Unclear	Measured using CPV scores (focussed on dermatitis, diarrhoea and pneumonia) plus quarterly caseload scores and patient satisfaction scores. Biannually 2 trained physician abstractors scored 3 CPVs from randomly	PHP 100 (USD 49 in 2006) per patient per day of confinement (eligible intervention B hospitals)	5% of total physician salaries	Yes

Table 6. Characteristics of interventions – table B *(Continued)*

					selected physicians at each hospital			
	Peabody 2014	Target payment (quality scores)	The total bonus payments received by the hospital were distributed among physicians and other hospital staff and were paid quarterly	Unclear	Measured using CPV scores (focussed on dermatitis, diarrhoea and pneumonia) plus quarterly caseload scores and patient satisfaction scores. Biannually 2 trained physician abstractors scored 3 CPVs from randomly selected physicians at each hospital	PHP 100 (USD 49 in 2006) per patient per day of confinement (eligible intervention B hospitals)	5% of total physician salaries	Yes
Rwanda	Basinga 2011	Payment per output modified by quality score (range 0–1)	Payments made directly to facilities and used at each facility's discretion. On average, facilities in intervention group allocated 77% of funds to increase personnel compensation; facilities in control group allocated 73% of the additional input-based funds to increase personnel compensation	Unclear	Facilities submitted monthly reports and quarterly requests for payment to district P4P steering committee. Verification by steering committee	From USD 0.09 (number of first ANC visit) to USD 4.59 (number of deliveries in facility; number of emergency transfers to hospital for obstetric care during delivery)	Unclear	Yes
	Lannes 2016	Payment per output modified by quality score (range 0–1)	Payments made directly to facilities and are used at each facility's discretion. On average, facilities in intervention group allocated 77% of funds to increase personnel compensation; facilities in control group allocated 73% of the additional input-based funds to increase personnel compensation	Unclear	Facilities submitted monthly reports and quarterly requests for payment to district P4P steering committee. Verification by steering committee	From USD 0.09 (number of first ANC visit) to USD 4.59 (number of deliveries in facility; number of emergency transfers to hospital for obstetric care during delivery)	Unclear	Yes

Table 6. Characteristics of interventions – table B *(Continued)*

Priedeman Skiles 2013	Payment per output modified by quality score (range 0–1)	Payments made directly to facilities and used at each facility's discretion. On average, facilities in intervention group allocated 77% of funds to increase personnel compensation; facilities in control group allocated 73% of the additional input-based funds to increase personnel compensation	Unclear	Facilities submitted monthly reports and quarterly requests for payment to district P4P steering committee. Verification by steering committee	From USD 0.09 (number of first ANC visit) to USD 4.59 (number of deliveries in facility; number of emergency transfers to hospital for obstetric care during delivery)	Unclear	Yes
Priedeman Skiles 2015	Payment per output modified by quality score (range 0–1)	Payments made directly to facilities and used at each facility's discretion. On average, facilities in intervention group allocated 77% of funds to increase personnel compensation; facilities in control group allocated 73% of the additional input-based funds to increase personnel compensation	Unclear	Facilities submitted monthly reports and quarterly requests for payment to district P4P steering committee. Verification by steering committee	From USD 0.09 (number of first ANC visit) to USD 4.59 (number of deliveries in facility; number of emergency transfers to hospital for obstetric care during delivery)	Unclear	Yes
Sherry 2017	Payment per output modified by quality score (range 0–1)	Payments made directly to facilities and used at each facility's discretion. On average, facilities in intervention group allocated 77% of funds to increase personnel compensation; facilities in control group allocated 73% of the additional input-based funds to increase personnel compensation	Unclear	Facilities submitted monthly reports and quarterly requests for payment to district P4P steering committee. Verification by steering committee	From USD 0.09 (number of first ANC visit) to USD 4.59 (number of deliveries in facility; number of emergency transfers to hospital for obstetric care during delivery)	Unclear	Yes
Lannes 2015	Payment per output modified by quality score (range 0–1)	Payments made directly to facilities and used at each facility's discretion. On average, facilities in intervention group allocated 77% of funds to increase personnel compensation; facilities in control group allocated 73% of the additional input-based funds to increase personnel compensation	Unclear	Facilities submitted monthly reports and quarterly requests for payment to district P4P steering committee. Verification by steering committee	From USD 0.09 (number of first ANC visit) to USD 4.59 (number of deliveries in facility; number of emergency transfers to hospital for obstetric care during delivery)	Unclear	Yes

Table 6. Characteristics of interventions – table B *(Continued)*

Shapira 2018	CCP to community co-operatives	Indication was that the extra P4P programme operated similarly to the background P4P programme operational since 2009; however, implementers themselves were noted to have been confused: 30% of the co-operative payments under the usual P4P scheme could be given to members; 70% minimum had to be reinvested in the co-operative	Unclear	Co-operative reporting (incentivized as part of a background P4P programme)	Varied 2010–2014. 2010: from USD 2.11 (per regular family planning user) to USD 3.24 (per child monitored for nutritional status). 2014: from USD 0.43 (per child monitored for nutritional status) to USD 1.05 (per new family planning user)	About 1% of gross national income (USD 7.3 on average, compared to gross national income USD 690/capita)	Yes
Rusa 2009a	Payment per output modified by quality score (quality score could only decrease the payment)	Unclear	Unclear who set targets – presumed MoH with support of Belgian Technical Cooperation. Indicators linked to services delivered and service quality	District supervisors collected monthly data on quantity and quality of services. Verification by 2 supervisors trained by central level supervisors	RWF 100–2500 (USD 0.18–4.5) per unit for basic activities	Subsidy/salary ratio 39% in 2005, 84% in 2006, 40% in 2007 (all personnel confounded). About 32–78% of the base salary of an auxiliary nurse A2	Yes
Gertler 2013	Payment per output modified by quality score (range 0–1)	Payments made directly to facilities and used at each facility's discretion. On average, facilities in intervention group allocated 77% of funds to increase personnel compensation; facilities in control group allocated 73% of the additional input-based funds to increase personnel compensation	Unclear	Facilities submitted monthly reports and quarterly requests for payment to district P4P steering committee. Verification by steering committee	From USD 0.18 (e.g. per curative care visit) to USD 4.59 (e.g. per delivery in the facility)	24.6% increase in funding above the base budget	Yes
de Walque 2015	Payment per output	Payments made directly to facilities and used at each facili-	MoH	Facilities submitted monthly re-	From USD 0.46 (per HIV-posi-	14% of overall expen-	Yes

Table 6. Characteristics of interventions – table B *(Continued)*

			ty's discretion. On average, facilities in intervention group allocated 60–80% of funds to increase personnel compensation		ports and quarterly requests for payment to district P4P steering committee. Verification by steering committee	tive patient treated with co-trimoxazole each month) to USD 9.17 (per infant born to HIV-positive mothers tested)	ditures in 2007	
Swaziland	Kliner 2015	Payment per output	CSWs given monthly financial incentives to cover travel to the clinic with (or on behalf of) the patient, and cover other supplies for the patient	Unclear	Appeared to be TB register	USD 5.75 per month/per patient plus USD 34.40 per patient who completed treatment or was cured after 6 months	Unclear	Yes (assessed by review authors but not explicitly stated)
Tanzania	Brock 2018	P4P (conditional provision of material goods)	Not applicable – this was about receiving gifts both conditional or not	Study team	Study team	Book	Not applicable (incentive was a book)	Yes
	Binyaruka 2015	P4P (target payment)	Full payment made to facilities if 100% of target achieved. If < 100% but ≥ 75% of targets achieved, 50% of payment was made. 75% of bonus payments distributed among health workers. Remaining 25% retained by facility – used for drugs, supplies, renovations	Unclear	National HMIS	Maximum USD 820 for dispensaries; USD 3220 for health centres; and USD 6790 for hospitals.	About 10% of health worker monthly salary	Yes
	Binyaruka 2017	P4P (target payment)	Full payment made to facilities if 100% of target achieved. If < 100% but ≥ 75% of targets achieved, 50% of payment was made. 75% of bonus payments distributed among health workers. Remaining 25% retained by facility – used for drugs, supplies, renovations	Unclear	National HMIS	Maximum USD 820 for dispensaries; USD 3220 for health centres; and USD 6790 for hospitals	About 10% of health worker monthly salary	Yes
	Binyaruka 2018b	P4P (target payment)	Full payment made to facilities if 100% of target achieved.	Unclear	National HMIS	Maximum USD 820 for dispen-	About 10% of health	Yes

Table 6. Characteristics of interventions – table B *(Continued)*

			If < 100% but ≥ 75% of targets achieved, 50% of payment was made. 75% of bonus payments distributed among health workers. Remaining 25% retained by facility – used for drugs, supplies, renovations			saries; USD 3220 for health centres; and USD 6790 for hospitals	worker monthly salary	
	Mayumana 2017	P4P (target payment)	Full payment made to facilities if 100% of target achieved. If < 100% but ≥ 75% of targets achieved, 50% of payment was made. 75% of bonus payments distributed among health workers. Remaining 25% retained by facility – used for drugs, supplies, renovations	Unclear	National HMIS	Maximum USD 820 for dispensaries; USD 3220 for health centres; and USD 6790 for hospitals	About 10% of health worker monthly salary	Yes
Zambia	Friedman 2016a	Conditional payment with quality adjustment (based on thresholds for quality scores of ≥ 61%. Quality scores additional to quantity. Contracting done by provincial steering committees	Health facilities authorized to use ≥ 40% of P4P payments for operational activities, and to increase service delivery. Up to 60% of payments could be used for staff motivation bonuses	Assumed MoH and RBF Steering Committees	Measurement through facility level data. Verification by DMOs (on quantity indicators) and District (General) Hospitals (on quality). Additional verification by District RBF Steering Committees	From USD 0.2 (curative consultation) to USD 6.4 (institutional deliveries by skilled birth attendant)	10% of staff salaries	Yes
	Shen 2017	Conditional payment with quality adjustment (based on thresholds for quality scores of ≥ 61%. Quality scores additional to quantity. Contracting done by provincial steering committees	Health facilities authorized to use ≥ 40% of P4P payments for operational activities, and to increase service delivery. Up to 60% of payments could be used for staff motivation bonuses	Assumed MoH and RBF Steering Committees	Measurement through facility level data. Verification by DMOs (on quantity indicators) and District (General) Hospitals (on quality). Additional verification by District RBF Steering Committees	From USD 0.2 (curative consultation) to USD 6.4 (institutional deliveries by skilled birth attendant)	10% of staff salaries	Yes

Table 6. Characteristics of interventions – table B *(Continued)*

	Chansa 2015	CCP + quality adjustment (multiplicative, not additional)	Unclear	Price of each indicator set based on baseline coverage, MoH targets and complexity of delivery	Measured via HMIS. Verification by a hospital contracted by the DMO; DMO verified self-reporting of facilities into HMIS; University of Zambia conducted external quality audits	From USD 0.2 (curative consultation) to USD 6.4 (institutional deliveries by skilled birth attendant)	2–56% of staff salary, dependent on area	Yes
Zimbabwe	Friedman 2016b	Combination of CCP (payment per targeted service) and quality adjustment (quality per service additional to the main CCP, capped at 25% of the main CCP, scores were scaled and quality score > 50% to receive minimum 15%). Additional remoteness bonus for facilities	According to Government's guidelines, facilities could share maximum of 25% of P4P income among staff as salary supplements. Remaining 75% spent on improving facility working conditions, such as infrastructure, supplies, and equipment	Set by programme based on priorities for improvement	Facility records verified by MoH and implementing NGOs and University of Zimbabwe	From USD 0.05 (new OPD consultation) to USD 140 (caesarean section)	Unclear	Yes
	Das 2017	Combination of CCP + addition of quality (weighted 75%) and patient satisfaction (weighted 25%) bonus	According to Government's guidelines, facilities could share maximum of 25% of P4P income among staff as salary supplements. Remaining 75% spent on improving facility working conditions, such as infrastructure, supplies and equipment	Set by programme based on priorities for improvement	Facility records verified by MoH and implementing NGOs and University of Zimbabwe	Unclear	Unclear	Yes

ANC: antenatal care; ARV: antiretroviral therapy; CGB: capitated global budget; CCP: conditional cash payment; CPV: clinical performance vignette; CSPS: care health and social promotion centre; CSW: community support worker; DMO: district medical officer; DOT: directly observed treatment; HMIS: Health Management Information System; MoH: Ministry of Health; MOPH: Ministry of Public Health; MSH: Management Sciences for Health; NCMS: New Cooperative Medical Scheme; NGO: non-governmental organization; P4P: paying for performance; P4P: paying for performance; PHD: Provincial Health Department; RBF: results-based funding; RDT: rapid diagnostic test; SOA: Special Operating Agencies; TB: tuberculosis.

Table 7. Intervention classification – table A

Scheme classification (as based on descriptions provided in reviewed documents)	Details on scheme	Number of studies	Studies reporting	Countries included (number)	Study types (number)	Comparators against which scheme impacts assessed (number)
Capitation and P4P	Payment reforms including capitation and P4P elements	2	Sun 2016; Yip 2014	China (2)	RCT (1) and quasi-non randomized trial (1)	Fee for service (1) and global capitated budget only (1)
Conditional provision of material goods	Conditional provision of material goods alongside supervision and quality improvement strategies	1	Brock 2018	Tanzania (1)	Quasi-non randomized trial (1)	Unconditional gifts (either immediate or delayed) as alternative interventions and control (all received a standard encouragement intervention) (1)
Financial and non-financial incentives + clinical decision guide	Mix of financial and non-financial incentives, alongside clinical decision guide and supervision/technical support	1	Duysburgh 2016	Burkina Faso, Ghana and Tanzania (all in 1)	CBA (1)	Control as standard care (1)
Performance-related pay	Performance-related pay (results-based management) involving different types of agreement according to province implemented (ranging from multilevel agreements with strategic targets to not specified)	1	Viñuela 2015	Brazil (1)	ITS (1)	Comparison of impact over time in implementing provinces (1)
Performance-based contracting or service agreements	Service agreements introduced as part of reform and in case of contracting, with indicators for performance chosen at year end to avoid distortion	3	Khim 2018a; Van de Poel 2016; Zeng 2013	Cambodia (2), Haiti (1)	CBA (2), ITS (1)	Routine practice as control (2) and comparison of indicators over time (1)
Hybrid scheme	Payment per output and for target	2	Cruzado de la Vega 2017; Powell-Jackson 2014	China (1), Peru (1)	Quasi/non-randomized trials (2)	Control as standard care (2)
Results-based aid	Fixed element alongside a targeted element as part of results-based aid	1	Bernal 2018	El-Salvador (1)	CBA (1)	Control as status quo (1)

CBA: controlled before-after study; ITS: interrupted time series study; P4P: paying for performance; RCT: randomized controlled trial.

Table 8. Intervention classification – table B

Scheme classification (as based on descriptions provided in reviewed documents)		Details on scheme	Number of Studies	Studies	Countries included (number)	Study types (number)	Comparators against which scheme impacts assessed (number)
Payment per output	Payment per output	Payment for each output	9	Celhay 2015; de Walque 2015; Huillery 2017; Ir 2015; Kliner 2015; Matsuoka 2014; Shapira 2017; Witvorapong 2016; Yao 2008	Afghanistan (1), Argentina (1), China (1), Cambodia (2), Democratic Republic of the Congo (1), Swaziland (1), Rwanda (2)	RCT (4), quasi/non-randomized (2), ITS (2), CBA (1)	Control as status quo/ standard care (4), comparison over time in implementing locations (2), comparator of matched funding or background P4P programmes into which experiments nested (3)
		Payment per output with income potentially withheld	1	Chang 2017	China (1)	ITS (1)	Comparison of impact over time in implementing hospital (1)
		Payment per output including revenue	1	Liu 2005	China (1)	ITS (1)	Comparison over time in implementing provinces (1)
	Payment per output modified by quality score	Payment per output with quality as multiplicative adjuster (0–1)	11	Basinga 2011; Chansa 2015; Gertler 2013; Lagarde 2015; Lannes 2015; Lannes 2016; Priedeman Skiles 2013; Priedeman Skiles 2015; Rusa 2009a; Sherry 2017; Zeng 2018	Republic of the Congo (1), Zambia (1), Benin (1), Rwanda (8)	Quasi/non-randomized trial (8), CBA (1), ITS (2)	Control with standard care (2), over time comparison in implementation areas (2), comparator of matched funding (7)
		Payment per output with quality bonuses (quality adjuster an additional but not detracting component)	7	Bonfrer 2014a; Bonfrer 2014b; Falisse 2015; Friedman 2016a; Rudasingwa 2014; Shen 2017	Burundi (4), Zambia (2)	RCT (2) and CBA (4)	Control as standard care (5), comparator of enhanced matched financing (2)
		No description of payment equation – quality adjustment noted	1	Engineer 2016	Afghanistan (1)	RCT (1)	Control with standard care (1)
	Payment per output modified by quali-	Modification to payment equation based on population equity	5	de Walque 2017; Friedman 2016b; Soeters	Burkina Faso (1), Cameroon (2), Democratic	Quasi/non-randomized	Control as standard care (4) and comparator in-

Table 8. Intervention classification – table B *(Continued)*

	ty and equity score	or remoteness of facilities		2011; Steenland 2017; Zang 2015	Republic of the Congo (1), Zimbabwe (1)	trials (2), CBA (3)	cluding equipment and other in kind support (1)
	Payment per output modified by quality and satisfaction score	Modification to payment including bonuses for enhanced patient satisfaction	2	Das 2017; McMahon 2016	Malawi (1), Zimbabwe (1)	CBA (2) and ITS (1) (1 study had both)	Control as standard care (2)
Target payment	Target payment	Potential for income gain only	12	Binyaruka 2015; Binyaruka 2017; Binyaruka 2018b; Gertler 2014; Mayumana 2017; Menya 2015; Peabody 2011a; Peabody 2014; Quimbo 2016; Wagner 2018a	Argentina (1), Kenya (1), Philippines (4), Tanzania (4)	RCT (5), CBA (5)	Control as standard care/ status quo (12)
		Potential for income withheld	1	Wu 2014	China (1)	ITS (1)	Over time (1)
		Target payment or payment per input	1	Mohanan 2017	India (1)	RCT (1)	Control as status quo (1)

CBA: controlled before-after study; ITS: interrupted time series study; P4P: paying for performance.

Table 9. Sensitivity analyses against control: direction of relative effect and GRADE rating for targeted outcomes across randomized controlled trials only

Direction of relative effect and GRADE rating for targeted outcomes across RCT studies only				
Outcome	**Indicator (if indicator not named, no RCT evidence available)**	**Comment on effect (desirable, undesirable, neutral or uncertain)**	**Certainty of the evidence**	**Commentary on intervention effect**
Primary: health outcomes	Neonatal mortality	▬	⊕⊕⊖⊖	P4P probably has no significant impact on neonatal mortality (0.03%)
Primary: utilization and delivery	Child immunization: receiving ≥ 1 vaccine	▬	⊕⊕⊖⊖	P4P probably has no important effect on outcome (1%)
	Child immunization: fully vaccinated	▲	⊕⊕⊖⊖	P4P may lead to higher rate of full vaccination (16.1%)
	Child immunization: receiving BCG	▲	⊕⊕⊖⊖	P4P may lead to higher rate of BCG vaccination (range 1–7%)
	Child immunization: receiving DTP	▲	⊕⊕⊖⊖	P4P may lead to higher rate of DTP vaccination (6.1%)
	Child immunization: measles	▬	⊕⊕⊖⊖	P4P may have little to no important effect on measles vaccination rates (–3.6%)
	Child immunization: polio	▲	⊕⊕⊖⊖	P4P may lead to higher rate of polio vaccination (21%)
	Child immunization: pentavalent	▼	⊕⊕⊖⊖	P4P reduces the pentavalent immunization rate (–5.7%)
	Probability of any utilization (% utilizing)	▬	⊕⊕⊖⊖	P4P may have slight positive effects on overall utilization of services (4.2%)
	ANC (utilization and delivery rates overall)	▬	⊕⊕⊖⊖	P4P may have a slight positive effect on the ANC utilization rate (4%)
	Total number ANC visits	▼	⊕⊕⊖⊖	P4P may lead to a decrease in the total number of ANC visits (range estimated at –35% to –4.60%)
	≥ 1 ANC (utilization rates)	▼	⊕⊕⊖⊖	P4P probably leads to a reduction in the utilization of at least 1 ANC visit (range –10% to –1.5%)
	≥ 4 ANC (utilization rates)	▼	⊕⊕⊖⊖	P4P may leads to a decrease in rate of women utilizing ≥ 4 ANC sessions (–5.4%)
	ANC from qualified provider (% receiving)	▬	⊕⊕⊖⊖	P4P may lead to an increase in the delivery of ANC by a qualified provider (4.7%)
	Family planning (% using any method)	▼	⊕⊕⊖⊖	P4P may have slight negative or no impact on family planning utilization (range –6.3% to null effect)

Table 9. Sensitivity analyses against control: direction of relative effect and GRADE rating for targeted outcomes across randomized controlled trials only *(Continued)*

	Family planning (% using modern methods)	▬	⊕⊕⊖⊖	P4P may have no important effect on utilization of modern family planning (0.2%)
	Institutional delivery (rates or coverage)	▲	⊕⊕⊕⊖	P4P probably has positive effects on the rate of institutional deliveries (range –3% to 18.1%, but were predominantly positive)
	Institutional delivery (% using caesarean section)	▬	⊕⊕⊕⊖	P4P probably has limited effect on the rate of caesarean sections within the institutional deliveries (2%)
	Institutional delivery: likelihood of skilled attendance at birth	▲	⊕⊕⊕⊖	P4P probably improves the likelihood of having a skilled birth attender (range 4–16.2%)
	PNC (overall utilization rate)	▲	⊕⊕⊕⊖	P4P probably has positive impacts on PNC utilization (range –2% to 10.8%, predominantly positive)
	PNC: likelihood of skilled attendance	▲	⊕⊕⊖⊖	P4P may have a positive effect on skilled attendance during PNC (15.79%)
	PNC (% receiving timely access)	▬	⊕⊕⊕⊖	P4P has no important effect on % of women receiving timely access (0.8%)
	Curative consultations in children (rates)	▼	⊕⊕⊖⊖	P4P may reduce the utilization of curative care visits for children by up to 10.9%
Primary: quality of care	Background and physical assessment (scores general, across ANC, PNC, childcare and for other consultations)	▼	⊕⊕⊖⊖	P4P may have negative effects on quality of care scores associated with background and physical assessments (range –17% to 4%, predominantly negative)
	Correct patient management by healthcare providers (scores in relation to ANC, childcare and PNC)	▬	⊕⊕⊕⊖	P4P probably has no effect on quality of care scores associated with correct patient management (0.03%)
	Patient counselling (scores on ANC- and PNC-related counselling)	□	⊕⊕⊖⊖	P4P effects on quality of care scores range between –37% to 6%
	Immunizations (score for receiving any tetanus and number of tetanus vaccinations)	▬	⊕⊕⊖⊖	P4P may have little to no important effect on quality of care relating to immunizations (2.25%)
	Women in ANC being given or prescribed folic acid/iron (%)	▲	⊕⊕⊖⊖	P4P may improve the likelihood of being prescribed folic acid/iron during ANC by up to 5.5%
	Staff knowledge and skills (score)	▬	⊕⊕⊖⊖	P4P may have little to no effect on staff knowledge and skills

Table 9. Sensitivity analyses against control: direction of relative effect and GRADE rating for targeted outcomes across randomized controlled trials only *(Continued)*

	Patient knowledge (score)	▲	⊕⊕⊖⊖	P4P may have positive effects on patient knowledge (range –3% to 116%, overall positive)
	Contact time	▬	⊕⊕⊕⊖	P4P probably has no significant impact upon contact time (2.5%)
	Overall composite quality of care (score)	▬	⊕⊕⊕⊖	P4P probably has little to no effect on overall care quality scores (range 1.6–4%)
	Quality of ANC (score)	▬	⊕⊕⊖⊖	P4P may have slight positive effects on quality of ANC (2%)
	Quality of child health (score)	▲	⊕⊕⊕⊖	P4P probably has positive effects on the quality of child health scores (300%)
	Quality of medicine and equipment (score)	▲	⊕⊕⊕⊖	P4P probably increases the quality of medicines and equipment by up to 220%
	Quality by department/service (score)	▲	⊕⊕⊕⊖	P4P probably increases the quality of specific departments and services up to 15 fold
Primary: unintended effects	Overall impacts on free riding and task shifting	▬	⊕⊕⊖⊖	P4P may have few distorting effects
Primary: changes in resource use	Equipment availability (index)	▲	⊕⊕⊕⊖	P4P probably increases equipment availability by up to 300%
	Equipment functionality (index)	▬	⊕⊕⊕⊖	P4P probably has little to no effect on equipment functionality (1.4%)
	Infrastructure functionality (index)	▲	⊕⊕⊕⊖	P4P probably leads to improvements in infrastructure functionality scores by up to 345%
	Medicine availability (index)	▲	⊕⊕⊕⊖	P4P probably has positive impacts on medicine availability by up to 200%
	Vaccine availability (index)	▲	⊕⊕⊖⊖	P4P may have positive effects on vaccine availability (21.95%)
Secondary: provider motivation, satisfaction, absenteeism and acceptability	Provider motivation (score)	▬	⊕⊕⊕⊖	P4P probably has no important effect on provider motivation
	Provider satisfaction (score)	▬	⊕⊕⊕⊖	P4P probably has no important effect on provider satisfaction
Secondary: patient satisfaction and acceptability (satisfaction scores)	Overall patient satisfaction with quality of care (score)	▬	⊕⊕⊕⊖	P4P probably has no important effect on overall satisfaction with quality of care
	Overall satisfaction (score)	▬	⊕⊕⊕⊖	P4P probably has no important effect on overall satisfaction

Table 9. Sensitivity analyses against control: direction of relative effect and GRADE rating for targeted outcomes across randomized controlled trials only *(Continued)*

Secondary: impacts on management or information system (if not a targeted measure of performance)	Facility or managerial autonomy (score)	▲	⊕⊕⊖⊖	P4P may have positive impacts on facility autonomy (score increases up to 146%)
	Facility governance (score)	▬	⊕⊕⊖⊖	P4P may have little to no effect on facility governance score
	Quality of management (score)	▬	⊕⊕⊖⊖	P4P may have little to no effect on quality of management score

ANC: antenatal care; *Bacillus Calmette–Guérin*; DTP: diphtheria-tetanus-pertussis; P4P: paying for performance; PNC: postnatal care; RCT: randomized controlled trial.
Direction of effect key
▲: desirable; ▼: non-desirable; ▬: neutral; □: uncertain
Certainty of the evidence key
⊕⊕⊕⊖: moderate; ⊕⊕⊖⊖: low.

Table 10. Sensitivity analyses against comparator: direction of relative effect and GRADE rating for targeted outcomes across randomized controlled trials only

Direction of relative effect and GRADE rating for targeted outcomes across RCT studies only				
Outcome	**Indicator (if indicator not named, no RCT evidence available)**	**Comment on effect desirable, undesirable, neutral or uncertain)**	**Certainty of the evidence**	**Commentary on intervention effect**
Primary: health outcomes	Likelihood of women breastfeeding	▬	⊕⊕⊖⊖	P4P may have little to no effect on the likelihood of women breastfeeding
Primary: utilization and delivery	Child immunization	▼	⊕⊕⊖⊖	P4P may decrease the likelihood of children being immunized by up to 7.4%
	Child immunization: BCG	▬	⊕⊕⊖⊖	P4P may have little to no effect on utilization of BCG vaccination (3.1%)
	Child immunization: DTP	▬	⊕⊕⊖⊖	P4P may have little to no effect on utilization of DTP vaccination (–1%)
	Child immunization: fully vaccinated	▲	⊕⊕⊖⊖	P4P may have positive effects on the likelihood of children being fully vaccinated (39.8%)
	Probability of any utilization	▲	⊕⊕⊖⊖	P4P may have slight positive effects on probability of care-seeking (8.3%) but overall other effects were inconsistent
	Family planning (% utilizing any)	▬	⊕⊕⊖⊖	P4P may have little to no effect on the utilization of family planning services
	ANC (% utilizing ≥ 1 ANC)	▬	⊕⊕⊖⊖	P4P may have little to no effect on utilization of ANC (–1.5%)
	ANC (% utilizing ≥ 4 ANC)	▬	⊕⊕⊖⊖	P4P may have little to no effect on utilization of ≥ 4 ANC appointments (–0.6%)

Table 10. Sensitivity analyses against comparator: direction of relative effect and GRADE rating for targeted outcomes across randomized controlled trials only *(Continued)*

	ANC (% accessing ANC in first trimester)	▲	⊕⊕⊕⊖	P4P may have a positive effect on timely care initiation by women (range 1–10% initiating care earlier, about 1 month earlier)
	Utilization of curative services in children	▬	⊕⊕⊖⊖	P4P may have little to no effect on utilization of curative visits for children (–3.1%)
	Institutional delivery (utilization rate)	▼	⊕⊕⊖⊖	P4P may have negative effects on the utilization of institutional deliveries (–8.7%)
	PNC (utilization rate)	▼	⊕⊕⊖⊖	P4P may have negative effects on the utilization of PNC (–10%)
Primary: changes in resource use	Equipment availability (composite score)	▲	⊕⊕⊖⊖	P4P may improve equipment availability scores by up to 75%
	Medicine availability (composite score)	▼	⊕⊕⊖⊖	P4P may decrease medicine availability scores by up to 160%
Primary: quality of care	Background and physical assessment (score)	▼	⊕⊕⊖⊖	P4P may decrease the likelihood of providers conducting background and physical assessments by up to 5.4%
	Counselling (score)	▼	⊕⊕⊖⊖	P4P may have negative effects on providers counselling patients appropriately (–40%)
	Immunizations quality (score)	▲	⊕⊕⊖⊖	P4P may have slight positive effects on immunization quality (5.2%)
	Knowledge outcomes (score)	▼	⊕⊕⊕⊖	P4P may have slight negative effects on patient knowledge outcomes (range –5.4% to –2.4%)
	Total quality family planning (score)	▲	⊕⊕⊕⊖	P4P probably has positive effects on the quality of family planning (500%)
	Total quality ANC (score)	▲	⊕⊕⊖⊖	P4P may have positive effects on ANC quality scores (40%)
Secondary: impacts on management or information systems (if not a targeted measure of performance)	Facility and managerial autonomy (score)	▲	⊕⊕⊖⊖	P4P may increase facility and managerial autonomy scores by up to 46%

ANC: antenatal care; *Bacillus Calmette–Guérin*; DTP: diphtheria-tetanus-pertussis; P4P: paying for performance; PNC: postnatal care; RCT: randomized controlled trial.

Direction of effect key

▲: desirable; ▼: non-desirable; ▬: neutral; □: uncertain

Certainty of the evidence key

⊕⊕⊕⊖: moderate; ⊕⊕⊖⊖: low

Table 11. Subgroup analyses: median rank by outcome of scheme designs against control

Findings of subgroup analysis P4P against control

Scheme design	Median rank by outcome[a]								
	P: health outcomes	P: utilization and delivery	P: quality of care	P: changes in resource use	S: provider motivation, satisfaction absenteeism and acceptability	S: patient satisfaction and acceptability (satisfaction scores)	S: impacts on overall financing or resource allocation	S: impacts on management or information systems (if not a targeted measure of performance)	S: equity-consideration: evidence of differential impact on different parts of the population
Capitation and P4P	NA	NA	NA	NA	NA	3	2	NA	NA
Financial and non-financial incentives + decision guide	NA	NA	3	NA	NA	NA	NA	NA	NA
Performance-based contracting or service agreements	NA	1.5	NA	NA	NA	NA	NA	NA	NA
Payment per output	NA	2	2	NA	2	2	NA	NA	NA
Payment per output (quality adjusted)	1	1	1	1.5	2	1	3	1	2
Payment per output (quality and equity adjusted)	2	1.5	1	1.5	1	2	1.5	2	1
Payment per output (quality and patient satisfaction adjusted)	NA	NA	3	NA	NA	1	NA	NA	NA
Payment per output and for target	2	1.5	NA	NA	NA	NA	NA	NA	2
Target payment	1	2.5	2.5	3	3	NA	1	3	2
Results-based aid	NA	1	NA	NA	NA	NA	NA	NA	NA

NA: not applicable; P: primary outcome; P4P: paying for performance; S: secondary outcome.
[a]A lower ranking indicates better performance.

APPENDICES

Appendix 1. Comparison 1: secondary 'Summary of findings' tables 1 to 45

1.1. Targeted health outcomes

Table 1. Burden of disease measures

Health outcomes: burden of disease measures				
Patient group: mothers and children				
Comparison: pure control group (standard practice, status quo, no additional financing)				
Intervention: any type of P4P				
Settings: Argentina				
Outcome	**Impact summary**	**Number of studies**	**Certainty of the evidence**	**Comments**
DALY	P4P may avert 25,401 DALY (95% confidence region 4064 to 46,738) (due to a mix of neonatal mortality and low-birth weight reduction).	1 (Gertler 2014)	**Low** [a]	No RCT reported this outcome for this comparison.

DALY: disability adjusted life-years; P4P: paying for performance.
[a]Critical concerns over three risk of bias criteria.

Table 2. Mortality and incidence of sickness

Health outcomes: mortality and incidence of sickness				
Patient group: mothers and children				
Comparison: pure control group (standard practice, status quo, no additional financing)				
Intervention: any type of P4P				
Settings: Argentina, Brazil, India				
Outcome	**Impact summary**	**Number of studies**	**Certainty of the evidence**	**Comments**
Child mortality (per 1000 children born alive)	P4P may have desirable effects; reduction in mortality ranging from 0.2% to 6.5%.	1 (Viñuela 2015)	**Low** [a]	ITS.
Neonatal mortality (see text)	P4P effects are inconsistent: P4P may have desirable effects and ensure reduction in neonatal mortality in implementing clinics by up to 22%. However, another study identified increase in region of 6.5% across catchment areas of P4P incentivized providers.	2 (Gertler 2014; Mohanan 2017)	**Low** [b]	Sensitivity analysis: RCT showed slight increase in neonatal mortality estimated beta of 0.0079 increase (standard error 0.0067; recalculated effect 6.5%), moderate-certainty evi-

(Continued)

	dence (1 study only, no substantive concerns).
Summary	Low-certainty evidence, suggestive of desirable effects.

ITS: interrupted time series; P4P: paying for performance.
[a]Concerns over risk of bias, one study only.
[b]Concerns over risk of bias.

Table 3. Reproductive maternal and child health outcomes

Health outcomes: RMNCH outcomes				
Patient group: mothers and children				
Comparison: pure control group (standard practice, status quo, no additional financing)				
Intervention: any type of P4P				
Settings: Cameroon, Peru				
Outcome	**Impact summary**	**Number of studies**	**Certainty of the evidence**	**Comments**
Unwanted pregnancy (rate)	Effects of the intervention are uncertain. Noted an increase of 1% in unwanted pregnancies.	1 (Zang 2015)	**Very low** [a]	No RCT reported this outcome for this comparison.
Reported anaemia in children (%)	P4P may have desirable effects, ranging from 2% to 3% reduction in children with anaemia.	1 (Cruzado de la Vega 2017)	**Low** [b]	No RCT reported this outcome for this comparison.
Summary	Overall, inconsistent impacts – relatively small increase in unwanted pregnancies (very low-certainty evidence) but positive impacts on reported anaemia in children (reduction of 2–3% with low certainty).			

P4P: paying for performance; RCT: randomized controlled trial; RMNCH: reproductive, maternal, newborn and child health.
[a]Serious concerns over the risk of bias criteria, one study only).
[b]Concerns over risk of bias, one study only).

Table 4. Tuberculosis treatment success

Health outcomes: tuberculosis treatment success
Patient group: people with tuberculosis
Comparison: pure control group (standard practice, status quo, no additional financing)
Intervention: any type of P4P
Settings: China, Swaziland

(Continued)

Outcome	Impact summary	Number of studies	Certainty of the evidence (GRADE)	Comments
Tuberculosis treatment success rate	P4P may have desirable effects, treatment success in PBF districts increased by 12–20% in comparison to controls.	2 (Kliner 2015; Yao 2008)	**Low** [a]	No RCT reported this outcome for this comparison.
Summary	Limited-certainty evidence; however, indicative of desirable effects.			

P4P: paying for performance; RCT: randomized controlled trial.
[a]Serious concerns over the risk of bias criteria.

1.2. Targeted measures of provider performance

1.2.1. Utilization and delivery

Table 5. Utilization and delivery of HIV-AIDS, malaria and TB services

Utilization and delivery: HIV-AIDS, malaria and TB

Patient group: households and patients exposed to HIV/TB/malaria and seeking care at health facilities

Comparison: pure control group (standard practice, status quo, no additional financing)

Intervention: any type of P4P

Settings: Burundi, Cameroon, China, Democratic Republic of the Congo, Swaziland, Tanzania

Outcome	Impact summary	Number of studies	Certainty of the evidence (GRADE)	Comments
Provision of HIV testing (% of people tested)	P4P may have a desirable effect on the % of people tested for HIV, with relative increases in testing rates of 6–600%.	3 (de Walque 2017; McMahon 2016; Zeng 2018)	**Low** [a]	Indicators assessed differently and over the course of different time points: de Walque 2017 provision of HIV testing from facility registers, Zeng 2018 % of patients receiving test when offered and McMahon 2016 considered different populations (males, females – both pregnant and not); effects consistent at endpoints of studies. No RCT reported this outcome for this comparison.
Provision of ART (% of people receiving)	P4P may have undesirable effects: ART provision in the general population declined by 121%; in pregnant women, effects on utilization and delivery of ART at health centres estimated at 0%, at hospitals – 13%.	2 (de Walque 2017; McMahon 2016)	**Low** [b]	Indicators differed, and there was inconsistency over time in impacts. No RCT reported this outcome for this comparison.

(Continued)

Provision of PMTCT (% of women receiving)	P4P may have desirable effects: the % of women receiving PMTCT ranging from –3.8% to 21%.	2 (Binyaruka 2015; de Walque 2017)	**Low** [c]	Indicators differed: Binyaruka 2015 assessed PMTCT in ANC clients only, de Walque 2017 at facility levels. No RCT reported this outcome for this comparison.
Bednet use (% children and households using bednets)	P4P may have undesirable effects: the effect of P4P on the % of children or households using bednets (ranging from 0% to –7.3%).	2 (Bonfrer 2014a; Zeng 2018)	**Low** [d]	2 distinct criteria, though targeting same concept so no indirectness suspected. Authors of 1 paper noted ceiling effects. No RCT reported this outcome for this comparison.
TB adherence rate (%)	The effects of the intervention on TB adherence were uncertain: we noted inconsistent effects, ranging from a positive effect (–2% reduction in loss to follow-up compared to control) in all patients; to 62% increase in loss to follow-up in smear-positive patients.	2 (Kliner 2015; Yao 2008)	**Very low** [e]	Indicators differed: 1 assessed defaulting in general and the other in smear-positive patients. No RCT reported this outcome for this comparison.
Summary	Overall, low-certainty evidence; P4P may have desirable effects on the proportion of people undergoing HIV testing and PMTCT. However, it may worsen ART delivery.			

ANC: antenatal care; ART: antiretroviral therapy; P4P: paying for performance; PMTCT: prevention of mother-to-child transmission; RCT: randomized controlled trial; TB: tuberculosis.
[a]Most studies with limitations for one or more criteria in risk of bias and indirectness.
[b]Limitations for one or more criteria in risk of bias and inconsistency of indicators.
[c]Limitations for one or more criteria in risk of bias and indirectness.
[d]Critical limitations for one or more criteria in risk of bias.
[e]Critical limitations for one or more criteria risk of bias and indirectness.

Table 6. Utilization and delivery of immunizations

Utilization and delivery: immunizations

Patient group: children and mothers undergoing vaccinations, reports for different age groups

Comparison: pure control group (standard practice, status quo, no additional financing)

Intervention: any type of P4P

Settings: Afghanistan, Argentina, Burundi, Cambodia, Cameroon, Democratic Republic of the Congo, Malawi, Peru, Zambia, Zimbabwe

Outcome	Impact summary	Number of studies	Certainty of the evidence (GRADE)	Comments
Child immunization: % receiving ≥ 1 vaccine	P4P may make little to no difference to outcome: effects in-	2 (Bonfrer 2014a; Huillery 2017)	**Low** [a]	Indicators assessed across different age groups, 1 in children and 1 in infants.

(Continued)

	consistent of small magnitude, ranging from –1 to 1%.			Sensitivity analysis: 1 RCT reported positive effect 1%, moderate-certainty evidence (1 study only).
Children fully vaccinated (%)	Effects of the intervention are uncertain: literature noted effect sizes ranging from –18% to 38.9%.	8 (Bonfrer 2014b; Chansa 2015; Cruzado de la Vega 2017; de Walque 2017; Friedman 2016a; Friedman 2016b; McMahon 2016; Zeng 2018)	**Low** [b]	Exact indicators differed across population groups assessed (age groups) and ITS slope and level change captured within range. Sensitivity analysis: 1 RCT estimated at 16.1%, low-certainty evidence (serious concerns over ≥ 2 risk of bias criteria, 1 study only).
Children receiving BCG (%)	P4P may have small desirable effects: effects ranging from small negative effects (–3.4%) to positive (7%)	8 (Bonfrer 2014a; Bonfrer 2014b; Falisse 2015; Friedman 2016a; Friedman 2016b; Huillery 2017; Zeng 2013, Zeng 2018)	**Low** [a]	Exact indicators differed, summary over indicators in coverage, children aged 12–24 months and different time points. Sensitivity analysis: RCT evidence was 1–7% (2 studies); low-certainty evidence (critical limitations risk of bias and indirectness).
Children receiving DTP (%)	P4P may have undesirable effects, ranging from –19.7% to +9%	6 (Bonfrer 2014b; Falisse 2015; Friedman 2016a;Friedman 2016b; Matsuoka 2014; Zeng 2018)	**Low** [c]	Exact indicators differed, summary drew on data across coverage and % indicators for children of different age groups receiving DTP 1, 2, 3 and ITS slope and level change captured within range. Sensitivity analysis: RCT effect was 6.1%; low-certainty evidence (1 study, concerns over risk of bias).
Children receiving measles vaccination (%)	P4P may have desirable effects, ranging from –5% to 18.7%	6 (Binyaruka 2015; Bonfrer 2014b; de Walque 2017; Friedman 2016a; Friedman 2016b; Matsuoka 2014)	**Low** [c]	Indirectness likely as indicators assessed across different populations and ITS slope and level change captured within range. Sensitivity analysis: RCT effect was –3.6%; low-certainty evidence (1 study, risk of bias concerns).
Children receiving polio vaccination (%)	P4P may have desirable effects, ranging from –7.1% to +23%	7 (Binyaruka 2015; Bonfrer 2014b; de Walque 2017; Falisse 2015; Friedman 2016a; Friedman 2016b; McMahon 2016)	**Low** [a]	Indicators different, ranging from coverage to % receiving specified number of doses. Sensitivity analysis: RCT effect was 21% (low-certainty evidence; concerns over 1 criterion among risk of bias and 1 study only)
Children receiving pentavalent vaccination (%)	P4P may make little to no difference to the outcome, with effects ranging from –5.7% to 3.1%	3 (Binyaruka 2015; Engineer 2016; McMahon 2016)	**Low** [a]	Sensitivity analysis: RCT effect was –5.7%; moderate-certainty evidence (downgraded, as 1 study only).
Mothers receiving immunizations (%)	P4P may have desirable effects, ranging from –2.2% to 65.5%	9 (Binyaruka 2015; Bonfrer 2014a; Bonfrer 2014b; de Walque 2017; Falisse 2015; Gertler 2014; McMahon 2016; Zang 2015; Zeng 2018)	**Low** [d]	Indicators were substantively different, ranging from coverage rates, to % of women vaccinated at facilities, to % of women giving birth who had received vaccine.

(Continued)

	No RCT reported this outcome for this comparison.
Summary	Effects on overarching likelihood of children being vaccinated appeared inconsistent; some vaccinations such as polio, measles and BCG may be positively affected, while others such as DTP may be negatively affected. Low-certainty evidence.

BCG: *Bacillus Calmette–Guérin*; DTP: diphtheria-tetanus-pertussis; ITS: interrupted time series; P4P: paying for performance; RCT: randomized controlled trial.

[a]Limitations for one or more criteria in risk of bias and indirectness.

[b]Limitations for one or more criteria in risk of bias and indirectness, upgraded for appreciable benefit.

[c]Limitations for one or more criteria in risk of bias and indirectness, one study reanalyzed).

[d]Critical limitations for one or more criteria in risk of bias and noted indirectness, +1 for potential of large effect, –1 for suspected publication bias)

Table 7. General service utilization and delivery (any, curative, outpatient)

Utilization and delivery: general

Patient group: overall patients utilizing clinics

Comparison: pure control group (standard practice, status quo, no additional financing)

Intervention: any type of P4P

Settings: Burundi, Cameroon, China, Democratic Republic of the Congo, Zambia

Outcome	Impact summary	Number of studies	Certainty of the evidence (GRADE)	Comments
Probability of any utilization (% rate)	P4P may make little to no difference to the outcome, effects noted were consistently positive ranging from 2% to 4.2%.	2 (Bonfrer 2014a; Friedman 2016a)	**Low** [a]	Sensitivity analysis: RCT suggested impacts around 4.2%; low-certainty evidence (concerns over risk of bias criteria, 1 study only).
Frequency of curative utilization (% rate)	P4P may have desirable effects: literature noted 83% increase in utilization.	1 (Zeng 2018)	**Low** [b]	No RCT reported this outcome for this comparison.
Frequency of outpatient utilization (% rate)	P4P may have desirable effects, ranging from –3% to 15%	3 (Chansa 2015; Falisse 2015; Zang 2015)	**Low** [a]	ITS slope and level change captured within range. No RCT reported this outcome for this comparison.
Frequency of all visits (number of visits)	P4P may have little to no impact on the outcome of interest, with effects in number of total visits in ranging from 0.8% to 3.6%	1 (Powell-Jackson 2014)	**Low** [c]	No RCT reported this outcome for this comparison.
Summary	P4P may have desirable effects of curative and outpatient utilization; however, appears to make little to no different to utilization or frequency of visits overall. Low-certainty evidence.			

ITS: interrupted time series; P4P: paying for performance; RCT: randomized controlled trial.
[a]Critical limitations for two risk of bias criteria.
[b]Concerns over two or more risk of bias criteria and suspected publication bias, one study only, upgraded for large effect.
[c]Critical concerns over one risk of bias criterion, one study only.

Table 8. Utilization and delivery of family planning services

Utilization and delivery: RMNCH – family planning

Patient group: women of reproductive age (15–49 years) in study districts

Comparison: pure control group (standard practice, status quo, no additional financing)

Intervention: any type of P4P

Settings: Burundi, Cameroon, Democratic Republic of the Congo, Zambia, Zimbabwe

Outcome	Impact summary	Number of studies	Certainty of the evidence	Comments
Any family planning (% people using any method)	Effects of the intervention were uncertain: inconsistent effects on the utilization rate of any contraceptives, ranging from –6.37% to 6.7% overall.	5 (Binyaruka 2015; Friedman 2016a; Friedman 2016b; Huillery 2017; Zeng 2018)	**Low** [a]	Sensitivity analysis: 2 RCTs reported estimates suggestive of no or negative impacts ranging from –6.3% to 0%; low-certainty evidence (concerns over risk of bias, 2 studies).
Modern family planning utilization (% women utilizing modern methods)	Overarchingly, effects of the intervention are uncertain. P4P may have positive effects on the coverage of modern family planning services, with effects ranging from 3.6% to 19.5%. However, effects of the intervention on facility utilization rates are uncertain: effects ranging from –20.5% to 36%.	7 (Bonfrer 2014a; de Walque 2017; Falisse 2015; Friedman 2016a; Friedman 2016b; Zang 2015; Zeng 2018)	**Low** [a]	Sensitivity analysis: RCT estimated relative effect of 0.2% in household survey; low-certainty evidence (1 study, risk of bias concerns).
Family planning (% of services delivered)	P4P probably improves the delivery of family planning services, with effects ranging from 10% to 300% increase in delivery of family planning services at health facility.	2 (de Walque 2017; Friedman 2016b)	**Moderate** [b]	No RCT reported this outcome for this comparison.
Summary	Moderate-certainty evidence that delivery of family planning services is increasing, consistent with the positive effects noted in relation to utilization of modern family planning methods among women (low-certainty evidence). Low-certainty evidence on the use of any family planning method, however.			

P4P: paying for performance; RCT: randomized controlled trial; RMNCH: reproductive, maternal, newborn and child health.
[a]Critical limitations over two or more risk of bias criteria.
[b]Critical risk of bias limitation on one criterion, study design plus large effect in large sample size.

Table 9. Utilization and delivery of antenatal care

Utilization and delivery: RMNCH – aNC

(Continued)

Patient group: pregnant women enrolled in study within specified time frames

Comparison: pure control group (standard practice, status quo, no additional financing)

Intervention: any type of P4P

Settings: Afghanistan, Benin, Burkina Faso, Burundi, Cambodia, Cameroon, Democratic Republic of the Congo, El-Salvador, India, Malawi, Peru, Rwanda, Zambia, Zimbabwe

Outcomes	Impact summary	Number of studies	Certainty of the evidence (GRADE)	Comments
ANC (% of women utilizing ANC)	P4P may have desirable effects, ranging from –4.9% to 15%.	5 (Chansa 2015; de Walque 2017; Friedman 2016b; Mohanan 2017; Zeng 2018)	**Low** [a]	Indicators overall consistent. ITS slope and level change captured within range. Sensitivity analysis: RCT estimates 4%, low-certainty evidence (concerns over risk of bias limited information and 1 study only).
Total number of ANC visits	Effects of the intervention are uncertain: relative effects ranging from –16.4% to 37.6%.	7 (Bernal 2018; Friedman 2016a; Friedman 2016b; Gertler 2014; Huillery 2017; Lagarde 2015; Matsuoka 2014)	**Low** [a]	Some differences in indicator specifications and populations data collected in. ITS slope and level change captured within range. Sensitivity analysis: RCT estimates ranging from –35% to –4.6%; low-certainty evidence (critical limitations risk of bias criteria for 1 study, 2 studies overall).
≥ 1 ANC (utilization rates)	P4P may have desirable effects, ranging from –1.5% to 26.9% (median 1.1%, interquartile range 3).	9 (Bernal 2018; Bonfrer 2014a; Bonfrer 2014b; Engineer 2016; Falisse 2015; Friedman 2016a; Friedman 2016b; Huillery 2017; Matsuoka 2014)	**Low** [b]	Differences in specification of indicators, though not substantive. ITS slope and level change captured within range. Sensitivity analysis: 3 RCTs suggested effects ranging from –10% to –1.5%; moderate-certainty evidence (limitations for risk of bias criteria).
≥ 2 ANC (utilization rates)	P4P may make little to no difference on utilization of ≥ 2 ANC visits (effects ranging from –1.1% to 1.1%).	3 (de Walque 2017; Matsuoka 2014; Zang 2015)	**Low** [c]	No RCT reported this outcome for this comparison.
≥ 4 ANC (utilization rates)	P4P may have desirable effects, ranging from –5.4% to 27% overall (though short-term impacts estimated to be higher in some cases).	4 (Friedman 2016a; Matsuoka 2014; McMahon 2016; Steenland 2017)	**Low** [a]	ITS slope and level change captured within range. Sensitivity analysis: RCT estimate was –5.4%; low-certainty evidence (concerns over risk of bias, 1 study only).
ANC from qualified provider (utilization rates)	P4P may make little to no difference on utilization of ANC from a qualified provider, effects ranging from 2.5% to 4.7%.	2 (Friedman 2016a; Friedman 2016b)	**Low** [a]	Sensitivity analysis: RCT estimated 4.7%; low-certainty evidence (concerns over risk of bias, 1 study only).

(Continued)

Delivery of iron supplementation during ANC (% women receiving)	P4P may have undesirable effects, differing over the time-span of assessment and by facility type; effects ranging from –109% to 6%.	2 (Cruzado de la Vega 2017; McMahon 2016)	**Low** [b]	No RCT reported this outcome for this comparison.
Women accessing care in first trimester (% women receiving)	P4P may have desirable effects, ranging from –0.1% to 37.7%	4 (Bernal 2018; Friedman 2016b; McMahon 2016; Steenland 2017)	**Low** [a]	No RCT reported this outcome for this comparison.
Summary	Low-certainty evidence overall; however, it appears P4P may have positive effects on accessing ANC in general.			

ANC: antenatal care; ITS: interrupted time series; P4P: paying for performance; RCT: randomized controlled trial; RMNCH: reproductive, maternal, newborn and child health.
[a]Critical limitations over two or more risk of bias criteria.
[b]Critical limitations over two or more risk of bias criteria and indirectness.
[c]Serious limitations over one criteria and lack of information in ITS.

Table 10. Utilization and delivery of institutional deliveries

Utilization and delivery: RMNCH – institutional deliveries

Patient group: women giving birth in study periods

Comparison: pure control group (standard practice, status quo, no additional financing)

Intervention: any type of P4P

Settings: Afghanistan, Burkina Faso, Burundi, Cambodia, Cameroon, Democratic Republic of the Congo, India, Malawi, Tanzania, Zambia, Zimbabwe

Outcome	Impact summary	Number of studies	Certainty of the evidence	Comments
Institutional delivery utilization (utilization rate)	Effects of the intervention are uncertain ranging from –3% to 27% (median 9.45%, interquartile range 17.5%); most studies reported positive effects on utilization or coverage rates overall.	13 (Binyaruka 2015; Bonfrer 2014a; Bonfrer 2014b; Chansa 2015; Falisse 2015; Friedman 2016a; Friedman 2016b; Huillery 2017; Ir 2015; Mohanan 2017; Steenland 2017; Zang 2015; Zeng 2018)	**Very low** [a]	Indicators specified differently, which introduces issues with interpretation. ITS slope and level change captured within range. Sensitivity analysis: 3 RCTs provided estimates that are inconsistent but P4P may have desirable effects, ranging from –3% to 18.1%; moderate-certainty evidence (concerns over risk of bias).
Institutional delivery: caesarean section (utilization rate)	P4P may have desirable effects, ranging from 2% to 146%.	2 (Friedman 2016b; Huillery 2017)	**Low** [b]	Sensitivity analysis: RCT estimate is 2%; moderate-certainty evidence (1 study only).

(Continued)

Institutional delivery: skilled attendance (utilization rate)	P4P may have desirable effects, ranging from –5% to 42%.	6 (de Walque 2017; Engineer 2016; Friedman 2016a; Friedman 2016b; McMahon 2016; Zeng 2018)	**Low** [c]	Sensitivity analysis: effects positive across the 2 RCTs (ranging from 4% to 16.2%); low-certainty evidence (risk of bias concerns).
Summary	Very low to low certainty in results surrounding overall utilization of institutional deliveries and skilled attendance at these, suggestive of potential desirable effects on caesarean section delivery and skilled attendance at deliveries.			

ANC: antenatal care; ITS: interrupted time series; P4P: paying for performance; RCT: randomized controlled trial; RMNCH: reproductive, maternal, newborn and child health.
[a]Serious concerns over risk of bias, indirectness and suspected publication bias.
[b]Serious concerns over risk of bias criteria.
[c]Concerns over more than two risk of bias criteria.

Table 11. Utilization and delivery of postnatal care

Utilization and delivery: RMNCH – postnatal care				
Patient group: women who have given birth in enrolled facilities				
Comparison: pure control group (standard practice, status quo, no additional financing)				
Intervention: any type of P4P				
Settings: Afghanistan, Burkina Faso, Democratic Republic of the Congo, India, Malawi, Tanzania, Zambia, Zimbabwe				
Outcome	**Impact summary**	**Number of studies**	**Certainty of the evidence**	**Comments**
Postnatal care: overall utilization rate	P4P may have desirable effects, ranging from –2.88% to 25% overall.	5 (Friedman 2016a; Friedman 2016b; Huillery 2017; Mohanan 2017; Steenland 2017)	**Low** [a]	Sensitivity analysis: 3 studies were RCTs with estimates ranging from –2% to 10.8%; moderate-certainty evidence (serious concerns over 2 risk of bias criteria in 1 study).
Postnatal care: proportion of women receiving skilled attendance	P4P may have desirable effects, ranging from 15.79% to 26.4%.	2 (Friedman 2016a; Friedman 2016b)	**Low** [a]	Sensitivity analysis: RCT estimate was 15.79%; low-certainty evidence (risk of bias concerns and 1 study only).
Postnatal care: proportion of women with timely access	P4P may have desirable effects, ranging from –3% to 25%.	4 (Binyaruka 2015; Engineer 2016; Friedman 2016b; McMahon 2016)	**Low** [b]	Comparability of indicators compromised; some estimate at facility level and other household and for different time frames. Sensitivity analysis: RCT results suggestive of no impact (–0.8%); moderate-certainty evidence (1 study only).
Summary	Low-certainty evidence overall; however, indicative of potential positive effects of P4P on postnatal care.			

P4P: paying for performance; RCT: randomized controlled trial; RMNCH: reproductive, maternal, newborn and child health.

[a]Serious concerns over risk of bias criteria.
[b]Serious concerns over risk of bias criteria and indirectness.

Table 12. Utilization and delivery of childcare

Utilization and delivery: childcare				
Patient group: households with children in study catchment areas **Comparison:** pure control group (standard practice, status quo, no additional financing) **Intervention:** any type of P4P **Settings:** Democratic Republic of the Congo, Haiti, Malawi, Zambia				
Outcome	**Impact summary**	**Number of studies**	**Certainty of the evidence**	**Comments**
Utilization rate of consultations in children	Effects of the intervention are uncertain: consultation rates for children aged < 1 year increasing by 9.4%, and for those aged 1–4 years by 5.7%.	1 (Zeng 2013)	**Very low** [a]	No RCT reported this outcome for this comparison.
Utilization rate of curative consultations in children	P4P may have slight undesirable effects: estimated at 10.9% reduction in utilization.	1 (Friedman 2016a)	**Low** [b]	RCT.
Vitamin A supplementation in children (rate)	P4P may have desirable effects: consistently positive impacts on children receiving vitamin A supplementation; impact on rates ranging between 50% and 155%.	2 (McMahon 2016; Zeng 2018)	**Low** [b]	Indicators not directly comparable, given different estimation (by facility or population). No RCT reported this outcome for this comparison.
Summary	Overall inconsistent effects: evidence of desirable impacts for vitamin A supplementation, however, uncertain and undesirable effects for utilization of child consultations.			

P4P: paying for performance; RCT: randomized controlled trial.
[a]Serious concerns over two or more risk of bias criteria, one study only.
[b]Serious concerns over two or more risk of bias criteria.

1.2.2. Quality of care

Table 13. Adherence to procedures and guidelines and adverse drug reaction management

Quality of care: adherence to procedures and guidelines and adverse drug reaction management
Patient group: predominantly mothers and children seeking care or living in the districts where assessments occurred **Comparison:** pure control group (standard practice, status quo, no additional financing) **Intervention:** any type of P4P

(Continued)

Settings: Afghanistan, Benin, Burundi, Zambia, Zimbabwe, Multiple

Outcome	Impact summary	Number of studies	Certainty of the evidence	Comments
Background and physical assessment (scores general, across ANC, PNC, childcare and for other consultations)	Effects of the intervention are uncertain, ranging from –17% to 23% change in scores.	7 (Bonfrer 2014b; Das 2017; Duysburgh 2016; Engineer 2016; Friedman 2016a; Friedman 2016b; Lagarde 2015)	**Very low** [a]	Substantial variation in specified indicators, calculated means across a range of measures, which may not be directly comparable but used same underlying concept. Sensitivity analysis: 2 RCTs suggest impacts range from –17% to 4%, low-certainty evidence (serious concerns over risk of bias).
Correct patient management by healthcare providers (scores in relation to ANC, childcare and PNC)	Effects of the intervention are uncertain: Engineer 2016 estimated difference to be minor at 0.8%, Friedman 2016b observed differences across diverse items ranging from –75% (for management of children with anaemia) to 225% for management of a child with HIV; Duysburgh 2016 noted similar differences from –12% to 26% change in scores.	3 (Duysburgh 2016; Engineer 2016; Friedman 2016b)	**Very low** [a]	Sensitivity analysis: RCT estimated impact at 0.6%, moderate-certainty evidence (1 study only, no other concerns).
Patient counselling (scores on ANC- and PNC-related counselling)	Effects of the intervention are uncertain, ranging from –37% to 17.25% change in scores, depending on the service and type of patient counselling conducted. High levels of heterogeneity in the way indicators were specified.	6 (Das 2017; Duysburgh 2016; Engineer 2016; Friedman 2016a; Friedman 2016b; Lagarde 2015)	**Very low** [a]	Sensitivity analysis: RCT estimates suggest impacts between –37% and 6%, low-certainty evidence (serious concerns over risk of bias, indirectness).
Quality of care in delivery of immunizations in ANC (%)	P4P may have desirable effects, ranging from 2.25% to 14% change in scores overall.	2 (Friedman 2016a; Friedman 2016b)	**Low** [b]	Sensitivity analysis: RCT estimated 2.25% on average; low-certainty evidence (serious risk of bias concerns, 1 study only).
Women in ANC given or prescribed folic acid or iron or both (%)	P4P may have desirable effects, ranging from 5.5% to 19.2% change in scores.	2 (Friedman 2016a; Friedman 2016b)	**Low** [b]	Sensitivity analysis: RCT estimated 5.5%, low-certainty evidence (serious risk of bias concerns, 1 study only).
Prescription quality of care (index score)	P4P may have desirable effects, effects on scores in PBF groups estimated at 7% change in score compared to control.	1 (Das 2017)	**Low** [b]	No RCT reported this outcome for this comparison.
Summary	Very low to limited certainty in results across this area – indictors on quality of care for ANC and prescriptions responded positively, across 3 other areas effects were inconsistent though to be expected given indirectness.			

ANC: antenatal care; P4P: paying for performance; PBF: performance-based funding; PNC: postnatal care; RCT: randomized controlled trial.

[a]Serious concerns over the risk of bias and indirectness.
[b]Concerns over risk of bias criteria.

Table 14. Human resource skills and responsiveness

Quality of care: human resource inputs				
Patient group: predominantly patients using RMCH and curative care services at targeted health facilities				
Comparison: pure control group (standard practice, status quo, no additional financing)				
Intervention: any type of P4P				
Settings: Afghanistan, Benin, Burundi				
Outcome	**Impact summary**	**Number of studies**	**Certainty of the evidence**	**Comments**
Staff knowledge and skills (score)	P4P may make little to no difference, effect estimated at 0.2% difference in knowledge scores.	1 (Engineer 2016)	**Low** [a]	RCT.
Staff responsiveness (score)	P4P may have desirable effects, ranging from –2% to 49%	2 (Bonfrer 2014a, Lagarde 2015)	**Very low** [b]	No RCT reported this outcome for this comparison.
Summary	Overall very low- to low-certainty evidence; however, suggestive of desirable effects in relation to staff responsiveness.			

P4P: paying for performance; RCT: randomized controlled trial; RMCH: reproductive, maternal and child health.
[a]No concerns over risk of bias but imprecision likely, one study only.
[b]Serious concerns over risk of bias criteria and indirectness.

Table 15. Patient knowledge outcomes and perceptions

Quality of care: patient outcomes and perceptions and contact and waiting time				
Patient group: predominantly women and households accessing care in facilities included in studies				
Comparison: pure control group (standard practice, status quo, no additional financing)				
Intervention: any type of P4P				
Settings: Afghanistan, Benin, Burundi, Tanzania, Zambia				
Outcome	**Impact summary**	**Number of studies**	**Certainty of the evidence**	**Comments**
Patient knowledge (score)	P4P may have desirable effects, ranging from –3% to 116%; however, majority was positive. Mean across area was 37%.	1 (Friedman 2016a)	**Low** [a]	RCT.
Contact time	P4P may make little to no difference to indicator, effects ranging from –5.1% to 5.9%.	3 (Binyaruka 2015; Engineer 2016; Lagarde 2015)	**Low** [b]	Sensitivity analysis: RCT estimates at 2.5%; moderate-certainty

(Continued)

				evidence (1 study only)
Waiting time	P4P may have undesirable effects, as increases in dissatisfaction with waiting times ranging from 10.8% to 12%.	2 (Binyaruka 2015; Bonfrer 2014a)	**Low** [c]	No RCT reported this outcome for this comparison.
Summary	Low-certainty evidence overall; however, indicative of desirable effects on patient knowledge, limited to negative effects on contact and waiting time.			

P4P: paying for performance; RCT: randomized controlled trial.
[a]Concerns over risk of bias criteria, one study only.
[b]Serious concerns over risk of bias and indirectness.
[c]Serious concerns over risk of bias.

Table 16. Quality scores

Quality of care: quality composite scores (assessed via a mix of direct observation and patient exit interviews)

Patient group: mixed groups – varied according to study and scheme

Comparison: pure control group (standard practice, status quo, no additional financing)

Intervention: any type of P4P

Settings: Afghanistan, Burundi, Cameroon, Philippines, Tanzania, Zambia, Zimbabwe, Multiple

Outcome	Impact summary	Number of studies	Certainty of the evidence	Comments
Overall composite quality of care score	P4P may have desirable effects, ranging from –4% to 20% change in scores in most studies, 1 study noted outlier of 15 times increase.	8 (Bonfrer 2014a; Das 2017; de Walque 2017; Engineer 2016; Friedman 2016b; Peabody 2011a; Quimbo 2016; Zang 2015)	**Low** [a]	Sensitivity analysis: 2 RCTs suggested impacts of 1.6% to 4%; moderate-certainty evidence (some concerns over risk of bias).
Quality family planning (score)	P4P may improve the quality of family planning services (range 9–32% change in score increased in quality of family planning scores).	3 (Rudasingwa 2014; Zang 2015, Friedman 2016a)	**Low** [b]	No RCT reported this outcome for this comparison.
Quality of ANC (score)	Effects of the intervention are uncertain, ranging from –11.3% to 27.3% change in scores.	6 (Binyaruka 2015; de Walque 2017; Duysburgh 2016; Friedman 2016a; Friedman 2016b; Zang 2015)	**Low** [c]	Sensitivity analysis: RCT estimated increase of 4%; low-certainty evidence (1 study, concerns over risk of bias).
Quality maternity care (score)	P4P may have desirable effects, ranging from 6.4% to 31% change in scores.	2 (Friedman 2016b; Zang 2015)	**Low** [b]	No RCT reported this outcome for this comparison.

(Continued)

Quality of child health care (score)	P4P probably improves quality of child healthcare scores, relative impact on scores ranging from 6.1% to 300% change in scores.	3 (Duysburgh 2016; Friedman 2016a; Friedman 2016b)	**Moderate** [d]	Sensitivity analysis: RCT suggested 300%; moderate-certainty evidence (downgraded 2 levels for risk of bias concerns and 1 study, and upgraded 1 level for effect).
Quality of outpatient services (score)	Effects of the intervention are uncertain, relative effect was 23% change in score.	1 (Zang 2015)	**Very low** [e]	No RCT reported this outcome for this comparison.
Quality of medicine and equipment (score)	P4P probably improves quality of medicine and equipment scores, effects ranging from 2.7% to 220% change in scores overall.	5 (Bonfrer 2014a; Das 2017; Duysburgh 2016; Friedman 2016a; Friedman 2016b)	**Moderate** [f]	Sensitivity analysis: RCT suggested 220%; moderate-certainty evidence (downgraded 2 levels for risk of bias concerns and 1 study, and upgraded 1 level for effect).
Quality by department and/or service (score)	P4P probably improves quality of care scores by department, relative effects vary from increases of 39% to 15-fold change in score increases in the indices across outpatient care, delivery room, referral services, infection prevention and control, and waste management.	3 (Das 2017; Friedman 2016a; Friedman 2016b)	**Moderate** [f]	Sensitivity analysis: RCT impact suggested 15-fold increase; moderate-certainty evidence (downgraded 2 levels for risk of bias concerns and 1 study, and upgraded 1 level for effect).
Summary	Family planning, maternal and child health, medicine and equipment, and department quality appeared to respond positively; however, ANC effects were mixed. Overall, moderate-certainty evidence for few indicators only.			

ANC: antenatal care; P4P: paying for performance; RCT: randomized controlled trial.
[a]Serious concerns over risk of bias, indirectness and potential publication bias, upgraded for large effect.
[b]Serious concerns over risk of bias criteria.
[c]Serious concerns over risk of bias criteria and indirectness.
[d]Serious concerns over risk of bias but upgraded for large effect.
[e]Serious concerns over risk of bias criteria, one study only.
[f]Serious concerns over risk of bias and indirectness, but upgraded for large effect.

1.3. Targeted changes in resource use

Table 17. Human resource inputs

Changes in resource use: human resources				
Patient group: schemes targeting maternal and child health				
Comparison: pure control group (standard practice, status quo, no additional financing)				
Intervention: any type of P4P				
Settings: Cameroon, El Salvador				
Outcome	**Impact summary**	**Number of studies**	**Certainty of the evidence**	**Comments**

(Continued)

Human resource availability	P4P probably has desirable effects on nurse availability, about 1–2 extra nurses in absolute numbers, increasing proportion of qualified staff by 19–44%.	2 (de Walque 2017; Zang 2015)	**Moderate** [a]	No RCT reported this outcome for this comparison.
Curative health visits per healthcare professional	Effects of the intervention are uncertain, there was an estimated decrease of 66%.	1 (Bernal 2018)	**Very low** [b]	No RCT reported this outcome for this comparison.
Summary	Human resource availability appears to increase if targeted (moderate-certainty evidence); limited certainty in estimates on curative health visits/health professional ratio.			

P4P: paying for performance; RCT: randomized controlled trial.
[a]Some limitations for risk of bias across one study and imprecision.
[b]Serious limitations for risk of bias and for imprecision, one study only.

Table 18. Medicine and equipment availability

Changes in resource use: medicine and equipment				
Patient group: schemes targeting maternal and child health predominantly				
Comparison: pure control group (standard practice, status quo, no additional financing)				
Intervention: any type of P4P				
Settings: Afghanistan, Cameroon, Tanzania, Zambia, Zimbabwe				
Outcome	**Impact summary**	**Number of studies**	**Certainty of the evidence**	**Comments**
Equipment availability (index)	P4P may have desirable effects, ranging in magnitude from about 3–308%.	4 (Binyaruka 2017; de Walque 2017; Friedman 2016a; Friedman 2016b)	**Low** [a]	Sensitivity analysis: RCT estimate was 308%; low-certainty evidence (downgraded 2 level for risk of bias concerns).
Equipment functionality (index)	P4P may have little to no impact on the indicator, slight positive effect (range 1.4%) difference in equipment functionality compared to control.	1 (Engineer 2016)	**Low** [b]	RCT.
Infrastructure functionality (index)	P4P may have desirable effects, ranging from 4.5% to 345%.	3 (Engineer 2016; Friedman 2016a; Friedman 2016b)	**Low** [a]	Sensitivity analysis: 2 RCTs suggested impacts between 4.5% and 345%; low-certainty evidence (downgraded due to risk of bias).
Medicine availability (index)	P4P may have desirable effects, ranging from 4.3 to 977%.	4 (de Walque 2017; Engineer 2016; Friedman 2016a; Friedman 2016b; Zang 2015)	**Low** [a]	Sensitivity analysis: 2 RCT provide estimates from 0.6% to 200%; low-certainty evidence (downgraded due to risk of bias).

(Continued)

Vaccine availability (index)	Effects of the intervention are uncertain, ranging from –89% to 24.7%.	4 (Binyaruka 2017; de Walque 2017; Friedman 2016a; Friedman 2016b)	**Low** [c]	Sensitivity analysis: RCT estimate was 21.95%; low-certainty evidence (risk of bias concerns, 1 study).
Stockout equipment	P4P may have desirable effects, reduction of stockout estimated at 33%.	1 (Binyaruka 2017)	**Low** [d]	No RCT reported this outcome for this comparison.
Stockout vaccines	P4P may have desirable effects, reduction of stockouts estimated at 47.4%.	1 (Binyaruka 2017)	**Low** [d]	No RCT reported this outcome for this comparison.
Summary	Low-certainty evidence; however, generally suggestive of desirable effects.			

P4P: paying for performance; RCT: randomized controlled trial.
[a]Serious concerns over risk of bias and imprecision.
[b]Concern over imprecision, one study only.
[c]Serious concerns over risk of bias and imprecision, indirectness.
[d]Serious concerns over risk of bias and imprecision, indirectness, one study only.

1.4. Targeted secondary outcomes

Table 19. Provider motivation, satisfaction, absenteeism and acceptability

Provider motivation, satisfaction, absenteeism and acceptability

Participants: healthcare workers at the facilities where studies conducted

Comparison: pure control group (standard practice, status quo, no additional financing)

Intervention: any type of P4P

Settings: Afghanistan, Benin

Outcome	Impact summary	Number of studies	Certainty of the evidence	Comments
Provider absenteeism (%)	P4P may have little to no effect on indicator, estimated range of 0.7–2% increases in absenteeism rate.	1 (Lagarde 2015)	**Low** [a]	No RCT reported this outcome for this comparison.
Provider motivation (score)	P4P probably has little to no effect on indicator.	1 (Engineer 2016)	**Moderate** [b]	RCT.
Provider satisfaction (score)	P4P probably has little to no effect on indicator.	1 (Engineer 2016)	**Moderate** [b]	RCT.
Summary	Low- to moderate-certainty evidence, relative effects suggestive of neutral effects overall.			

P4P: paying for performance; RCT: randomized controlled trial.
[a]Serious concerns over risk of bias and imprecision, one study only.
[b]One study only, no other concerns.

Table 20. Patient satisfaction and acceptability

Patient satisfaction and acceptability (satisfaction scores)				
Patient group: patients that had accessed ANC, child or curative care at study facilities **Comparison:** pure control group (standard practice, status quo, no additional financing) **Intervention:** any type of P4P **Settings:** Afghanistan, Benin, Cameroon, China, Tanzania, Zimbabwe				
Outcome	**Impact summary**	**Number of studies**	**Certainty of the evidence**	**Comments**
Patient satisfaction with facility cleanliness (score)	P4P may have desirable effects, ranging from 19.5% to 30%.	2 (Das 2017; de Walque 2017)	**Low** [a]	No RCT reported this outcome for this comparison.
Patient satisfaction with contact time (score)	Effects of the intervention are uncertain: positive impacts (about 2.25%) in satisfaction score with consultation times.	1 (Das 2017)	**Very low** [b]	No RCT reported this outcome for this comparison.
Patient satisfaction with opening hours (score)	P4P may have desirable effects, ranging from under 1–17.11% (for the opening hours for ANC consultations).	2 (Das 2017; de Walque 2017)	**Low** [a]	No RCT reported this outcome for this comparison.
Patient satisfaction with waiting time (score)	Effects of the intervention are uncertain, positive effect estimated at 32%.	1 (Das 2017)	**Very low** [b]	No RCT reported this outcome for this comparison.
Patient satisfaction with privacy (score)	P4P may have desirable effects, ranging from 4.6% to 44.6%.	2 (Das 2017; de Walque 2017)	**Low** [a]	No RCT reported this outcome for this comparison.
Overall patient satisfaction with quality of care (score)	P4P may have little to no effect (estimated at 0.4%).	1 (Engineer 2016)	**Low** [b]	RCT
Patient satisfaction with staff: communication (score)	P4P may have little to no effect on the indicator: mean effects ranging from 0.2% to 5.3% in comparison to control (politeness of staff during ANC and childcare and communication during delivery).	2 (Binyaruka 2015; Lagarde 2015)	**Low** [a]	No RCT reported this outcome for this comparison.
Patient satisfaction with staff: attitude (score)	P4P may have desirable effects, ranging from 3.3% to 13.3% (for ANC and curative care).	2 (Das 2017; Lagarde 2015)	**Low** [a]	No RCT reported this outcome for this comparison.
Overall satisfaction (score)	P4P may have desirable effects, ranging from –0.05 to absolute increase in scores in range of 0.6 standard deviations.	2 (Das 2017; Yip 2014)	**Low** [a]	Sensitivity analysis: RCT estimated between negative 0.03% and 0.1%, both crossing no effect line; moderate-certainty evidence (1 study only, no other concerns).

(Continued)

Summary	Overall, low-certainty evidence; however, evidence suggestive of some desirable effects.

ANC: antenatal care; P4P: paying for performance; RCT: randomized controlled trial.
[a]Concerns over risk of bias criteria.
[b]Concerns over risk of bias criteria, one study only.

Table 21. Impacts on overall financing and resource allocation

Impacts on overall financing or resource allocation				
Patient group: households accessing care (except for remuneration, for which healthcare workers were reporting)				
Comparison: pure control group (standard practice, status quo, no additional financing)				
Intervention: any type of PBF				
Settings: China				
Outcome	**Impact summary**	**Number of studies**	**Certainty of the evidence**	**Comments**
Expenditure on medicine and equipment	P4P may have little to no effect on drug expenditures for insured patients rising by 2.5%, dropping for uninsured by 0.9%.	1 (Wu 2014)	**Low** [a]	ITS. No RCT reported this outcome for this comparison.
Summary	Low-certainty evidence; however, suggestive of slight desirable effects.			

ITS: interrupted time series; PBF: performance-based funding; RCT: randomized controlled study.
[a]Some limited concerns over generalizability and risk of bias, one study only.

Table 22. Management or information systems

Impacts on management or information systems				
Patient group: healthcare workers and management staff in PBF and control facilities				
Comparison: pure control group (standard practice, status quo, no additional financing)				
Intervention: any type of PBF				
Settings: Afghanistan, Zambia				
Outcome	**Impact summary**	**Number of studies**	**Certainty of the evidence**	**Comments**
Facility or managerial autonomy (index)	P4P may have desirable effects, estimate on autonomy index 136%.	1 (Friedman 2016a)	**Low** [a]	RCT.
Facility governance (index)	P4P may have little to no effect on the indicator, intervention group had lower mean than control group, difference of 0.7%.	1 (Engineer 2016)	**Low** [b]	RCT.

(Continued)

Quality of management (index)	P4P may have little to no effect on the indicator, impacts on management functionality index was positive, about 0.6%.	1 (Engineer 2016)	**Low** [b]	RCT.
Summary	Low-certainty evidence; however, suggestive of desirable effects on managerial autonomy, little to no effect on governance and quality of management.			

P4P: paying for performance; PBF: performance-based funding; RCT: randomized controlled study.
[a]Downgraded for risk of bias, imprecision, one study only, upgraded for large effects.
[b]Downgraded for imprecision, one study only.

Table 23. Equity impacts

Equity-consideration: evidence of differential impact on different parts of the population

Patient group: same as for main utilization outcomes; primarily mothers and children in PBF and control districts

Comparison: pure control group (standard practice, status quo, no additional financing)

Intervention: any type of PBF

Settings: Peru, Zimbabwe

Outcome	Impact summary	Number of studies	Certainty of the evidence	Comments
Equity of child immunization delivery (wealth related)	P4P may have desirable effects that are pro poor, ranging from increasing utilization of immunizations by 4.5% to 42% among the poorest groups in comparison to wealthiest.	2 (Cruzado de la Vega 2017; Friedman 2016b)	**Low** [a]	No RCT reported this outcome for this comparison.
Equity in ANC delivery (wealth related)	P4P may have undesirable effects: impacts suggest households below median wealth/poorest households benefited less in ANC utilization compared to those of median wealth.	2 (Cruzado de la Vega 2017; Friedman 2016b)	**Low** [a]	No RCT reported this outcome for this comparison.
Equity in institutional delivery (wealth related)	P4P may have little to no effect, estimate suggestive of slight pro-poor effect (< 2% compared to above median wealth group).	1 (Friedman 2016b)	**Low** [b]	No RCT reported this outcome for this comparison.
Equity in institutional delivery (by educational status of mother)	P4P may have little to no effect: 0.3% more institutional deliveries among mothers with primary education or less compared to mothers with secondary education or above.	1 (Friedman 2016b)	**Low** [b]	No RCT reported this outcome for this comparison.
Summary	Mixed picture in relation to equity effects overall; however, some desirable effects in relation to child immunization, undesirable in relation to ANC.			

ANC: antenatal care; P4P: paying for performance; PBF: performance-based funding; RCT: randomized controlled study.
[a]Concerns over consistent risk of bias and imprecision.
[b]Concerns over risk of bias, one study only.

1.5. Untargeted health outcomes

Table 24. mortality and incidence of sickness

Health outcomes: mortality and incidence of sickness				
Patient group: mothers and children				
Comparison: pure control group (standard practice, status quo, no additional financing)				
Intervention: any type of PBF				
Settings: Democratic Republic of the Congo, India, Zambia, Zimbabwe				
Outcome	**Impact summary**	**Number of studies**	**Certainty of the evidence**	**Comments**
Child mortality (% of children alive still from mothers giving birth in study period)	P4P probably has a desirable effect, achieving a reduction of approximately 1%.	1 (Huillery 2017)	**Moderate** [a]	RCT.
Neonatal mortality rate	P4P probably has little to no effect: small reduction in neonatal mortality 0.07%; however, model with controls suggest possible increase 0.3%.	1 (Mohanan 2017)	**Moderate** [a]	RCT.
Incidence of sickness	P4P may have desirable effects: consistent reduction in incidence of sickness, ranging from –4% to –29% on average.	2 (Friedman 2016a; Friedman 2016b)	**Low** [b]	Sensitivity analysis: RCT estimates 4% reduction, low-certainty evidence. (risk of bias criteria, 1 study only).
Summary	Moderate-certainty evidence suggestive of reductions in child mortality, and low certainty in reduction of incidence of sickness.			

P4P: paying for performance; PBF: performance-based funding; RCT: randomized controlled trial.
[a]No serious concerns, one study only.
[b]Serious concerns over three risk of bias criteria.

Table 25. Reproductive maternal and child health outcomes

Health outcomes: RMNCH outcomes				
Patient group: mothers and children				
Comparison: pure control group (standard practice, status quo, no additional financing)				
Intervention: any type of PBF				
Settings: Cameroon, Democratic Republic of the Congo, Philippines				
Outcome	**Impact summary**	**Number of studies**	**Certainty of the evidence**	**Comments**

(Continued)

Child wasting (%)	P4P probably has a desirable effect, signalling a reduction in wasting from 5.9% to 9.25%.	2 (de Walque 2017; Peabody 2014)	**Moderate** [a]	Sensitivity analysis: RCT estimated a 9.25% increase in likelihood of children not wasting; low-certainty evidence (1 study only, risk of bias significant concerns around this outcome).
Incidence of pregnancy (%)	P4P probably has little to no effect: small reduction (1%) in pregnancies.	1 (Huillery 2017)	**Moderate** [b]	RCT.
Reported anaemia in children (%)	P4P probably has a desirable effect, about 5% reduction in anaemic children.	1 (Peabody 2014)	**Moderate** [b]	RCT.
Summary	Moderate-certainty evidence suggestive of desirable effects on health outcomes, despite not being targeted.			

P4P: paying for performance; PBF: performance-based funding; RCT: randomized controlled trial; RMNCH: reproductive, maternal, newborn and child health.
[a]Critical concerns over one risk of bias criterion.
[b]No serious concerns, one study only.

1.6. Changes in untargeted measures of provider performance

1.6.1. Untargeted utilization and delivery

Table 26. Utilization and delivery of HIV-AIDS, malaria and tuberculous services

Utilization and delivery: HIV-AIDS, malaria and TB				
Patient group: households and patients exposed to HIV/TB/malaria and seeking care at health facilities **Comparison:** pure control group (standard practice, status quo, no additional financing) **Intervention:** any type of PBF **Settings:** Cameroon, Malawi				
Outcome	**Impact summary**	**Number of studies**	**Certainty of the evidence**	**Comments**
Provision of HIV testing (%)	P4P may have desirable effects, ranging from long term (–2 to 15%), though consistently positive at hospital levels in the range of 12–15%.	1 (McMahon 2016)	**Low** [a]	Indicators assessed at different time points and different health facility types. No RCT reported this outcome for this comparison.
Bednet use (% children and households)	P4P probably has little to no impact on the outcome, effect estimated at 0.12%.	1 (de Walque 2017)	**Moderate** [b]	Indicator concerns children sleeping under a bednet. No RCT reported this outcome for this comparison.
Summary	Limited influence on bednet use; however, may have desirable effects on provision of HIV testing.			

P4P: paying for performance; PBF: performance-based funding; RCT: randomized controlled trial.
[a]Non-critical limitations for one or more criteria in risk of bias, one study only.
[b]No substantive concerns, one study only.

Table 27. Untargeted delivery of services (generic)

Utilization and delivery: general				
Patient group: overall patients utilizing clinics **Comparison:** pure control group (standard practice, status quo, no additional financing) **Intervention:** any type of PBF **Settings:** Cambodia, China, Democratic Republic of the Congo, El-Salvador, Haiti, Tanzania				
Outcome	**Impact summary**	**Number of studies**	**Certainty of the evidence**	**Comments**
Probability of any utilization (%)	P4P may have little to no effect, impacts inconsistent across studies, ranging from –6 to 2.4% overall.	2 (Huillery 2017; Powell-Jackson 2014)	**Low** [a]	Sensitivity analysis: RCT estimate is –6%; moderate-certainty evidence (1 study only, no further concerns).
Frequency of curative utilization (%)	Effects of the intervention are uncertain: decrease overall (range 2%) and in women aged 15–49 years (0.2%); non-significant increase in children aged < 5 years (0.06%).	1 (Bernal 2018)	**Very low** [b]	No RCT reported this outcome for this comparison.
Frequency of outpatient utilization (%)	P4P may have little to no effect, range –4% to 6.7% overall, but likely small effects over longer time periods.	4 (Bernal 2018; Binyaruka 2015; Khim 2018a; Yip 2014)	**Low** [c]	Differences exist in indicator specification – e.g. visits per day/month. Sensitivity analysis: RCT evaluation suggested negative effects, reduction in absolute number of patients per day range of 1%; moderate-certainty evidence (1 study only, no further concerns).
Frequency – all visits (number of visits)	P4P may have little to no effect, 2.7% increase in consultations for non-incentivized services noted.	1 (Zeng 2013)	**Low** [c]	No RCT reported this outcome for this comparison.
Frequency – elderly visits (number of visits)	P4P may have little to no effect, increases in visits in range of 2.8–5.7%.	2 (Bernal 2018; Zeng 2013)	**Low** [c]	No RCT reported this outcome for this comparison.
Summary	If not targeted, impacts as to be expected, P4P may have little to no effect.			

P4P: paying for performance; PBF: performance-based funding; RCT: randomized controlled trial.
[a]Concerns over lack of comparability between indicators and risk of bias criteria.
[b]Concerns over risk of bias criteria and potential for imprecision, one study only.

[c]Concerns over risk of bias criteria.

Table 28. Untargeted delivery of reproductive maternal and child health

Utilization and delivery: RMNCH – family planning				
Patient group: women of reproductive age (15–49 years) in study districts **Comparison:** pure control group (standard practice, status quo, no additional financing) **Intervention:** any type of PBF **Settings:** Afghanistan, Zambia				
Outcome	**Impact summary**	**Number of studies**	**Certainty of the evidence**	**Comments**
Family planning (% women utilizing- modern methods)	P4P probably has little to no effect on the outcome. Negative effect, estimated at –0.1%.	1 (Engineer 2016)	**Moderate** [a]	RCT.
Family planning (% services delivered)	P4P may have desirable effects, noted a 9.7% increase in the range of services delivered.	1 (Friedman 2016a)	**Low** [b]	RCT.
Summary	Non-targeted effects largely consistent with effects noted as when targeted.			

P4P: paying for performance; PBF: performance-based funding; RCT: randomized controlled trial; RMNCH: reproductive, maternal, newborn and child health.
[a]No serious limitations, one study only.
[b]Limitations in risk of bias, one study only.

Table 29. Untargeted utilization and delivery of antenatal care

Utilization and delivery: RMNCH – aNC				
Patient group: pregnant women enrolled in study within specified time frames **Comparison:** pure control group (standard practice, status quo, no additional financing) **Intervention:** any type of PBF **Settings:** Burundi, Cameroon, India, Tanzania, Zambia				
Outcome	**Impact summary**	**Number of studies**	**Certainty of the evidence**	**Comments**
Antenatal care (utilization rate)	P4P may make little to no difference to the outcome: small, but not significant, reduction in P4P group compared to control (under 5%).	1 (Mohanan 2017)	**Low** [a]	RCT.
≥ 1 ANC (utilization rates)	Effects of the intervention are uncertain: positive impact, estimated at 3.4%.	1 (Binyaruka 2015)	**Very low** [b]	No RCT reported this outcome for this comparison.

(Continued)

≥ 2 ANC (utilization rates)	Effects of the intervention are uncertain: both substantial level and trend increases and decreases noted across different districts.	1 (Khim 2018a)	**Very low** [b]	Authors attributed changes more to increased financing availability throughout country. No RCT reported this outcome for this comparison.
≥ 4 ANC (utilization rates)	Effects of the intervention are uncertain: effect estimated at 6%.	1 (Binyaruka 2015)	**Very low** [b]	No RCT reported this outcome for this comparison.
Women accessing care in first trimester (% women receiving)	P4P may have desirable effects, ranging between 1.4% and 12%.	2 (Bonfrer 2014b; Friedman 2016a)	**Low** [c]	Sensitivity analysis: RCT estimate at 12% reduction in time of first ANC visit; GRADE at 2 (concerns over 2 risk of bias criteria, 1 study only).
Summary	Overall largely uncertain effects, however timeliness of ANC care-seeking may be positively affected.			

P4P: paying for performance; PBF: performance-based funding; RCT: randomized controlled trial; RMNCH: reproductive, maternal, newborn and child health.
[a]Concerns over risk of bias, one study only.
[b]Critical concerns over more than two criteria, one study only.
[c]Critical concerns over more than two criteria.

Table 30. Untargeted delivery of institutional deliveries

Utilization and delivery: RMNCH – institutional deliveries				
Patient group: women giving birth in study periods **Comparison:** pure control group (standard practice, status quo, no additional financing) **Intervention:** any type of PBF **Settings:** India, Rwanda				
Outcome	**Impact summary**	**Number of studies**	**Certainty of the evidence**	**Comments**
Institutional delivery utilization or coverage rates	P4P may make little to no difference to the outcome of interest, impact (–2%) overall.	1 (Mohanan 2017)	**Low** [a]	RCT.
Institutional delivery: caesarean section (%)	Effects of the intervention are uncertain; utilization of caesarean sections decreased by 21%.	1 (Gertler 2014)	**Very low** [b]	No RCT reported this outcome for this comparison.
Summary	Very low-certainty evidence on the impacts on institutional delivery utilization (consistent with when outcome was targeted), utilization of caesarean sections noted to be decreasing from a mean of 26% to 5%, though unclear if impacts positive.			

P4P: paying for performance; PBF: performance-based funding; RCT: randomized controlled trial; RMNCH: reproductive, maternal, newborn and child health.
[a]Minor risk of bias concerns across two or more criteria, one study.
[b]Serious concerns over two or more criteria, one study only.

Table 31. Untargeted delivery of postnatal care

Utilization and delivery: RMNCH – postnatal care				
Patient group: women who have given birth in enrolled facilities				
Comparison: pure control group (standard practice, status quo, no additional financing)				
Intervention: any type of PBF				
Settings: Burundi, Cameroon, Democratic Republic of the Congo, El-Salvador, India, Tanzania				
Outcome	**Impact summary**	**Number of studies**	**Certainty of the evidence**	**Comments**
Delivery and coverage of postnatal care	P4P may have desirable effects, ranging from 7.2 to 85%.	3 (de Walque 2017; Falisse 2015; Zeng 2018)	**Low** [a]	No RCT reported this outcome for this comparison.
Postnatal care (overall utilization rate)	P4P probably has undesirable effects, ranging from –8.9 to –0.02%.	3 (de Walque 2017; Huillery 2017; Mohanan 2017)	**Moderate** [b]	Sensitivity analysis: 2 RCTs estimate impact ranging from –2% to –1.4%; moderate-certainty evidence (some concerns over risk of bias).
Postnatal care: timely access (% women receiving)	P4P may have desirable effects, ranging from –5.8 to 49.45%.	2 (Bernal 2018; Binyaruka 2015)	**Low** [c]	No RCT reported this outcome for this comparison.
Summary	Inconsistent effects noted across this area; moderate-certainty evidence.			

P4P: paying for performance; PBF: performance-based funding; RCT: randomized controlled trial; RMNCH: reproductive, maternal, newborn and child health.
[a]Concerns over more than two criteria in risk of bias and imprecision, two of three studies non-RCT, upgraded due to large effect.
[b]Downgraded for indirectness.
[c]Concerns over risk of bias and indirectness.

Table 32. Untargeted delivery of childcare

Utilization and delivery: childcare
Patient group: households with children in study catchment areas
Comparison: pure control group (standard practice, status quo, no additional financing)
Intervention: any type of PBF
Settings: Tanzania

(Continued)

Outcome	Impact summary	Number of studies	Certainty of the evidence	Comments
Utilization rate of consultations in children	Effects of the intervention are uncertain: Impacts on child consultations (aged < 5 years) –18.4% in Tanzania.	1 (Binyaruka 2015)	**Very low** [a]	No RCT reported this outcome for this comparison.
Summary	Negative impacts on overall utilization of child consultations, suggesting outcome must be targeted to achieve impacts; very low-certainty evidence.			

PBF: performance-based funding; RCT: randomized controlled trial.
[a]Serious concerns over two or more risk of bias criteria, one study only.

1.6.2. Untargeted quality of care

Table 33. Adherence to procedures and guidelines and adverse drug reaction management

Quality of care: adherence to procedures and guidelines and adverse drug reaction management				
Patient group: predominantly mothers and children seeking care or living in the districts where assessments occurred				
Comparison: pure control group (standard practice, status quo, no additional financing)				
Intervention: any type of PBF				
Settings: Democratic Republic of the Congo				
Outcome	**Impact summary**	**Number of studies**	**Certainty of the evidence**	**Comments**
Correct patient management by healthcare providers (scores in relation to ANC, childcare and PNC)	P4P probably makes little to no difference to the outcome, effects ranging from –1% to 4% on items assessing compliance with desired postnatal care procedures.	1 (Huillery 2017)	**Moderate** [a]	RCT
Prescription quality of care: women receiving medication via prescription in case of illness (%)	P4P may have desirable effects, ranging from –8 to 20%.	2 (Huillery 2017; Zeng 2018)	**Low** [b]	Sensitivity analysis: RCT suggested negative effect (–8%), moderate-certainty evidence (1 study only).
Summary	Probably little to no effect on correct patient management, may have desirable effects on prescription quality of care.			

ANC: antenatal care; PBF: performance-based funding; PNC: postnatal care; RCT: randomized controlled trial.
[a]No serious concerns, one study only.
[b]Concerns over risk of bias.

Table 34. Human resource inputs

Quality of care: human resource inputs				
Patient group: predominantly patients using RMCH and curative care services at targeted health facilities **Comparison:** pure control group (standard practice, status quo, no additional financing) **Intervention:** any type of PBF **Settings:** Benin				
Outcome	**Impact summary**	**Number of studies**	**Certainty of the evidence**	**Comments**
Staff knowledge and skills (score)	P4P may have little to no effect: positive on clinical knowledge of staff but unclear if clinically relevant (2.3% increase in vignette test scores).	1 (Lagarde 2015)	**Low** [a]	No RCT reported this outcome for this comparison.
Summary	Effects on staff knowledge consistent with when outcomes were targeted, but limited certainty.			

PBF: performance-based funding; RCT: randomized controlled trial; RMCH: reproductive, maternal and child health.
[a]Serious concerns over risk of bias.

Table 35. Patient outcomes and perceptions

Quality of care: patient outcomes and perceptions				
Patient group: predominantly pregnant women **Comparison:** pure control group (standard practice, status quo, no additional financing) **Intervention:** any type of PBF **Settings:** Democratic Republic of the Congo				
Outcome	**Impact summary**	**Number of studies**	**Certainty of the evidence**	**Comments**
Patient knowledge (scores)	P4P probably has little to no effect on patient knowledge scores: impacts ranging from –5% to 2% in regard to indicators on patient knowledge of diagnosis, danger signs and medication adherence.	1 (Huillery 2017)	**Moderate** [a]	RCT.
Summary	Consistent with impacts on the targeted outcomes.			

PBF: performance-based funding; RCT: randomized controlled trial.
[a]No serious concerns, one study only.

Table 36. Contact and waiting time

Quality of care: contact and waiting time
Patient group: predominantly women and children using RMCH services at facilities

(Continued)

Comparison: pure control group (standard practice, status quo, no additional financing)

Intervention: any type of PBF

Settings: China, Democratic Republic of the Congo, Tanzania

Outcome	Impact summary	Number of studies	Certainty of the evidence	Comments
Contact time (% change)	P4P may have little to no effect on the outcome: effects ranging from –2.2% to 1.79%.	2 (Binyaruka 2015; Huillery 2017)	**Low** [a]	Sensitivity analysis: RCT suggested positive effects only, ranging from 1.03 to 2.55; moderate-certainty evidence (no serious concerns, 1 study only).
Waiting time (% change)	Effects of the intervention are uncertain: 20% reduction in waiting time of untargeted services.	1 (Binyaruka 2015)	**Very low** [b]	No RCT reported this outcome for this comparison.
Length of stay (% change)	P4P may have undesirable effects, extending length of stay relatively by 0.05–16% (depending on insurance status of population).	2 (Huillery 2017; Wu 2014)	**Low** [c]	Sensitivity analysis: RCT estimates 5% increase in length of stay; low-certainty evidence (no serious concerns, but likely imprecision and 1 study only).
Summary	Similarly inconsistent effects on contact times as when indicators were targeted; however, suggestive of positive effects on waiting time (i.e. waiting time was reduced) and negative effects on length of stay (i.e. this increases).			

P4P: paying for performance; PBF: performance-based funding; RCT: randomized controlled trial; RMCH: reproductive, maternal and child health.
[a]Serious concerns over risk of bias and indirectness.
[b]Serious concerns over risk of bias criteria, one study only.
[c]Some concerns over several risk of bias criteria.

Table 37. Composite quality of care scores

Quality of care: quality composite scores

Patient group: mixed groups – varies according to study and scheme

Comparison: pure control group (standard practice, status quo, no additional financing)

Intervention: any type of PBF

Settings: Burundi, Democratic Republic of the Congo

Outcome	Impact summary	Number of studies	Certainty of the evidence	Comments
Overall composite quality of care score	P4P probably has undesirable effects, estimated at 52%.	1 (Huillery 2017)	**Moderate** [a]	RCT.
Quality maternity care (score)	Effects of the intervention are uncertain: 45.6% increase in score, statistically significant.	1 (Rudasingwa 2014)	**Very low** [b]	No RCT reported this outcome for this comparison.

(Continued)

Quality of outpatient services (score)	Effects of the intervention are uncertain: impact indicated at 38%.	1 (Rudasingwa 2014)	**Very low** [b]	No RCT reported this outcome for this comparison.
Quality of medicine and equipment (score)	Effects of the intervention are uncertain: ranging from –14% (material management) to 8.8% (laboratory care) impacts on scores.	1 (Rudasingwa 2014)	**Very low** [b]	No RCT reported this outcome for this comparison.
Summary	Overall, composite score was negative, suggesting quality must be targeted to achieve impacts. Other effects are uncertain.			

P4P: paying for performance; PBF: performance-based funding; RCT: randomized controlled trial.
[a]Concerns over imprecision of estimate, one study only; however, magnitude high so upgraded.
[b]Serious concerns over risk of bias and generalizability, one study only.

1.7. Unintended effects

Table 38. Unintended effects

Unintended effects				
Patient group: differed by study				
Comparison: pure control group (standard practice, status quo, no additional financing)				
Intervention: any type of PBF				
Settings: China, Democratic Republic of the Congo				
Outcome	**Impact summary**	**Number of studies**	**Certainty of the evidence**	**Comments**
Overall impacts on free riding and task shifting	P4P may make little to no difference to the outcome: no effects or differences noted between PBF groups and control.	2 (Huillery 2017; Yip 2014)	**Low** [a]	Both were RCTs in different populations: women and children vs all patients requiring antibiotic-based care.
Summary	Certain that no unintended effects such as free-riding or task-shifting occurred; consistent with findings when targeted.			

P4P: paying for performance; PBF: performance-based funding; RCT: randomized controlled trial.
[a]Concerns over imprecision and limited comparability of indicators.

1.8. Untargeted resource use

Table 39. Human resources

Changes in resource use: human resources
Patient group: schemes targeting maternal and child health
Comparison: pure control group (standard practice, status quo, no additional financing)
Intervention: any type of PBF

(Continued)

Settings: Benin

Outcome	Impact summary	Number of studies	Certainty of the evidence	Comments
Human resource availability (people available)	Effects of the intervention are uncertain: no increase in number of qualified staff available per facility was noted.	1 (Lagarde 2015)	**Very low** [a]	No RCT reported this outcome for this comparison.
Curative health visits per healthcare professional	Effects of the intervention are uncertain: estimated increase of 52%.	1 (Lagarde 2015)	**Very low** [b]	No RCT reported this outcome for this comparison.
Summary	Effects of the intervention are uncertain.			

P4P: paying for performance; PBF: performance-based funding; RCT: randomized controlled trial.
[a]Serious limitations for risk of bias, one study only.
[b]Serious limitations for risk of bias and imprecision.

Table 40. Medicine and equipment availability and functionality

Changes in resource use: medicine and equipment

Patient group: predominantly across RMNCH schemes

Comparison: pure control group (standard practice, status quo, no additional financing)

Intervention: any type of PBF

Settings: Benin, Democratic Republic of the Congo, Tanzania

Outcome	Impact summary	Number of studies	Certainty of the evidence	Comments
Equipment availability (index)	Effects of the intervention are uncertain: ranging from –6.4% to 6.9%.	3 (Binyaruka 2017; Huillery 2017; Lagarde 2015)	**Very low** [a]	Sensitivity analysis: RCT suggested –64%; low-certainty evidence (some concerns over risk of bias and imprecision, 1 study only).
Equipment functionality (index)	Effects of the intervention are uncertain: small (3%) positive effect.	1 (Mayumana 2017)	**Very low** [a]	No RCT reported this outcome for this comparison.
Infrastructure functionality (index)	P4P may have little to no effect: small increase in infrastructure functionality (magnitude not interpretable), but authors noted no relevant difference to control.	1 (Huillery 2017)	**Low** [b]	RCT.
Medicine availability (index)	P4P may have desirable effects: ranging from 0.6% to 13.8% increases in comparison to control.	2 (Lagarde 2015, Binyaruka 2017)	**Low** [a]	No RCT reported this outcome for this comparison.

(Continued)

Vaccine availability (%)	Effects of the intervention are uncertain: estimated at 5.6%.	1 (Binyaruka 2017)	**Very low** [a]	No RCT reported this outcome for this comparison.
Stockout equipment	Effects of the intervention are uncertain: positive effect in reducing stockouts (15%).	1 (Mayumana 2017)	**Very low** [a]	No RCT reported this outcome for this comparison.
Stockout medicines	Effects of the intervention are uncertain: positive effect in reducing stockouts (16–30%).	2 (Mayumana 2017, Binyaruka 2017)	**Very low** [a]	No RCT reported this outcome for this comparison.
Stockout vaccines	P4P may have desirable effects: reducing stockouts (10–60%).	2 (Mayumana 2017, Binyaruka 2017)	**Low** [c]	No RCT reported this outcome for this comparison.
Summary	Evidence largely consistent with when indicators were targeted, though smaller magnitude and overall weaker evidence base.			

P4P: paying for performance; PBF: performance-based funding; RCT: randomized controlled trial; RMNCH: reproductive, maternal, newborn and child health.
[a]Serious concerns over risk of bias and imprecision.
[b]Concerns over imprecision, one study only.
[c]Serious concerns over risk of bias and imprecision, upgrade for effect.

1.9. Untargeted secondary outcomes

Table 41. Provider motivation, satisfaction, absenteeism and acceptability

Provider motivation, satisfaction, absenteeism and acceptability				
Participants: healthcare workers at the facilities where studies conducted				
Comparison: pure control group (standard practice, status quo, no additional financing)				
Intervention: any type of PBF				
Settings: Benin, Cameroon, Democratic Republic of the Congo, Zambia, Zimbabwe				
Outcome	**Impact summary**	**Number of studies**	**Certainty of the evidence**	**Comments**
Provider attendance (%)	P4P probably has a desirable effect, estimated at 7%, though similar to control sites.	1 (Huillery 2017)	**Moderate** [a]	RCT.
Provider motivation (score)	P4P may have a desirable effect, estimated at 0.7% to 8%; however, noted to be largely similar to controls across studies.	4 (Friedman 2016a; Huillery 2017; Lagarde 2015; Shen 2017)	**Low** [b]	Sensitivity analysis: RCT estimated range between 1% and 6.9%; low-certainty evidence (concerns over risk of bias).
Provider satisfaction (score)	Effects are uncertain ranging from –81% to 31%.	7 (de Walque 2017; Friedman 2016a; Friedman 2016b; Huillery 2017; La-	**Low** [b]	Sensitivity analysis: 2 RCT estimates were inconsistent overall, ranging from –81% to 5%; low-cer-

(Continued)

		garde 2015; Shen 2017)	tainty evidence (concerns over risk of bias and imprecision).
Summary	If not targeted, provider attendance appears to increase.		

P4P: paying for performance; PBF: performance-based funding; RCT: randomized controlled trial.
[a]No serious concerns, one study only.
[b]Serious concerns over risk of bias and indirectness.

Table 42. Patient satisfaction and acceptability (satisfaction scores)

Patient satisfaction and acceptability (satisfaction scores)

Patient group: patients who had accessed ANC, child or curative care at study facilities

Comparison: pure control group (standard practice, status quo, no additional financing)

Intervention: any type of PBF

Settings: Cameroon, Democratic Republic of the Congo, Zambia, Zimbabwe

Outcome	Impact summary	Number of studies	Certainty of the evidence	Comments
Patient satisfaction with facility cleanliness (scores)	Effects of the intervention are uncertain: impacts on satisfaction scores ranging from –21.9% to 12.5%.	3 (Friedman 2016a; Friedman 2016b; Zeng 2018)	**Low** [a]	Sensitivity analysis: RCT estimate –22%; low-certainty evidence (1 study, risk of bias concerns).
Patient satisfaction with contact time (score)	P4P may have undesirable effects: impacts on satisfaction relating to the time healthcare workers spent on ANC consults, ranging from –5% to 0.3%; for childcare consults ranging from –11.3% to 4.7%.	2 (Friedman 2016a; Friedman 2016b)	**Low** [a]	Sensitivity analysis: RCT estimate 1.2%; low-certainty evidence (1 study, risk of bias concerns).
Patient satisfaction with opening hours (score)	P4P may have undesirable effects: impacts on satisfaction scores associated with facility opening hours for ANC care ranging from –11% to 9%; for childcare ranging from –19.3% to 1.2%.	2 (Friedman 2016a; Friedman 2016b)	**Low** [a]	Sensitivity analysis: RCT estimate –15%; low-certainty evidence (1 study, risk of bias concerns).
Patient satisfaction with waiting time (score)	Effects of the intervention are uncertain: impacts on the acceptability of waiting times for ANC appointments are consistently positive and higher in the PBF group, ranging from 10.5% to 21.8%; for child health consultations they ranged from –8.3% to 11.6%.	3 (de Walque 2017; Friedman 2016a; Friedman 2016b)	**Low** [a]	Sensitivity analysis: RCT estimate 1.9%; low-certainty evidence (1 study, risk of bias concerns).
Overall patient satisfaction with quality of care (score)	P4P may have desirable effects in relation to patients' satisfaction with quality of care, ranging from 0% to 7.4%.	2 (Huillery 2017; Zeng 2018)	**Low** [b]	Sensitivity analysis: RCT estimate –1%, low-certainty evidence (concerns over indirectness and precision, 1 study only).

(Continued)

Overall patient satisfaction with welcome and reception at facility (score)	P4P may have desirable effects ranging from –3% to 11.7% satisfaction with welcome quality at health facilities.	2 (Huillery 2017; Zeng 2018)	**Low** [b]	Sensitivity analysis: RCT estimates –3% or 0; low-certainty evidence (concerns over indirectness and precision, 1 study only).
Patient satisfaction with staff: communication (score)	P4P may have desirable effects, ranging from –2.2% to 7.45% on average in relation to communication satisfaction for ANC; largely positive for childcare, ranging from 1.85% to 7.1% on average.	3 (de Walque 2017; Friedman 2016a; Friedman 2016b)	**Low** [a]	Sensitivity analysis: RCT estimate 2.45%; low-certainty evidence (1 study, risk of bias concerns).
Patient satisfaction with staff: trust (score)	P4P may have desirable effects, ranging from –0.25% to 23.75% on average for scores reflecting trust in the skills of healthcare providers.	2 (Friedman 2016a; Friedman 2016b)	**Low** [a]	Sensitivity analysis: RCT estimate 24%; low-certainty evidence (1 study, risk of bias concerns).
Overall satisfaction (score)	P4P probably has desirable effects: impacts on overall patient satisfaction scores ranging from 1% to 88.5% on average across ANC and child health care.	4 (de Walque 2017; Friedman 2016a; Friedman 2016b; Huillery 2017)	**Moderate** [c]	Sensitivity analysis: 2 RCTs estimates between 1% and 88%; low-certainty evidence (risk of bias concerns).
Summary	When indicators not targeted, very inconsistent impacts across most indicators in area. Low-certainty evidence overall.			

ANC: antenatal care; P4P: paying for performance; PBF: performance-based funding; RCT: randomized controlled trial.
[a]Concerns over risk of bias criteria.
[b]Serious concerns over risk of bias.
[c]Some concerns over risk of bias and large effect.

Table 43. Impacts on overall financing or resource allocation

Impacts on overall financing or resource allocation

Patient group: households accessing care (except for remuneration, for which healthcare workers were reporting)

Comparison: pure control group (standard practice, status quo, no additional financing)

Intervention: any type of PBF

Settings: Benin, Cameroon, Tanzania, Zimbabwe

Outcome	Impact summary	Number of studies	Certainty of the evidence	Comments
Out of pocket payments – user fees	P4P may have undesirable effects: impacts on user fees for consultations ranging from –15% to 63%; most impacts were negative (i.e. user fees increased).	4 (Binyaruka 2015; de Walque 2017; Friedman 2016b; Lagarde 2015)	**Low** [a]	No RCT reported this outcome for this comparison.
Expenditure on medicine and equipment	P4P probably has little to no effect on the outcome: impacts on drug expenditure at township health	1 (Yip 2014)	**Moderate** [b]	RCT.

(Continued)

	centres and health centres ranging from –2.1% to –4.7%.			
Probability of payment for users	Effects of the intervention are uncertain. Probability of paying for antenatal care decreased, ranging from 15.28% to 33.3%; effect on delivery payments were inconsistent though likely largely positive, reported to range between 30.3% reduction and 1.5% increase in probability of payment. Probability of payment for postnatal care appeared to have increased consistently ranging from 35% to 61%.	2 (Binyaruka 2015; Friedman 2016b)	**Low** [a]	No RCT reported this outcome for this comparison.
Summary	Inconsistent impacts on user fees and expenditures on medicine and equipment, suggesting these need to be targeted to be influenced; probability of payments for users decreased for some services on outpatient basis but not for postnatal care, which may require inpatient care.			

P4P: paying for performance; PBF: performance-based funding; RCT: randomized controlled trial.
[a]Concerns over risk of bias criteria.
[b]No serious concerns, one study only.

Table 44. Impacts on management or information systems

Impacts on management or information systems				
Patient group: healthcare workers and management staff in PBF and control facilities				
Comparison: pure control group (standard practice, status quo, no additional financing)				
Intervention: any type of PBF				
Settings: Benin, Cameroon, Tanzania, Zambia, Zimbabwe				
Outcome	**Impact summary**	**Number of studies**	**Certainty of the evidence**	**Comments**
Facility or managerial autonomy (score)	P4P may have desirable effects, ranging from 144% to 188% overall.	2 (Lagarde 2015; Friedman 2016b)	**Low** [a]	No RCT reported this outcome for this comparison.
Facility governance (score)	P4P may have undesirable effects, in relation to the number of governance meetings held at facility in last 90 days, ranging from –10.2% to –5.5%.	2 (Friedman 2016a; Friedman 2016b; Mayumana 2017)	**Low** [b]	Sensitivity analysis: RCT estimates –10.2%; low certainty evidence (1 study only, risk of bias concerns).
Quality of management (score)	P4P may have undesirable effects, staff rating of management quality in facility was negatively impacted (–15%).	1 (de Walque 2017)	**Low** [c]	No RCT reported this outcome for this comparison.
Summary	Overall effects on autonomy are sustained as when indicator is targeted, governance is not responsive; however quality of management is negatively affected.			

P4P: paying for performance; PBF: performance-based funding; RCT: randomized controlled trial.
[a]Downgraded for risk of bias, imprecision, upgraded for large effects.

[b]Downgraded for risk of bias and imprecision.
[c]Downgraded for imprecision, one study only.

Table 45. Equity-consideration: evidence of differential impact on different parts of the population

Equity-consideration: evidence of differential impact on different parts of the population				
Patient group: same as for main utilization outcomes; primarily mothers and children in PBF and control districts				
Comparison: pure control group (standard practice, status quo, no additional financing)				
Intervention: any type of PBF				
Settings: Afghanistan, Tanzania				
Outcome	**Impact summary**	**Number of studies**	**Certainty of the evidence**	**Comments**
Equity of child immunization delivery (wealth related)	Effects of the intervention are uncertain: effects towards poorest, approximately 0.4% in comparison to less poor.	1 (Binyaruka 2015)	**Very low** [a]	No RCT reported this outcome for this comparison.
Equity in institutional delivery (wealth related)	P4P may have undesirable effects: studies suggested increased inequality among patients among PBF facilities; impacts on patients were higher in mid-wealth quintiles.	2 (Engineer 2016, Binyaruka 2015)	**Low** [b]	Sensitivity analysis: RCT estimate also supported that wealthier women were likelier to receive institutional deliveries; moderate-certainty evidence (1 study only, no substantial concerns).
Equity in institutional delivery (by educational status of mother)	Effects of the intervention are uncertain: more institutional deliveries recorded among mothers with basic education rather than none/illiterate (effect estimated 3%).	1 (Binyaruka 2018b)	**Very low** [a]	No RCT reported this outcome for this comparison.
Summary	Overall estimates supportive of effects as when targeted, except for institutional deliveries where there was a negative effect if not targeted.			

P4P: paying for performance; PBF: performance-based funding; RCT: randomized controlled trial.
[a]Concerns over risk of bias and imprecision, one study only.
[b]Concerns over risk of bias and imprecision.

Appendix 2. Comparison 2: secondary 'Summary of findings' tables 46 to 66

2.1. Targeted health outcomes

Table 46. Reproductive maternal and child health outcomes

Health outcomes: RMNCH outcomes
Patient group: pregnant women and children
Comparison: comparator groups (matched financing or inputs)

(Continued)

Intervention: any type of P4P

Settings: Zambia

Outcome	Impact summary	Number of studies	Certainty of the evidence	Comments
Proportion of women breastfeeding	P4P may have little to no effect, no impacts noted.	1 (Friedman 2016a)	**Low** [a]	RCT.
Summary	P4P may have no effect.			

P4P: paying for performance; RCT: randomized controlled trial; RMNCH: reproductive, maternal, newborn and child health.
[a]Concerns over risk of bias criteria, one study only.

2.2. Targeted measures of provider performance

2.2.1. Utilization and delivery

Table 47. Utilization of mother and child immunization

Utilization: mother and child immunization

Patient group: mother and children accessing health services

Comparison: comparator groups (matched financing or inputs)

Intervention: any type of P4P

Settings: Cambodia, Democratic Republic of the Congo, Rwanda, Zambia

Outcome	Impact summary	Number of studies	Certainty of the evidence	Comments
Child immunization (likelihood of being vaccinated)	Effects of P4P are uncertain, with impact on the likelihood of any vaccination ranging from –7.4 to 19%.	3 (Friedman 2016a; Soeters 2011; Van de Poel 2016)	**Low** [a]	Some indirectness observed across studies. Sensitivity analysis: RCT estimate suggested P4P may have undesirable effects (–7.4%); low-certainty evidence (downgraded for risk of bias criteria, 1 study).
Child immunization: % receiving BCG	P4P may lead to little or no difference: impacts on coverage of BCG vaccination estimated at 3.1%.	1 (Friedman 2016a)	**Low** [a]	RCT.
Child immunization: % receiving DTP	P4P may lead to little or no difference: effect estimated at –1%.	1 (Friedman 2016a)	**Low** [a]	RCT.
Child immunization: % fully vaccinated	Effects of P4P are uncertain: impacts on coverage of immunization (full immunization at 12–23 months) ranging from –8.1% to 39.8%.	3 (Basinga 2011; Friedman 2016a; Sherry 2017)	**Low** [a]	Sensitivity analysis: P4P may have desirable effects: RCT estimates positive impact at 39.8%; low-certainty evidence (risk of bias criteria, 1 study).

(Continued)

Immunization during ANC – % receiving tetanus injection	P4P may have desirable effects on- immunization rates: effect estimated at 6.84%.	1 (Sherry 2017)	**Low** [b]	No RCT reported this outcome for this comparison.
Summary	Overall inconsistent effects across this area, limited certainty in estimates.			

ANC: antenatal care; BCG: *Bacillus Calmette–Guérin*; DTP: diphtheria-tetanus-pertussis; P4P: paying for performance; RCT: randomized controlled trial.
[a]Concerns over risk of bias criteria.
[b]Some concerns over risk of bias and other concurrent campaigns, one study only.

Table 48. Utilization of family planning

Utilization of family planning

Patient group: women and households enrolled in studies

Comparison: comparator groups (matched financing or inputs)

Intervention: any type of P4P

Settings: Democratic Republic of the Congo, Rwanda, Zambia

Outcome	Impact summary	Number of studies	Certainty of the evidence	Comments
Family planning: % using any method	P4P may make little or no difference, effects on the current use of contraceptives among households in study (recent birth households or otherwise) estimated between –4.28% and 2.8%.	2 (Friedman 2016a; Shapira 2017)	**Low** [a]	RCTs.
Family planning: % using modern methods	P4P may have little to no effect on utilization of modern family planning methods.	3 (Priedeman Skiles 2013; Sherry 2017; Soeters 2011)	**Low** [b]	No RCT reported this outcome for this comparison.
Summary	Inconsistent effects overall on family planning; however, consistent positive effects on utilization of modern family planning.			

P4P: paying for performance; RCT: randomized controlled trial.
[a]Some concerns over risk of bias criteria.
[b]Some concerns over multiple risk of bias criteria.

Table 49. Utilization of antenatal care

Utilization of ANC

Patient group: pregnant women seeking ANC in enrolled facilities.

(Continued)

Comparison: comparator groups (matched financing or inputs)

Intervention: any type of P4P

Settings: Argentina, Cambodia, Rwanda, Zambia

Outcome	Impact summary	Number of studies	Certainty of the evidence	Comments
ANC: % receiving at ≥ 1 ANC	P4P may have little to no effect on the outcome: likelihood of any ANC being utilized among populations in the sites ranging from –1.5% to 3.2%.	3 (Basinga 2011; Friedman 2016a; Van de Poel 2016)	**Low** [a]	Sensitivity analysis: RCT estimate –1.5%; low-certainty evidence (risk of bias criteria, 1 study only).
ANC: % ≥ 4 ANC	P4P may have little to no effect on the outcome: the use of ≥ 4 ANC visits by women in the study sites ranging from –5.3% to 4.4%.	5 (Basinga 2011; Friedman 2016a; Priedeman Skiles 2013; Shapira 2017; Sherry 2017)	**Low** [b]	Sensitivity analysis: RCT estimate –0.6%; low-certainty evidence (risk of bias criteria, 1 study only).
ANC: % receiving ANC in first trimester	P4P may have desirable effects: likelihood of ANC utilization being in the first trimester increases in PBF facilities by 1.3% to 10%; studies noted that results-based financing facilities saw women initiating ANC approximately 1 month earlier compared to other facilities.	4 (Celhay 2015; Friedman 2016a; Priedeman Skiles 2013; Shapira 2017)	**Low** [c]	Sensitivity analysis: 2 studies, RCT estimates suggested 1.3% to 10% of women initiated care earlier, approximately by 1 month; moderate-certainty evidence (risk of bias criteria and indirectness).
Summary	Potential desirable effects on timely utilization of ANC; however, little to no effect on ANC utilization overall.			

ANC: antenatal care; P4P: paying for performance; RCT: randomized controlled trial.
[a]Critical concerns over risk of bias criteria.
[b]Some concerns over risk of bias.
[c]Concerns over risk of bias criteria.

Table 50. Utilization of institutional delivery, postnatal care and child curative care

Utilization: institutional delivery, postnatal care and child curative care

Patient group: pregnant women in households in facility catchment areas and children aged < 5 years

Comparison: comparator groups (matched financing or inputs)

Intervention: any type of P4P

Settings: Cambodia, Democratic Republic of the Congo, Rwanda, Zambia

Outcome	Impact summary	Number of studies	Certainty of the evidence	Comments
Institutional deliveries (rates and coverage)	Effects of the intervention are uncertain: Inconsistent effects on facility delivery rates ranging from –8.7% to 23.2%; 1 study estimated effects on overall coverage (–4.9%,	7 (Basinga 2011; Friedman 2016a; Priedeman Skiles 2013; Shapira 2017; Sherry 2017; Soeters	**Low** [a]	Overall impacts noted were largely positive, only Zambia studies suggest negative impacts, suggestive of potential publication bias.

(Continued)

	same study as aforementioned negative).	2011; Van de Poel 2016)		Sensitivity analysis: 2 studies, but evidence inconsistent, between –8.7% and 1.9%; low-certainty evidence (risk of bias criteria).
Postnatal care (rates and coverage)	P4P may have undesirable effects: impacts on any PNC being utilized, approximately –10%.	1 (Friedman 2016a)	**Low** [a]	RCT.
Child (aged < 5 years) curative visits (rates)	P4P may have little to no effect on the outcome, ranging from –5.76% to –3.1%.	2 (Friedman 2016a; Sherry 2017)	**Low** [a]	Sensitivity analysis: RCT estimate –3.1%; low-certainty evidence (risk of bias criteria, 1 study only).
Summary	Inconsistent effects overall in this area, low-certainty evidence.			

P4P: paying for performance; RCT: randomized controlled trial.
[a]Concerns over risk of bias criteria.

Table 51. Utilization of services (general)

Probability of any utilization and total utilization				
Patient group: all patients accessing health care **Comparison:** comparator groups (matched financing or inputs) **Intervention:** any type of P4P **Settings:** Democratic Republic of the Congo, Zambia				
Outcome	**Impact summary**	**Number of studies**	**Certainty of the evidence**	**Comments**
Probability of any utilization (generic)	P4P may have desirable effects, estimated to range between 1.5% and 10%; however, may differ according to type of health provider or facility visited.	2 (Friedman 2016a; Soeters 2011)	**Low** [a]	Sensitivity analysis: RCT estimate 1.5% overall; however ranging from –6% to 9% depending on the type of facility or healthcare worker visited; low-certainty evidence (1 study).

P4P: paying for performance; RCT: randomized controlled trial.
[a]Serious concerns over risk of bias.

2.2.2. Quality of care

Table 52. Adherence to procedure and guidelines

Quality of care: adherence to procedure and guidelines
Patient group: dependent on indicator. Largely those accessing RMNCH services. Additionally those accessing curative services

(Continued)

Intervention: any type of P4P

Settings: Benin, Rwanda, Zambia

Outcome	Impact summary	Number of studies	Certainty of the evidence	Comments
Background and physical assessment (score)	P4P may have desirable effects: ranging from –5.93% to 10.62% overall on diverse set of measures reflective of ANC, child health and adult curative consultations.	3 (Friedman 2016a; Lagarde 2015; Sherry 2017)	**Low** [a]	Sensitivity analysis: RCT estimate –5.4% on average; low-certainty evidence (risk of bias criteria, 1 study).
Counselling (score)	Effects are uncertain: effects ranging from –37% to 26.12% overall.	3 (Friedman 2016a; Lagarde 2015; Sherry 2017)	**Low** [a]	Sensitivity analysis: RCT estimate –40% on average; low-certainty evidence (risk of bias criteria, 1 study).
Immunization quality (score)	P4P may have desirable effects: quality index of vaccinations increasing in PBF facilities by 3.2%; overall effects on likelihood of receiving a tetanus vaccine during ANC estimated at 7.2%.	2 (Basinga 2011; Friedman 2016a)	**Low** [a]	Sensitivity analysis: RCT estimate 5.2% on average; low-certainty evidence (risk of bias criteria, 1 study).
Summary	Overall low-certainty evidence, some desirable effects noted.			

ANC: antenatal care; P4P: paying for performance; PBF: performance-based funding; RCT: randomized controlled trial: RMNCH: reproductive, maternal, newborn and child health.
[a]Serious concerns over risk of bias criteria.

Table 53. Human resource knowledge and skills

Quality of care: human resource knowledge and skills, health literacy

Patient group: mainly from studies focused on RMNCH

Comparison: comparator groups (matched financing or inputs)

Intervention: any type of P4P

Settings: Democratic Republic of the Congo, Rwanda

Outcome	Impact summary	Number of studies	Certainty of the evidence	Comments
Staff knowledge and skills (scores)	P4P may have desirable effects on provider knowledge (or availability of knowledgeable staff in facility), ranging from an absolute increase in knowledge scores of 0.4 standard deviations, to relative impacts on availability of skilled personnel between 0.06% and 15% change in scores.	3 (Gertler 2013; Sherry 2017; Soeters 2011)	**Low** [a]	No RCT reported this outcome for this comparison.
Knowledge outcomes (index)	P4P may have desirable effects on health literacy outcomes (though these are diverse, e.g. having heard about family planning vs	2 (Shapira 2017; Soeters 2011)	**Low** [b]	Sensitivity analysis: RCT suggested impacts were consistently negative, rang-

(Continued)

	HIV/AIDS) ranging from –5.4% to 10% change in scores.	ing from –5.4% to –2.4%; moderate-certainty evidence (data sources and 1 study).
Summary	Overarchingly desirable effects, low-certainty evidence.	

P4P: paying for performance; RCT: randomized controlled trial: RMNCH: reproductive, maternal, newborn and child health.
[a]Serious concerns over risk of bias criteria and imprecision.
[b]Concerns over risk of bias criteria.

Table 54. Total quality scores

Quality of care: total quality scores				
Patient group: principally mothers and children				
Comparison: comparator groups (matched financing or inputs)				
Intervention: any type of P4P				
Settings: Democratic Republic of the Congo, Rwanda, Zambia				
Outcome	**Impact summary**	**Number of studies**	**Certainty of the evidence**	**Comments**
Total quality family planning (scores)	P4P may have desirable effects, ranging from 1.34% to 500% change in scores increases in quality of family planning in PBF facilities.	2 (Friedman 2016a; Sherry 2017)	**Low** [a]	Sensitivity analysis: RCT estimate 500%; low-certainty evidence (risk of bias and 1 study).
Total quality antenatal care (scores)	P4P may have desirable effects on antenatal care scores, ranging from 3.56% to 40%.	3 (Basinga 2011; Friedman 2016a; Sherry 2017)	**Low** [a]	Sensitivity analysis: RCT estimate 40% increase in ANC quality of care; low-certainty evidence (risk of bias and 1 study only).
Total quality composite (score)	P4P may have desirable effects, ranging from 25% to 0.13 standard deviation changes in composite scores.	2 (Gertler 2013; Soeters 2011)	**Low** [a]	No RCT reported this outcome for this comparison.
Summary	Moderate certainty in the consistently positive results across this area.			

P4P: paying for performance; PBF: performance-based funding; RCT: randomized controlled trial.
[a]Serious concerns over risk of bias.

2.3. Targeted changes in resource use

Table 55. Changes in medicine and equipment use

Changes in resource use: medicine and equipment
Patient group: primarily mothers and children, and patients using other curative services

(Continued)

Comparison: comparator groups (matched financing or inputs)

Intervention: any type of P4P

Settings: Zambia

Outcome	Impact summary	Number of studies	Certainty of the evidence	Comments
Equipment availability (composite score)	P4P may have desirable effects, estimated at 75% increase; however, not significant in comparison to comparator.	1 (Friedman 2016a)	**Low** [a]	RCT.
Medicine availability (composite score)	P4P may have undesirable effects, estimated at –160% decrease in composite score.	1 (Friedman 2016a)	**Low** [a]	RCT.
Summary	Inconsistent effects in relation to medicines vs equipment, equipment availability appeared to be increased; that of medicine decreased.			

P4P: paying for performance; RCT: randomized controlled trial.
[a]Concerns over risk of bias, imprecision, one study only but upgraded for substantive effect.

2.4. Targeted secondary outcomes

Table 56. Impacts on management or information systems

Impacts on management or information systems

Patient group: healthcare workers in PBF and comparator facilities

Comparison: comparator groups (matched financing or inputs)

Intervention: any type of P4P

Settings: Zambia

Outcome	Impact summary	Number of studies	Certainty of the evidence	Comments
Facility and managerial autonomy (score)	P4P may have desirable effects: estimated impact on autonomy index about 46%.	1 (Friedman 2016a)	**Low** [a]	RCT.
Summary	Consistently positive effects on facility and managerial autonomy, though larger when targeted.			

P4P: paying for performance; PBF: performance-based funding; RCT: randomized controlled trial.
[a]Concerns over risk of bias and imprecision, one study only.

Table 57. Patient satisfaction and acceptability

Patient satisfaction and acceptability

(Continued)

Patient group: patients attending antenatal, childcare or curative adult care in facilities

Comparison: comparator groups (matched financing or inputs)

Intervention: any type of P4P

Settings: Benin, Democratic Republic of the Congo

Outcome	Impact summary	Number of studies	Certainty of the evidence	Comments
Waiting time	Effects of the intervention are uncertain: impact about 7%.	1 (Soeters 2011)	**Very low** [a]	No RCT reported this outcome for this comparison.
Patient satisfaction with staff communication (index)	Effects of the intervention are uncertain: impacts on the satisfaction with staff politeness estimated at 0.5%.	1 (Lagarde 2015)	**Very low** [a]	No RCT reported this outcome for this comparison.
Summary	Overarchingly uncertain impacts.			

P4P: paying for performance; RCT: randomized controlled trial.
[a]Serious concerns over risk of bias, one study only.

Table 58. Equity-consideration: evidence of differential impact on different parts of the population

Equity-consideration: evidence of differential impact on different parts of the population

Patient group: women and households utilizing family planning, antenatal, delivery and childcare

Comparison: comparator groups (matched financing or inputs)

Intervention: any type of P4P

Settings: Cambodia, Rwanda

Outcome	Impact summary	Number of studies	Certainty of the evidence	Comments
Wealth related: ANC (utilization)	P4P may have little to no effect: inconsistent impacts regarding ≥ 4 ANC visits in relation to pro-poor effects (estimated at < 10% in comparison to least poor); similar in relation to utilization of ANC in first trimester.	2 (Lannes 2016; Priedeman Skiles 2013)	**Low** [a]	No RCT reported this outcome for this comparison.
Wealth related: curative visits (utilization)	P4P may have little to no effect: utilization among lower socioeconomic groups increased between 3.5% and 10%.	2 (Lannes 2016; Priedeman Skiles 2015)	**Low** [a]	No RCT reported this outcome for this comparison.
Wealth related: family planning (utilization)	P4P may have undesirable effects, less poor and mid-status groups appear to benefit more.	2 (Lannes 2016; Priedeman Skiles 2015)	**Low** [a]	No RCT reported this outcome for this comparison.

(Continued)

Wealth related: institutional delivery (utilization)	P4P may have undesirable effects: middle-income groups (or mid-poverty) groups benefit more than poorest.	3 (Lannes 2016; Priedeman Skiles 2015; Van de Poel 2016)	**Low** [a]	No RCT reported this outcome for this comparison.
Summary	Low certainty overall, suggestive of limited to negative effects.			

ANC: antenatal care; P4P: paying for performance; RCT: randomized controlled trial.
[a]Some concern over risk of bias.

2.5. Untargeted measures of provider performance

2.5.1. Untargeted utilization and delivery

Table 59. Utilization of mother and child immunization

Utilization: mother and child immunization				
Patient group: mother and children accessing health services				
Comparison: comparator groups (matched financing or inputs)				
Intervention: any type of P4P				
Settings: Argentina				
Outcome	**Impact summary**	**Number of studies**	**Certainty of the evidence**	**Comments**
Cross-price spillover effect on mothers receiving tetanus vaccination	P4P probably has little to no effect, impact estimated 2%.	1 (Celhay 2015)	**Moderate** [a]	RCT.
Summary	Consistent effects with when indicator on tetanus vaccination during ANC is targeted.			

P4P: paying for performance; RCT: randomized controlled trial.
[a]One study only.

Table 60. Utilization of institutional delivery, postnatal care and child curative care

Utilization: institutional delivery, postnatal care and child curative care				
Patient group: pregnant women in households in facility catchment areas and children aged < 5 years				
Comparison: comparator groups (matched financing or inputs)				
Intervention: any type of P4P				
Settings: Rwanda				
Outcome	**Impact summary**	**Number of studies**	**Certainty of the evidence**	**Comments**

(Continued)

Postnatal care (rates and coverage)	P4P may make little to no difference to the outcome, effects on any postnatal care being utilized estimated at –0.5%.	1 (Shapira 2017)	**Low** [a]	RCT.
Summary	Consistent with when indicator targeted, negative effects on the utilization on postnatal care noted.			

P4P: paying for performance; RCT: randomized controlled trial.
[a]Serious risk of bias concerns, one study only.

2.5.2. Untargeted quality of care

Table 61. Human resource inputs

Quality of care: human resource inputs				
Patient group: mainly from studies focused on RMNCH **Comparison:** comparator groups (matched financing or inputs) **Intervention:** any type of P4P **Settings:** Benin				
Outcome	**Impact summary**	**Number of studies**	**Certainty of the evidence**	**Comments**
Staff knowledge and skills (score)	Effects are uncertain: estimated at 5.6%.	1 (Lagarde 2015)	**Very low** [a]	No RCT reported this outcome for this comparison.
Summary	Consistent with when indicator is targeted, impacts are positive but limited certainty in estimate.			

P4P: paying for performance; RCT: randomized controlled trial; RMNCH: reproductive, maternal, newborn and child health.
[a]Serious concerns over risk of bias criteria and imprecision, one study only.

2.6. Untargeted health outcomes

Table 62. Reproductive maternal and child health outcomes

Health outcomes: RMNCH outcomes				
Patient group: women with pregnancies in study periods **Comparison:** comparator groups (matched financing or inputs) **Intervention:** any type of P4P **Settings:** Rwanda, Zambia				
Outcome	**Impact summary**	**Number of studies**	**Certainty of the evidence**	**Comments**

(Continued)

Proportion of women breast-feeding	P4P may have little to no effect, impact estimated at 0.29%.	1 (Sherry 2017)	**Low** [a]	RCT.
Reported illness in children (%)	P4P may have desirable effects, ranging from –5% to 10.5%.	2 (Priedeman Skiles 2015, Friedman 2016a)	**Low** [b]	Sensitivity analysis: RCT reported 10.5%; low-certainty evidence (risk of bias criteria, 1 study only).
Summary	Overall inconsistent effects.			

P4P: paying for performance; RCT: randomized controlled trial; RMNCH: reproductive, maternal, newborn and child health.
[a]Some concerns over risk of bias, one study only.
[b]Concerns over risk of bias criteria.

2.7. Untargeted resource use

Table 63. Medicine and equipment availability

Changes in resource use: medicine and equipment				
Patient group: primarily mothers and children, and patients using other curative services				
Comparison: comparator groups (matched financing or inputs)				
Intervention: any type of P4P				
Settings: Benin				
Outcome	**Impact summary**	**Number of studies**	**Certainty of the evidence**	**Comments**
Equipment availability (composite score)	Effects of the intervention are uncertain: negative effect about –2.5%.	1 (Lagarde 2015)	**Very low** [a]	No RCT reported this outcome for this comparison.
Medicine availability (composite score)	Effects of the intervention are uncertain: positive effect about 4.8%.	1 (Lagarde 2015)	**Very low** [a]	No RCT reported this outcome for this comparison.
Summary	Opposite impacts to when indicators are targeted: medicine availability appeared to be increasing and that of equipment decreasing.			

P4P: paying for performance; RCT: randomized controlled trial.
[a]Serious concerns over risk of bias and imprecision.

2.8. Untargeted secondary outcomes

Table 64. Impacts on management or information systems

Impacts on management or information systems

(Continued)

Patient group: healthcare workers in PBF and comparator facilities

Comparison: comparator groups (matched financing or inputs)

Intervention: any type of P4P

Settings: Benin

Outcome	Impact summary	Number of studies	Certainty of the evidence	Comments
Facility and managerial autonomy (score)	Effect of the intervention is uncertain: impact estimated at 0.3% difference compared to comparator.	1 (Lagarde 2015)	**Very low** [a]	No RCT reported this outcome for this comparison.
Summary	Effects uncertain.			

P4P: paying for performance; PBF: performance-based funding; RCT: randomized controlled trial.
[a]Concerns over risk of bias and imprecision, one study only.

Table 65. Patient satisfaction and acceptability

Patient satisfaction and acceptability

Patient group: patients attending antenatal, childcare or curative adult care in facilities

Comparison: comparator groups (matched financing or inputs)

Intervention: any type of P4P

Settings: Rwanda, Zambia

Outcome	Impact summary	Number of studies	Certainty of the evidence	Comments
Cleanliness	P4P may have a desirable effect: impacts on satisfaction scores for antenatal, child and adult curative care were consistently positive ranging from 2.45% to 11.90%.	2 (Friedman 2016a; Lannes 2015)	**Low** [a]	Sensitivity analysis: RCT estimate 2.45%; low-certainty evidence (risk of bias criteria, 1 study only).
Contact time	P4P may have a desirable effect: impacts on client satisfaction with contact time ranging from 2.1% to 7.8%, though impacts were not consistently positive within studies.	2 (Friedman 2016a; Lannes 2015)	**Low** [a]	Sensitivity analysis: RCT estimate 7.8%; low-certainty evidence (risk of bias criteria, 1 study only).
Waiting time	P4P may have a desirable effect: impacts on client satisfaction with waiting times ranging from 0.05% to 6%, though at times negative (e.g. for childcare from –2.6% to –0.07).	2 (Friedman 2016a; Lannes 2015)	**Low** [a]	Sensitivity analysis: RCT estimate 0.05%; low-certainty evidence (risk of bias criteria, 1 study only).
Patient satisfaction with staff	P4P may have little to no effect: impacts on client satisfaction with staff courteousness estimated at 3.35%	1 (Friedman 2016a)	**Low** [b]	Sensitivity analysis: RCT estimate 2.35%; low-certainty

(Continued) **communication (index)**	evidence (risk of bias criteria, 1 study only).
Summary	Low-certainty evidence, overarchingly desirable effects.

P4P: paying for performance; RCT: randomized controlled trial.
[a]Serious concerns over risk of bias.
[b]Serious concerns over risk of bias, one study only

Table 66. Provider motivation, satisfaction, absenteeism and acceptability

Provider motivation, satisfaction, absenteeism and acceptability				
Patient group: healthcare workers in PBF and comparator facilities **Comparison:** comparator groups (matched financing or inputs) **Intervention:** any type of P4P **Settings:** Benin and Zambia				
Outcome	**Impact summary**	**Number of studies**	**Certainty of the evidence**	**Comments**
Motivation (score)	P4P may have little to no effect, ranging from –3.8% to 2.4%.	3 (Friedman 2016a; Lagarde 2015; Shen 2017)	**Low** [a]	Sensitivity analysis: RCT estimates inconsistent overall, ranging from –3.8 to. 2.4% depending on item; low-certainty evidence (indirectness, risk of bias, 1 study).
Satisfaction (score)	P4P may have little to no effect, impacts ranging from –4.6 to 4.3%.	3 (Friedman 2016a; Lagarde 2015; Shen 2017)	**Low** [a]	Sensitivity analysis: RCT estimates inconsistent overall, ranging from –4.6% to 4.3% depending on item; low-certainty evidence (indirectness, risk of bias, 1 study).
Summary	Overall little to no effect, low-certainty evidence.			

P4P: paying for performance; PBF: performance-based funding; RCT: randomized controlled trial.
[a]Concerns over risk of bias, indirectness and imprecision.

Appendix 3. Reasons for exclusion at full-text screening

Exclusions based on type of study

- Study not a randomized controlled trial (RCT), quasi-randomized trial, controlled before-after study (CBA) or interrupted time series (ITS).
- Study was a CBA, but there was only one cluster/site in each comparison group.
- Study was a CBA, but the pre- and postintervention periods for study and control groups were not the same.
- Study was a CBA, but the choice of control site was not appropriate (e.g. different socioeconomic characteristics, or major differences in the baseline group).
- Study was an ITS, but did not have clearly defined time of intervention.
- Study was an ITS but not have at least three data points before or after the intervention, neither was it likely that at least three data points before and after the intervention could have been retrieved from the authors.

Exclusions based on study population/participants

- The study population/participants/healthcare providers were not from low- and middle-income countries (as classified by the World Bank).

Exclusions based on intervention components

- Study was not an impact evaluation of paying for performance (P4P) schemes (including ancillary components), compared to any alternative (including non-conditional financial incentives and different levels of conditional financial incentives).
- Study intervention did not cover conditional cash payment, conditional provision of material goods or target payments (payments for reaching a certain level of coverage, which can be defined in absolute terms or relative to a starting point).
- Study focused on the demand side of health care only (i.e. payments to consumers, not producers).
- Study focused only on payment to health workers or facilities that were not explicitly linked to changing patterns of performance (e.g. for coming to work; salary increases; routine increases in activity-based payments such as diagnosis-related groups or fees for service).
- Study focused only on changes to budget flows that were routine or intended to motivate, but without being conditional on specific activity or output measures.

Exclusions based on type of provider

- Study did not include health workers/providers of healthcare services, public health facilities, private for profit/not-for-profit health facilities, non-governmental organizations, subnational governments (municipalities or provinces), national governments (Ministries of Health) or multiple levels of healthcare provision.

Exclusions based on primary outcomes of this systematic review

- Study did not report on our major outcome measures of interest: changes in targeted measures of provider performance, the utilization or delivery of healthcare services, or patient outcomes; unintended effects, including motivating unintended behaviours, distortions (ignoring important tasks that were not rewarded with incentives), 'cherry-picking'/'cream-skimming' (prioritizing patients that were most profitable over those who released fewer financial rewards), gaming (improving or cheating on reporting rather than improving performance), increased inequities, and dependency on financial incentives; or**c**hanges in resource use, including for incentives, administration and services.

Other

- Insufficient detail given in paper to determine inclusion/exclusion. More information needed.
- Duplicate.
- Ongoing study for which relevant results not yet available.
- Study complementary to, or superseded by, other included studies.

Appendix 4. Search strategies

CENTRAL Issue 3 2018, the Cochrane Library (searched 10 April 2018)

ID	Search	Hits
#1	MeSH descriptor: [Reimbursement, Incentive] this term only	91
#2	MeSH descriptor: [Physician Incentive Plans] this term only	16
#3	MeSH descriptor: [Employee Incentive Plans] this term only	8
#4	"p4p":ti,ab,kw	28
#5	((performance or result or results) near/3 (pay* or paid or money or monetary or cash or financ* or fund* or econom* or disbursement* or remunerat* or re-imburs* or compensat*)):ti,ab,kw	1342
#6	((performance or result or results) near/3 (nonmonetary or voucher* or token or tokens or goods)):ti,ab,kw	35

(Continued)

#7	((performance or result or results) near/3 (reward* or bonus* or initiative* or incentive* or contract or contracts)):ti,ab,kw	408
#8	(indicator* near/3 (pay* or disbursement* or remunerat* or reimburs*)):ti,ab,kw	7
#9	((performance or merit) next based):ti,ab,kw	411
#10	((payment or financial or monetary or nonmonetary or economic or disbursement or remuneration or reimbursement or reward* or bonus) next incentive*):ti,ab,kw	873
#11	((payment or financial or monetary or nonmonetary or economic or disbursement or remuneration or reimbursement) next (reward* or bonus*)):ti,ab,kw	183
#12	(pay* near/3 quality):ti,ab,kw	34
#13	(bonus next payment*):ti,ab,kw	9
#14	((incentive* or compensatory or reimbursement) next (plan or plans)):ti,ab,kw	29
#15	((incentiv* or motivat* or positive* next reinforc*) near/3 (quality or output* or outcome* or delivery or utilisation or utilization)):ti,ab,kw	879
#16	((incentiv* or motivat* or positive* next reinforc*) near/3 (target or targets or "health goal" or "health goals" or measurable next action* or behaviour* or behavior* or "best practice" or practice next pattern* or standard or standards or recommendation* or guideline*)):ti,ab,kw	1192
#17	(conditional near/3 (pay* or money or monetary or cash or financ* or fund* or econom* or disbursement* or remunerat* or reimburs* or nonmonetary or voucher* or token or tokens or goods or reward* or bonus* or incentive* or motivat*)):ti,ab,kw	113
#18	(incentive next payment*):ti,ab,kw	37
#19	((target or targets or targeted) near/3 (pay* or reward*)):ti,ab,kw	23
#20	((chang* or enhanc* or improve*) near/6 (provider* or practitioner* or "health personnel" or "health care personnel" or "healthcare personnel" or health next worker* or "health care" next worker* or healthcare next worker* or physician* or doctor or doctors or nurse or nurses or health next facilit* or "health care" next facilit* or healthcare next facilit* or hospital or hospitals or health next service* or "health care" next service* or healthcare next service* or health next sector* or "health care" next sector* or healthcare next sector* or "health administrations" or government* or nongovernment*) near/6 performance):ti,ab,kw	171
#21	("provider recognition" next program*):ti,ab,kw	1
#22	"cash on delivery":ti,ab,kw	0
#23	("output based aid" or "result based aid" or "results based aid"):ti,ab,kw	0
#24	("program for result" or "program for results" or "programs for result" or "programs for results" or "programme for result" or "programme for results" or "programmes for result" or "programmes for results"):ti,ab,kw	0

(Continued)

#25	#1 or #2 or #3 or #4 or #5 or #6 or #7 or #8 or #9 or #10 or #11 or #12 or #13 or #14 or #15 or #16 or #17 or #18 or #19 or #20 or #21 or #22 or #23 or #24	4981
#26	(Africa or Asia or Caribbean or "West Indies" or "South America" or "Latin America" or "Central America"):ti,ab,kw	8894
#27	(Afghanistan or Albania or Algeria or Angola or Antigua or Barbuda or Argentina or Armenia or Armenian or Aruba or Azerbaijan or Bahrain or Bangladesh or Barbados or Benin or Byelarus or Byelorussian or Belarus or Belorussian or Belorussia or Belize or Bhutan or Bolivia or Bosnia or Herzegovina or Hercegovina or Botswana or Brasil or Brazil or Bulgaria or "Burkina Faso" or "Burkina Fasso" or "Upper Volta" or Burundi or Urundi or Cambodia or "Khmer Republic" or Kampuchea or Cameroon or Cameroons or Cameron or Camerons or "Cape Verde" or "Central African Republic" or Chad or Chile or China or Colombia or Comoros or "Comoro Islands" or Comores or Mayotte or Congo or Zaire or "Costa Rica" or "Cote d'Ivoire" or "Ivory Coast" or Croatia or Cuba or Cyprus or Czechoslovakia or "Czech Republic" or Slovakia or "Slovak Republic"):ti,ab,kw	19351
#28	(Djibouti or "French Somaliland" or Dominica or "Dominican Republic" or "East Timor" or "East Timur" or "Timor Leste" or Ecuador or Egypt or "United Arab Republic" or "El Salvador" or Eritrea or Estonia or Ethiopia or Fiji or Gabon or "Gabonese Republic" or Gambia or Gaza or Georgia or Georgian or Ghana or "Gold Coast" or Greece or Grenada or Guatemala or Guinea or Guam or Guiana or Guyana or Haiti or Honduras or Hungary or India or Maldives or Indonesia or Iran or Iraq or "Isle of Man" or Jamaica or Jordan or Kazakhstan or Kazakh or Kenya or Kiribati or Korea or Kosovo or Kyrgyzstan or Kirghizia or "Kyrgyz Republic" or Kirghiz or Kirgizstan or "Lao PDR" or Laos or Latvia or Lebanon or Lesotho or Basutoland or Liberia or Libya or Lithuania):ti,ab,kw	21045
#29	(Macedonia or Madagascar or "Malagasy Republic" or Malaysia or Malaya or Malay or Sabah or Sarawak or Malawi or Nyasaland or Mali or Malta or "Marshall Islands" or Mauritania or Mauritius or "Agalega Islands" or Mexico or Micronesia or "Middle East" or Moldova or Moldovia or Moldovian or Mongolia or Montenegro or Morocco or Ifni or Mozambique or Myanmar or Myanma or Burma or Namibia or Nepal or "Netherlands Antilles" or "New Caledonia" or Nicaragua or Niger or Nigeria or "Northern Mariana Islands" or Oman or Muscat or Pakistan or Palau or Palestine or Panama or Paraguay or Peru or Philippines or Philipines or Phillipines or Phillippines or Poland or Portugal or "Puerto Rico"):ti,ab,kw	10552
#30	(Romania or Rumania or Roumania or Russia or Russian or Rwanda or Ruanda or "Saint Kitts" or "St Kitts" or Nevis or "Saint Lucia" or "St Lucia" or "Saint Vincent" or "St Vincent" or Grenadines or Samoa or "Samoan Islands" or "Navigator Island" or "Navigator Islands" or "Sao Tome" or "Saudi Arabia" or Senegal or Serbia or Montenegro or Seychelles or "Sierra Leone" or Slovenia or "Sri Lanka" or Ceylon or "Solomon Islands" or Somalia or Sudan or Suriname or Surinam or Swaziland or Syria or Tajikistan or Tadzhikistan or Tadjikistan or Tadzhik or Tanzania or Thailand or Togo or "Togolese Republic" or Tonga or Trinidad or Tobago or Tunisia or Turkey or Turkmenistan or Turkmen or Uganda or Ukraine or Uruguay or USSR or "Soviet Union" or "Union of Soviet Socialist Republics" or Uzbekistan or Uzbek or Vanuatu or "New Hebrides" or Venezuela or Vietnam or "Viet Nam" or "West Bank" or Yemen or Yugoslavia or Zambia or Zimbabwe or Rhodesia):ti,ab,kw	12515
#31	(developing or less* next developed or "under developed" or underdeveloped or "middle income" or low* next income or underserved or "under served" or deprived or poor*) next (countr* or nation* or population* or world):ti,ab,kw	5136

(Continued)

#32	(developing or less* next developed or "under developed" or under-developed or "middle income" or low* next income) next (economy or economies):ti,ab,kw	24
#33	low* next (gdp or gnp or "gross domestic" or "gross national"):ti,ab,kw	41
#34	(low near/3 middle near/3 countr*):ti,ab,kw	772
#35	(lmic or lmics or "third world" or "lami country" or "lami countries"):ti,ab,kw	208
#36	("transitional country" or "transitional countries"):ti,ab,kw	3
#37	#26 or #27 or #28 or #29 or #30 or #31 or #32 or #33 or #34 or #35 or #36	65159
#38	#25 and #37 in Trials	414

MEDLINE Epub Ahead of Print, In-Process & Other Non-Indexed Citations, MEDLINE Daily and MEDLINE 1946 to present, Ovid (searched 10 April 2018)

#	Searches	Results
1	Reimbursement, Incentive/	3896
2	Physician Incentive Plans/	2138
3	Employee Incentive Plans/	1550
4	or/1-3	7218
5	"p4p".ti,ab,kw.	453
6	((performance or result? based) adj3 (pay* or paid or money or monetary or cash or financ* or fund* or econom* or disbursement? or remunerat* or reimburs* or compensat*)).ti,ab,kf.	5600
7	((performance or result? based) adj3 (nonmonetary or voucher? or token? or goods)).ti,ab,kf.	48
8	((performance or result? based) adj3 (reward* or bonus? or initiative? or incentive? or contract?)).ti,ab,kf.	1675
9	(indicator? adj3 (pay* or disbursement? or remunerat* or reimburs*)).ti,ab,kf.	82
10	((performance or merit) adj based).ti,ab,kf.	4495
11	((payment or financial or monetary or nonmonetary or economic or disbursement or remuneration or reimbursement or reward* or bonus) adj incentive?).ti,ab,kf.	5896
12	((payment or financial or monetary or nonmonetary or economic or disbursement or remuneration or reimbursement) adj (reward* or bonus?)).ti,ab,kf.	1584
13	(pay* adj3 quality).ti,ab,kf.	832

(Continued)

14	bonus payment?.ti,ab,kw.	81
15	((incentive or compensatory or reimbursement) adj plan?).ti,ab,kf.	222
16	((incentiv* or motivat* or positive* reinforc*) adj3 (quality or output? or outcome? or delivery or utilisation or utilization)).ti,ab,kf.	1972
17	((incentiv* or motivat* or positive* reinforc*) adj3 (target or targets or health goal? or measurable action? or behaviour? or behavior? or best practice or practice pattern? or standard? or recommendation? or guideline?)).ti,ab,kf.	5400
18	(conditional adj3 (pay* or money or monetary or cash or financ* or fund* or econom* or disbursement? or remunerat* or reimburs* or nonmonetary or voucher? or token? or goods or reward? or bonus? or incentive? or motivat*)).ti,ab,kf.	412
19	incentive payment?.ti,ab,kw.	395
20	((target or targets or targeted) adj3 (pay* or reward*)).ti,ab,kw.	470
21	((chang* or enhanc* or improve*) adj6 (provider? or practitioner? or health personnel or health care personnel or healthcare personnel or health worker? or health care worker? or healthcare worker? or physician* or doctor? or nurse? or health facilit* or health care facilit* or healthcare facilit* or hospital? or health service? or health care service? or healthcare service? or health sector? or health care sector? or healthcare sector? or health administrations or government* or nongovernment*) adj6 performance).ti,ab,kf.	1726
22	provider recognition program*.ti,ab,kw.	12
23	cash on delivery.ti,ab,kw.	6
24	(output based aid or result? based aid).ti,ab,kw.	13
25	program* for result?.ti,ab,kw.	4338
26	or/5-25	31970
27	4 or 26	36614
28	Developing Countries.sh,kf.	80636
29	(Africa or Asia or Caribbean or West Indies or South America or Latin America or Central America).hw,kf,ti,ab,cp.	238702
30	(Afghanistan or Albania or Algeria or Angola or Antigua or Barbuda or Argentina or Armenia or Armenian or Aruba or Azerbaijan or Bahrain or Bangladesh or Barbados or Benin or Byelarus or Byelorussian or Belarus or Belorussian or Belorussia or Belize or Bhutan or Bolivia or Bosnia or Herzegovina or Hercegovina or Botswana or Brasil or Brazil or Bulgaria or Burkina Faso or Burkina Fasso or Upper Volta or Burundi or Urundi or Cambodia or Khmer Republic or Kampuchea or Cameroon or Cameroons or Cameron or Camerons or Cape Verde or Central African Republic or Chad or Chile or China or Colombia or Comoros or Comoro Islands or Comores or Mayotte or Congo or Zaire or Costa Rica or Cote d'Ivoire or Ivory Coast or Croatia or Cuba or Cyprus or Czechoslovakia or Czech Republic or Slovakia or Slovak Republic or Djibouti or French Somaliland or Dominica or Dominican Republic or East Timor or East Timur or Timor Leste or Ecuador or Egypt or United Arab Republic or El Salvador or Er-	3299715

(Continued)

	itrea or Estonia or Ethiopia or Fiji or Gabon or Gabonese Republic or Gambia or Gaza or Georgia Republic or Georgian Republic or Ghana or Gold Coast or Greece or Grenada or Guatemala or Guinea or Guam or Guiana or Guyana or Haiti or Honduras or Hungary or India or Maldives or Indonesia or Iran or Iraq or Isle of Man or Jamaica or Jordan or Kazakhstan or Kazakh or Kenya or Kiribati or Korea or Kosovo or Kyrgyzstan or Kirghizia or Kyrgyz Republic or Kirghiz or Kirgizstan or Lao PDR or Laos or Latvia or Lebanon or Lesotho or Basutoland or Liberia or Libya or Lithuania or Macedonia or Madagascar or Malagasy Republic or Malaysia or Malaya or Malay or Sabah or Sarawak or Malawi or Nyasaland or Mali or Malta or Marshall Islands or Mauritania or Mauritius or Agalega Islands or Mexico or Micronesia or Middle East or Moldova or Moldovia or Moldovian or Mongolia or Montenegro or Morocco or Ifni or Mozambique or Myanmar or Myanma or Burma or Namibia or Nepal or Netherlands Antilles or New Caledonia or Nicaragua or Niger or Nigeria or Northern Mariana Islands or Oman or Muscat or Pakistan or Palau or Palestine or Panama or Paraguay or Peru or Philippines or Philipines or Phillipines or Phillippines or Poland or Portugal or Puerto Rico or Romania or Rumania or Roumania or Russia or Russian or Rwanda or Ruanda or Saint Kitts or St Kitts or Nevis or Saint Lucia or St Lucia or Saint Vincent or St Vincent or Grenadines or Samoa or Samoan Islands or Navigator Island or Navigator Islands or Sao Tome or Saudi Arabia or Senegal or Serbia or Montenegro or Seychelles or Sierra Leone or Slovenia or Sri Lanka or Ceylon or Solomon Islands or Somalia or South Africa or Sudan or Suriname or Surinam or Swaziland or Syria or Tajikistan or Tadzhikistan or Tadjikistan or Tadzhik or Tanzania or Thailand or Togo or Togolese Republic or Tonga or Trinidad or Tobago or Tunisia or Turkey or Turkmenistan or Turkmen or Uganda or Ukraine or Uruguay or USSR or Soviet Union or Union of Soviet Socialist Republics or Uzbekistan or Uzbek or Vanuatu or New Hebrides or Venezuela or Vietnam or Viet Nam or West Bank or Yemen or Yugoslavia or Zambia or Zimbabwe or Rhodesia).hw,kf,ti,ab,cp.	
31	((developing or less* developed or under developed or underdeveloped or middle income or low* income or underserved or under served or deprived or poor*) adj (countr* or nation? or population? or world)).ti,ab.	82240
32	((developing or less* developed or under developed or underdeveloped or middle income or low* income) adj (economy or economies)).ti,ab.	426
33	(low* adj (gdp or gnp or gross domestic or gross national)).ti,ab.	212
34	(low adj3 middle adj3 countr*).ti,ab.	10061
35	(lmic or lmics or third world or lami countr*).ti,ab.	5396
36	transitional countr*.ti,ab.	142
37	or/28-36	3434653
38	randomized controlled trial.pt.	457171
39	controlled clinical trial.pt.	92291
40	multicenter study.pt.	230940
41	pragmatic clinical trial.pt.	713
42	non-randomized controlled trials as topic/	318
43	interrupted time series analysis/	400

(Continued)

44	controlled before-after studies/	312
45	(randomis* or randomiz* or randomly or groups or trial or multicenter or multi center or multicentre or multi centre or intervention? or effect? or impact? or controlled or control group? or (before adj5 after) or (pre adj5 post) or ((pretest or pre test) and (posttest or post test)) or quasiexperiment* or quasi experiment* or pseudo experiment* or pseudoexperiment* or evaluat* or time series or time point? or time trend? or repeated measur*).ti,ab.	9340545
46	or/38-45	9435441
47	exp Animals/	21420298
48	Humans/	16980031
49	47 not (47 and 48)	4440267
50	review.pt.	2362528
51	meta analysis.pt.	86627
52	news.pt.	186688
53	comment.pt.	711961
54	editorial.pt.	454775
55	cochrane database of systematic reviews.jn.	13526
56	comment on.cm.	711958
57	(systematic review or literature review).ti.	109172
58	or/49-57	7852927
59	46 not 58	6604157
60	27 and 37 and 59	2107

Embase 1974 to 2018 April 09, Ovid (searched 10 April 2018)

#	Searches	Results
1	"p4p".ti,ab,kw.	534

(Continued)

2	((performance or result? based) adj3 (pay* or paid or money or monetary or cash or financ* or fund* or econom* or disbursement? or remunerat* or reimburs* or compensat*)).ti,ab,kf.	6667
3	((performance or result? based) adj3 (nonmonetary or voucher? or token? or goods)).ti,ab,kf.	65
4	((performance or result? based) adj3 (reward* or bonus? or initiative? or incentive? or contract?)).ti,ab,kf.	2062
5	(indicator? adj3 (pay* or disbursement? or remunerat* or reimburs*)).ti,ab,kf.	99
6	((performance or merit) adj based).ti,ab,kf.	5428
7	((payment or financial or monetary or nonmonetary or economic or disbursement or remuneration or reimbursement or reward* or bonus) adj incentive?).ti,ab,kf.	7146
8	((payment or financial or monetary or nonmonetary or economic or disbursement or remuneration or reimbursement) adj (reward* or bonus?)).ti,ab,kf.	1985
9	(pay* adj3 quality).ti,ab,kf.	1012
10	bonus payment?.ti,ab,kw.	95
11	((incentive or compensatory or reimbursement) adj plan?).ti,ab,kf.	264
12	((incentiv* or motivat* or positive* reinforc*) adj3 (quality or output? or outcome? or delivery or utilisation or utilization)).ti,ab,kf.	2410
13	((incentiv* or motivat* or positive* reinforc*) adj3 (target or targets or health goal? or measurable action? or behaviour? or behavior? or best practice or practice pattern? or standard? or recommendation? or guideline?)).ti,ab,kf.	6560
14	(conditional adj3 (pay* or money or monetary or cash or financ* or fund* or econom* or disbursement? or remunerat* or reimburs* or nonmonetary or voucher? or token? or goods or reward? or bonus? or incentive? or motivat*)).ti,ab,kf.	496
15	incentive payment?.ti,ab,kw.	475
16	((target or targets or targeted) adj3 (pay* or reward*)).ti,ab,kw.	598
17	((chang* or enhanc* or improve*) adj6 (provider? or practitioner? or health personnel or health care personnel or healthcare personnel or health worker? or health care worker? or healthcare worker? or physician* or doctor? or nurse? or health facilit* or health care facilit* or healthcare facilit* or hospital? or health service? or health care service? or healthcare service? or health sector? or health care sector? or healthcare sector? or health administrations or government* or nongovernment*) adj6 performance).ti,ab,kf.	2167
18	provider recognition program*.ti,ab,kw.	14
19	cash on delivery.ti,ab,kw.	4
20	(output based aid or result? based aid).ti,ab,kw.	19

(Continued)

21	or/1-20	33682
22	Developing Country.sh.	89096
23	(Africa or Asia or Caribbean or West Indies or South America or Latin America or Central America).hw,ti,ab,cp.	304374
24	(Afghanistan or Albania or Algeria or Angola or Antigua or Barbuda or Argentina or Armenia or Armenian or Aruba or Azerbaijan or Bahrain or Bangladesh or Barbados or Benin or Byelarus or Byelorussian or Belarus or Belorussian or Belorussia or Belize or Bhutan or Bolivia or Bosnia or Herzegovina or Hercegovina or Botswana or Brasil or Brazil or Bulgaria or Burkina Faso or Burkina Fasso or Upper Volta or Burundi or Urundi or Cambodia or Khmer Republic or Kampuchea or Cameroon or Cameroons or Cameron or Camerons or Cape Verde or Central African Republic or Chad or Chile or China or Colombia or Comoros or Comoro Islands or Comores or Mayotte or Congo or Zaire or Costa Rica or Cote d'Ivoire or Ivory Coast or Croatia or Cuba or Cyprus or Czechoslovakia or Czech Republic or Slovakia or Slovak Republic or Djibouti or French Somaliland or Dominica or Dominican Republic or East Timor or East Timur or Timor Leste or Ecuador or Egypt or United Arab Republic or El Salvador or Eritrea or Estonia or Ethiopia or Fiji or Gabon or Gabonese Republic or Gambia or Gaza or Georgia Republic or Georgian Republic or Ghana or Gold Coast or Greece or Grenada or Guatemala or Guinea or Guam or Guiana or Guyana or Haiti or Honduras or Hungary or India or Maldives or Indonesia or Iran or Iraq or Isle of Man or Jamaica or Jordan or Kazakhstan or Kazakh or Kenya or Kiribati or Korea or Kosovo or Kyrgyzstan or Kirghizia or Kyrgyz Republic or Kirghiz or Kirgizstan or Lao PDR or Laos or Latvia or Lebanon or Lesotho or Basutoland or Liberia or Libya or Lithuania or Macedonia or Madagascar or Malagasy Republic or Malaysia or Malaya or Malay or Sabah or Sarawak or Malawi or Nyasaland or Mali or Malta or Marshall Islands or Mauritania or Mauritius or Agalega Islands or Mexico or Micronesia or Middle East or Moldova or Moldovia or Moldovian or Mongolia or Montenegro or Morocco or Ifni or Mozambique or Myanmar or Myanma or Burma or Namibia or Nepal or Netherlands Antilles or New Caledonia or Nicaragua or Niger or Nigeria or Northern Mariana Islands or Oman or Muscat or Pakistan or Palau or Palestine or Panama or Paraguay or Peru or Philippines or Philipines or Phillipines or Phillippines or Poland or Portugal or Puerto Rico or Romania or Rumania or Roumania or Russia or Russian or Rwanda or Ruanda or Saint Kitts or St Kitts or Nevis or Saint Lucia or St Lucia or Saint Vincent or St Vincent or Grenadines or Samoa or Samoan Islands or Navigator Island or Navigator Islands or Sao Tome or Saudi Arabia or Senegal or Serbia or Montenegro or Seychelles or Sierra Leone or Slovenia or Sri Lanka or Ceylon or Solomon Islands or Somalia or South Africa or Sudan or Suriname or Surinam or Swaziland or Syria or Tajikistan or Tadzhikistan or Tadjikistan or Tadzhik or Tanzania or Thailand or Togo or Togolese Republic or Tonga or Trinidad or Tobago or Tunisia or Turkey or Turkmenistan or Turkmen or Uganda or Ukraine or Uruguay or USSR or Soviet Union or Union of Soviet Socialist Republics or Uzbekistan or Uzbek or Vanuatu or New Hebrides or Venezuela or Vietnam or Viet Nam or West Bank or Yemen or Yugoslavia or Zambia or Zimbabwe or Rhodesia).hw,ti,ab,cp.	3794559
25	((developing or less* developed or under developed or underdeveloped or middle income or low* income or underserved or under served or deprived or poor*) adj (countr* or nation? or population? or world)).ti,ab.	102736
26	((developing or less* developed or under developed or underdeveloped or middle income or low* income) adj (economy or economies)).ti,ab.	552
27	(low* adj (gdp or gnp or gross domestic or gross national)).ti,ab.	309

(Continued)

28	(low adj3 middle adj3 countr*).ti,ab.	11603
29	(lmic or lmics or third world or lami countr*).ti,ab.	6491
30	transitional countr*.ti,ab.	202
31	or/22-30	3989622
32	Randomized Controlled Trial/	497473
33	Controlled Clinical Trial/	459840
34	Quasi Experimental Study/	4473
35	Pretest Posttest Control Group Design/	339
36	Time Series Analysis/	20575
37	Experimental Design/	15363
38	Multicenter Study/	182164
39	(randomis* or randomiz* or randomly or groups or trial or multicenter or multi center or multicentre or multi centre or intervention? or effect? or impact? or controlled or control group? or (before adj5 after) or (pre adj5 post) or ((pretest or pre test) and (posttest or post test)) or quasiexperiment* or quasi experiment* or pseudo experiment* or pseudoexperiment* or evaluat* or time series or time point? or time trend? or repeated measur*).ti,ab.	11966055
40	or/32-39	12075806
41	exp animals/ or exp invertebrate/ or animal experiment/ or animal model/ or animal tissue/ or animal cell/ or nonhuman/	25885548
42	human/ or normal human/ or human cell/	19570376
43	41 and 42	19522175
44	41 not 43	6363373
45	(systematic review or literature review).ti.	129754
46	"cochrane database of systematic reviews".jn.	11732
47	or/44-46	6503618
48	40 not 47	9228365
49	21 and 31 and 48	2212
50	limit 49 to embase	1158

(Continued)

PsycINFO 1806 to April Week 1 2018 (searched 10 April 2018)

#	Searches	Results
1	Monetary Incentives/	1313
2	Monetary Rewards/	1001
3	"p4p".ti,ab.	81
4	((performance or result? based) adj3 (pay* or paid or money or monetary or cash or financ* or fund* or econom* or disbursement? or remunerat* or reimburs* or compensat*)).ti,ab.	4684
5	((performance or result? based) adj3 (nonmonetary or voucher? or token? or goods)).ti,ab.	71
6	((performance or result? based) adj3 (reward* or bonus? or initiative? or incentive? or contract?)).ti,ab.	2076
7	(indicator? adj3 (pay* or disbursement? or remunerat* or reimburs*)).ti,ab.	23
8	((performance or merit) adj based).ti,ab.	3815
9	((payment or financial or monetary or nonmonetary or economic or disbursement or remuneration or reimbursement or reward* or bonus) adj incentive?).ti,ab.	2876
10	((payment or financial or monetary or nonmonetary or economic or disbursement or remuneration or reimbursement) adj (reward* or bonus?)).ti,ab.	1843
11	(pay* adj3 quality).ti,ab.	143
12	bonus payment?.ti,ab.	39
13	((incentive or compensatory or reimbursement) adj plan?).ti,ab.	134
14	((incentiv* or motivat* or positive* reinforc*) adj3 (quality or output? or outcome? or delivery or utilisation or utilization)).ti,ab.	2025
15	((incentiv* or motivat* or positive* reinforc*) adj3 (target or targets or health goal? or measurable action? or behaviour? or behavior? or best practice or practice pattern? or standard? or recommendation? or guideline?)).ti,ab.	8296
16	(conditional adj3 (pay* or money or monetary or cash or financ* or fund* or econom* or disbursement? or remunerat* or reimburs* or nonmonetary or voucher? or token? or goods or reward? or bonus? or incentive? or motivat*)).ti,ab.	229

(Continued)

17	incentive payment?.ti,ab.	60
18	((target or targets or targeted) adj3 (pay* or reward*)).ti,ab.	246
19	((chang* or enhanc* or improve*) adj6 (provider? or practitioner? or health personnel or health care personnel or healthcare personnel or health worker? or health care worker? or healthcare worker? or physician* or doctor? or nurse? or health facilit* or health care facilit* or healthcare facilit* or hospital? or health service? or health care service? or healthcare service? or health sector? or health care sector? or healthcare sector? or health administrations or government* or nongovernment*) adj6 performance).ti,ab.	446
20	provider recognition program*.ti,ab.	2
21	cash on delivery.ti,ab.	3
22	(output based aid or result? based aid).ti,ab.	1
23	or/1-22	26035
24	Developing Countries/	5060
25	(Africa or Asia or Caribbean or West Indies or South America or Latin America or Central America).id,ti,ab,hw.	33464
26	(Afghanistan or Albania or Algeria or Angola or Antigua or Barbuda or Argentina or Armenia or Armenian or Aruba or Azerbaijan or Bahrain or Bangladesh or Barbados or Benin or Byelarus or Byelorussian or Belarus or Belorussian or Belorussia or Belize or Bhutan or Bolivia or Bosnia or Herzegovina or Hercegovina or Botswana or Brasil or Brazil or Bulgaria or Burkina Faso or Burkina Fasso or Upper Volta or Burundi or Urundi or Cambodia or Khmer Republic or Kampuchea or Cameroon or Cameroons or Cameron or Camerons or Cape Verde or Central African Republic or Chad or Chile or China or Colombia or Comoros or Comoro Islands or Comores or Mayotte or Congo or Zaire or Costa Rica or Cote d'Ivoire or Ivory Coast or Croatia or Cuba or Cyprus or Czechoslovakia or Czech Republic or Slovakia or Slovak Republic or Djibouti or French Somaliland or Dominica or Dominican Republic or East Timor or East Timur or Timor Leste or Ecuador or Egypt or United Arab Republic or El Salvador or Eritrea or Estonia or Ethiopia or Fiji or Gabon or Gabonese Republic or Gambia or Gaza or Georgia Republic or Georgian Republic or Ghana or Gold Coast or Greece or Grenada or Guatemala or Guinea or Guam or Guiana or Guyana or Haiti or Honduras or Hungary or India or Maldives or Indonesia or Iran or Iraq or Isle of Man or Jamaica or Jordan or Kazakhstan or Kazakh or Kenya or Kiribati or Korea or Kosovo or Kyrgyzstan or Kirghizia or Kyrgyz Republic or Kirghiz or Kirgizstan or Lao PDR or Laos or Latvia or Lebanon or Lesotho or Basutoland or Liberia or Libya or Lithuania or Macedonia or Madagascar or Malagasy Republic or Malaysia or Malaya or Malay or Sabah or Sarawak or Malawi or Nyasaland or Mali or Malta or Marshall Islands or Mauritania or Mauritius or Agalega Islands or Mexico or Micronesia or Middle East or Moldova or Moldovia or Moldovian or Mongolia or Montenegro or Morocco or Ifni or Mozambique or Myanmar or Myanma or Burma or Namibia or Nepal or Netherlands Antilles or New Caledonia or Nicaragua or Niger or Nigeria or Northern Mariana Islands or Oman or Muscat or Pakistan or Palau or Palestine or Panama or Paraguay or Peru or Philippines or Philipines or Phillipines or Phillippines or Poland or Portugal or Puerto Rico or Romania or Rumania or Roumania or Russia or Russian or Rwanda or Ruanda or Saint Kitts or St Kitts or Nevis or Saint Lucia or St Lucia or Saint Vincent or St Vincent or Grenadines or Samoa or Samoan Islands or Navigator Island or Navigator Islands or Sao Tome or Saudi Arabia or Senegal or Serbia or Montenegro or Seychelles or Sierra Leone or Slovenia or Sri Lanka	186869

(Continued)

	or Ceylon or Solomon Islands or Somalia or South Africa or Sudan or Suriname or Surinam or Swaziland or Syria or Tajikistan or Tadzhikistan or Tadjikistan or Tadzhik or Tanzania or Thailand or Togo or Togolese Republic or Tonga or Trinidad or Tobago or Tunisia or Turkey or Turkmenistan or Turkmen or Uganda or Ukraine or Uruguay or USSR or Soviet Union or Union of Soviet Socialist Republics or Uzbekistan or Uzbek or Vanuatu or New Hebrides or Venezuela or Vietnam or Viet Nam or West Bank or Yemen or Yugoslavia or Zambia or Zimbabwe or Rhodesia).ti,ab,hw.	
27	((developing or less* developed or under developed or underdeveloped or middle income or low* income or underserved or under served or deprived or poor*) adj (countr* or nation? or population? or world)).ti,ab.	15378
28	((developing or less* developed or under developed or underdeveloped or middle income or low* income) adj (economy or economies)).ti,ab.	318
29	(low* adj (gdp or gnp or gross domestic or gross national)).ti,ab.	39
30	(low adj3 middle adj3 countr*).ti,ab.	2302
31	(lmic or lmics or third world or lami countr*).ti,ab.	1485
32	transitional countr*.ti,ab.	59
33	or/24-32	210233
34	Treatment Outcome.md.	18819
35	Empirical Study.md.	2263554
36	Prospective Study.md.	38176
37	Quantitative Study.md.	1377390
38	experimental design/	10755
39	between groups design/	110
40	quantitative methods/	3044
41	quasi experimental methods/	144
42	pretesting/	236
43	posttesting/	135
44	repeated measures/	651
45	time series/	1897
46	(posttest or posttests or post test or post tests or pretest or pretests or pre test or pre tests or "pretest/posttest" or quasi experimental or repeated measure or repeated measurement or repeated measurements or repeated measures or time series).id.	3385
47	(randomis* or randomiz* or randomly or groups or trial or multicenter or multi center or multicentre or multi centre or intervention? or effect? or impact? or controlled or control group? or (before adj5 after) or (pre adj5 post) or ((pretest	2015402

(Continued)

	or pre test) and (posttest or post test)) or quasiexperiment* or quasi experiment* or pseudo experiment* or pseudoexperiment* or evaluat* or time series or time point? or time trend? or repeated measur*).ti,ab.	
48	or/34-47	3013075
49	23 and 33 and 48	1266

CINAHL 1981 to present, EBSCOhost (searched 10 April 2018)

#	Query	Results
S47	S21 AND S31 AND S45 Exclude MEDLINE records	340
S46	S21 AND S31 AND S45	815
S45	S32 OR S33 OR S34 OR S35 OR S36 OR S37 OR S38 OR S39 OR S40 OR S41 OR S42 OR S43 OR S44	1,582,750
S44	TI ((randomis* or randomiz* or randomly or trial or effect* or impact* or intervention* or before N5 after or pre N5 post or ((pretest or "pre test") and (posttest or "post test")) or quasiexperiment* or quasi W0 experiment* or pseudo experiment* or pseudoexperiment* or evaluat* or "time series" or time W0 point* or repeated W0 measur*)) OR AB ((randomis* or randomiz* or randomly or trial or effect* or impact* or intervention* or before N5 after or pre N5 post or ((pretest or "pre test") and (posttest or "post test")) or quasiexperiment* or quasi W0 experiment* or pseudo experiment* or pseudoexperiment* or evaluat* or "time series" or time W0 point* or repeated W0 measur*))	987,530
S43	(MH "Health Services Research")	8,042
S42	(MH "Multicenter Studies")	35,373
S41	(MH "Quasi-Experimental Studies+")	10,453
S40	(MH "Pretest-Posttest Design+")	31,400
S39	(MH "Experimental Studies")	17,810

(Continued)

S38	(MH "Nonrandomized Trials")	261
S37	(MH "Intervention Trials")	6,995
S36	(MH "Clinical Trials")	93,018
S35	(MH "Randomized Controlled Trials")	41,155
S34	PT research	1,198,627
S33	PT clinical trial	55,968
S32	PT randomized controlled trial	43,976
S31	S22 OR S23 OR S24 OR S25 OR S26 OR S27 OR S28 OR S29 OR S30	234,939
S30	TI transitional N0 countr* OR AB transitional N0 countr*	42
S29	TI (lmic or lmics or "third world" or lami N0 countr*) OR AB (lmic or lmics or "third world" or lami N0 countr*)	721
S28	TI low N3 middle N3 countr* OR AB low N3 middle N3 countr*	2,061
S27	TI (low* N0 (gdp or gnp or "gross domestic" or "gross national")) OR AB (low* N0 (gdp or gnp or "gross domestic" or "gross national"))	21
S26	TI ((developing or less* N0 developed or "under developed" or underdeveloped or "middle income" or low* N3 income) N0 (economy or economies)) OR AB ((developing or less* N0 developed or "under developed" or underdeveloped or "middle income" or low* N3 income) N0 (economy or economies))	60
S25	TI (developing or less* N0 developed or "under developed" or underdeveloped or "middle income" or low* N0 income or underserved or "under served" or deprived or poor*) N0 (countr* or nation* or population* or world)) OR AB (developing or less* N0 developed or "under developed" or underdeveloped or "middle income" or low* N0 income or underserved or "under served" or deprived or poor*) N0 (countr* or nation* or population* or world))	12,974
S24	TX Afghanistan or Albania or Algeria or Angola or Antigua or Barbuda or Argentina or Armenia or Armenian or Aruba or Azerbaijan or Bahrain or Bangladesh or Barbados or Benin or Byelarus or Byelorussian or Belarus or Belorussian or Belorussia or Belize or Bhutan or Bolivia or Bosnia or Herzegovina or Hercegovina or Botswana or Brasil or Brazil or Bulgaria or Burkina Faso or Burkina Fasso or Upper Volta or Burundi or Urundi or Cambodia or Khmer Republic or Kampuchea or Cameroon or Cameroons or Cameron or Camerons or Cape Verde or Central African Republic or Chad or Chile or China or Colombia or Comoros or Comoro Islands or Comores or Mayotte or Congo or Zaire or Costa Rica or Cote d'Ivoire or Ivory Coast or Croatia or Cuba or Cyprus or Czechoslovakia or Czech Republic or Slovakia or Slovak Republic or Djibouti or French Somaliland or Dominica or Dominican Republic or East Timor or East Timur or Timor Leste or Ecuador or Egypt or United Arab Republic or El Salvador or Eritrea or Estonia or Ethiopia or Fiji or Gabon or Gabonese Republic or Gambia or Gaza or Georgia Republic or Georgian Republic or Ghana or Gold Coast or Greece or Grenada or Guatemala or Guinea or Guam or Guiana or Guyana or Haiti or Honduras or Hungary or India or Maldives or Indonesia or Iran or Iraq or Isle of Man or Jamaica or Jordan or Kazakhstan or Kazakh or Kenya or Kiribati or Korea or Kosovo or Kyrgyzstan or Kirghizia or Kyrgyz Republic or Kirghiz or Kirgizstan or Lao PDR or Laos or Latvia or Lebanon	203,277

(Continued)

	or Lesotho or Basutoland or Liberia or Libya or Lithuania or Macedonia or Madagascar or Malagasy Republic or Malaysia or Malaya or Malay or Sabah or Sarawak or Malawi or Nyasaland or Mali or Malta or Marshall Islands or Mauritania or Mauritius or Agalega Islands or Mexico or Micronesia or Middle East or Moldova or Moldovia or Moldovian or Mongolia or Montenegro or Morocco or Ifni or Mozambique or Myanmar or Myanma or Burma or Namibia or Nepal or Netherlands Antilles or New Caledonia or Nicaragua or Niger or Nigeria or Northern Mariana Islands or Oman or Muscat or Pakistan or Palau or Palestine or Panama or Paraguay or Peru or Philippines or Philipines or Phillipines or Phillippines or Poland or Portugal or Puerto Rico or Romania or Rumania or Roumania or Russia or Russian or Rwanda or Ruanda or Saint Kitts or St Kitts or Nevis or Saint Lucia or St Lucia or Saint Vincent or St Vincent or Grenadines or Samoa or Samoan Islands or Navigator Island or Navigator Islands or Sao Tome or Saudi Arabia or Senegal or Serbia or Montenegro or Seychelles or Sierra Leone or Slovenia or Sri Lanka or Ceylon or Solomon Islands or Somalia or South Africa or Sudan or Suriname or Surinam or Swaziland or Syria or Tajikistan or Tadzhikistan or Tadjikistan or Tadzhik or Tanzania or Thailand or Togo or Togolese Republic or Tonga or Trinidad or Tobago or Tunisia or Turkey or Turkmenistan or Turkmen or Uganda or Ukraine or Uruguay or USSR or Soviet Union or Union of Soviet Socialist Republics or Uzbekistan or Uzbek or Vanuatu or New Hebrides or Venezuela or Vietnam or Viet Nam or West Bank or Yemen or Yugoslavia or Zambia or Zimbabwe or Rhodesia	
S23	TX Africa or Asia or Caribbean or "West Indies" or "South America" or "Latin America" or "Central America"	43,714
S22	(MH "Developing Countries")	9,732
S21	S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11 OR S12 OR S13 OR S14 OR S15 OR S16 OR S17 OR S18 OR S19 OR S20	11,558
S20	TI ("output based aid" or "output based aid" or "result based aid" or "results based aid") OR AB ("output based aid" or "output based aid" or "result based aid" or "results based aid")	155,579
S19	TI "cash on delivery" OR AB "cash on delivery"	3
S18	TI "provider recognition" N0 program* OR AB "provider recognition" N0 program*	7
S17	TI ((chang* or enhanc* or improve*) N6 (provider* or practitioner* or "health personnel" or "health care personnel" or "healthcare personnel" or health N0 worker* or "health care" N0 worker* or healthcare N0 worker* or physician* or doctor or doctors or nurse or nurses or health N0 facilit* or "health care" N0 facilit* or healthcare N0 facilit* or hospital or hospitals or health N0 service* or "health care" N0 service* or healthcare N0 service* or health N0 sector* or "health care" N0 sector* or healthcare N0 sector* or "health administrations" or government* or nongovernment*) N6 performance) OR AB ((chang* or enhanc* or improve*) N6 (provider* or practitioner* or "health personnel" or "health care personnel" or "healthcare personnel" or health N0 worker* or "health care" N0 worker* or healthcare N0 worker* or physician* or doctor or doctors or nurse or nurses or health N0 facilit* or "health care" N0 facilit* or healthcare N0 facilit* or hospital or hospitals or health N0 service* or "health care" N0 service* or healthcare N0 service* or health N0 sector* or "health care" N0 sector* or healthcare N0 sector* or "health administrations" or government* or nongovernment*) N6 performance)	911
S16	TI (target or targets or targeted) N3 (pay* or reward*) OR AB (target or targets or targeted) N3 (pay* or reward*)	99

(Continued)

S15	TI (incentive N0 payment*) OR AB (incentive N0 payment*)	310
S14	TI (conditional N3 (pay* or money or monetary or cash or financ* or econom* or disbursement* or remunerat* or reimburs* or nonmonetary or voucher* or token or tokens or goods or reward* or bonus* or incentive* or motivat*)) OR AB (conditional N3 (pay* or money or monetary or cash or financ* or econom* or disbursement* or remunerat* or reimburs* or nonmonetary or voucher* or token or tokens or goods or reward* or bonus* or incentive* or motivat*))	121
S13	TI ((incentiv* or motivat* or positive* N0 reinforc*) N3 (target or targets or "health goal" or "health goals" or measurable N0 action* or behaviour* or behavior* or "best practice" or practice N0 pattern* or standard or standards or recommendation* or guideline*)) OR AB ((incentiv* or motivat* or positive* N0 reinforc*) N3 (target or targets or "health goal" or "health goals" or measurable N0 action* or behaviour* or behavior* or "best practice" or practice N0 pattern* or standard or standards or recommendation* or guideline*))	1,977
S12	TI ((incentiv* or motivat* or positive* N0 reinforc*) N3 (quality or output* or outcome* or delivery or utilisation or utilization)) OR AB ((incentiv* or motivat* or positive* N0 reinforc*) N3 (quality or output* or outcome* or delivery or utilisation or utilization))	973
S11	TI ((incentive* or compensatory or reimbursement) N0 (plan or plans)) OR AB ((incentive* or compensatory or reimbursement) N0 (plan or plans))	67
S10	TI (bonus N0 payment*) OR AB (bonus N0 payment*)	37
S9	TI (pay* N3 quality) OR AB (pay* N3 quality)	588
S8	TI ((payment or financial or monetary or nonmonetary or economic or disbursement or remuneration or reimbursement) N0 (reward* or bonus*)) OR AB ((payment or financial or monetary or nonmonetary or economic or disbursement or remuneration or reimbursement) N0 (reward* or bonus*))	313
S7	TI ((payment or financial or monetary or nonmonetary or economic or disbursement or remuneration or reimbursement or reward* or bonus) N0 incentive*) OR AB ((payment or financial or monetary or nonmonetary or economic or disbursement or remuneration or reimbursement or reward* or bonus) N0 incentive*)	1,952
S6	TI ((performance or merit) N0 based) OR AB ((performance or merit) N0 based)	1,549
S5	TI (indicator* N3 (pay* or disbursement* or remunerat* or reimburs*)) OR AB (indicator* N3 (pay* or disbursement* or remunerat* or reimburs*))	51
S4	TI (((performance or "result based" or "results based") N3 (reward* or bonus* or initiative* or incentive* or contract or contracts))) OR AB (((performance or "result based" or "results based") N3 (reward* or bonus* or initiative* or incentive* or contract or contracts)))	696
S3	TI ((performance or "result based" or "results based") N3 (nonmonetary or voucher* or token or tokens or goods)) OR AB ((performance or "result based" or "results based") N3 (nonmonetary or voucher* or token or tokens or goods))	900
S2	TI ((performance or "result based" or "results based") N3 (pay* or paid or money or monetary or cash or financ* or fund* or econom* or disbursement* or remunerat* or reimburs* or compensat*)) OR AB ((performance or "result based"	2,346

(Continued)

	or "results based") N3 (pay* or paid or money or monetary or cash or financ* or fund* or econom* or disbursement* or remunerat* or reimburs* or compensat*))	
S1	(MH "Reimbursement, Incentive")	1,183

ClinicalTrials.gov, NIH (clinicaltrials.gov) (searched June 2018)

Advanced search in Intervention/treatment (6 individual strategies/searches)
ID Search
1 "performance based" OR "reward based" OR "result based" OR "results based" OR "performance incentive" OR "performance incentives" OR "reimbursement incentive" OR "reimbursement incentives" OR "p4p"
2 "pay for performance" OR "paying for performance" OR "payment for performance" OR "payments for performance" OR "pay by performance" OR "paying by performance" OR "payment by performance" OR "payments by performance"
3 "performance related payment" OR "performance related payments" OR "incentive payment" OR "incentive payments" OR "payment incentive" OR "payment incentives"
4 "financial incentive" OR "financial incentives" OR "economic incentive" OR "economic incentives" OR "monetary incentive" OR "monetary incentives"
5 "financial reward" OR "financial rewards" OR "economic reward" OR "economic rewards" OR "monetary reward" OR "monetary rewards"
6 "rewarding performance" OR "performance reward" OR "performance rewards" OR "bonus payment" OR "bonus payments" OR "conditional cash"

ICTRP, WHO (apps.who.int/trialsearch/AdvSearch.aspx) (searched June 2018)

Advanced search in the Intervention with Recruitment status: ALL (6 individual strategies/searches)
ID Search
1 performance based OR reward based OR result based OR results based OR performance incentive OR performance incentives OR reimbursement incentive OR reimbursement incentives OR p4p
2 pay for performance OR paying for performance OR payment for performance OR payments for performance OR pay by performance OR paying by performance OR payment by performance OR payments by performance
3 performance related payment OR performance related payments OR incentive payment OR incentive payments OR payment incentive OR payment incentives
4 financial incentive OR financial incentives OR economic incentive OR economic incentives OR monetary incentive OR monetary incentives
5 financial reward OR financial rewards OR economic reward OR economic rewards OR monetary reward OR monetary rewards
6 rewarding performance OR performance reward OR performance rewards OR bonus payment OR bonus payments OR conditional cash

Global Health 1973 to 2018 Week 43, Ovid (searched 27 April 2018)

ID Search
1 "p4p".af.
2 ((result based or results based) adj (pay* or fund* or reward*)).af.
3 (pay* adj3 perform*).af.
4 ((performance or merit) adj based).af.
5 ((performance or payment or financial or monetary or nonmonetary or economic or disbursement or remuneration or reimbursement or reward* or bonus) adj incentive?).af.
6 incentive payment?.af.
7 ((performance or payment or financial or monetary or nonmonetary or economic or disbursement or remuneration or reimbursement) adj (reward* or bonus?)).af.
8 (pay* adj3 quality).af.
9 ((incentive or compensatory or reimbursement) adj plan?).af.
10 (conditional adj3 (pay* or money or monetary or cash or financ* or fund* or econom* or disbursement? or remunerat* or reimburs* or nonmonetary or voucher? or token? or goods or reward? or bonus? or incentive? or motivat*)).af.
11 ((target or targets or targeted) adj3 (pay* or reward*)).af.
12 ((chang* or enhanc* or improve*) adj6 (provider? or practitioner? or health personnel or health care personnel or healthcare personnel or health worker? or health care worker? or healthcare worker? or physician* or doctor? or nurse? or health facilit* or health care facilit* or healthcare facilit* or hospital? or health service? or health care service? or healthcare service? or health sector? or health care sector? or healthcare sector? or health administrations or government* or nongovernment*) adj6 performance).af.

13 or/1-12
14 (random* or intervention? or control* or evaluat* or (before adj5 after) or (pre adj5 post) or ((pretest or pre test) and (posttest or post test)) or quasiexperiment* or quasi experiment* or time series or time point? or time trend? or repeated measur*).ti,ab.
15 (trial or effect? or impact?).ti.
16 or/14-15
17 13 and 16

EconLit 1886 to present, EBSCOhost (searched 27 April 2018)

ID Search
S27 S15 AND S16 AND S25 AND S26
S26 TI (randomis* OR randomiz* OR randomly OR groups OR trial OR multicenter OR "multi center" OR multicentre OR "multi centre" OR intervention* OR effect* OR impact* OR controlled OR "control group" OR "before and after" OR quasiexperiment* OR quasi W0 experiment* OR pseudo W0 experiment* OR pseudoexperiment* OR evaluat* OR "time series" OR time W0 point* OR time W0 trend* OR repeated W0 measur*) OR AB (randomis* OR randomiz* OR randomly OR groups OR trial OR multicenter OR "multi center" OR multicentre OR "multi centre" OR intervention* OR effect* OR impact* OR controlled OR "control group" OR "before and after" OR quasiexperiment* OR quasi W0 experiment* OR pseudo W0 experiment* OR pseudoexperiment* OR evaluat* OR "time series" OR time W0 point* OR time W0 trend* OR repeated W0 measur*)
S25 S17 OR S18 OR S19 OR S20 OR S21 OR S22 OR S23 OR S24
S24 TI ("transitional country" or "transitional countries")) OR AB ("transitional country" or "transitional countries"))
S23 TI (lmic or lmics or "third world" or "lami country" or "lami countries") OR AB (lmic or lmics or "third world" or "lami country" or "lami countries")
S22 TI (low N3 middle N3 countr*) OR AB (low N3 middle N3 countr*)
S21 TI (low* W0 (gdp or gnp or "gross domestic" or "gross national")) OR AB (low* W0 (gdp or gnp or "gross domestic" or "gross national"))
S20 TI ((developing or "less developed" or "lesser developed" or "under developed" or underdeveloped or "middle income" or "low income" or "lower income") W0 (economy or economies)) OR AB ((developing or "less developed" or "lesser developed" or "under developed" or underdeveloped or "middle income" or "low income" or "lower income") W0 (economy or economies))
S19 TI ((developing or "less developed" or "lesser developed" or "under developed" or underdeveloped or "middle income" or "low income" or "lower income" or underserved or "under served" or deprived or poor*) W0 (countr* or nation* or population* or world)) OR AB ((developing or "less developed" or "lesser developed" or "under developed" or underdeveloped or "middle income" or "low income" or "lower income" or underserved or "under served" or deprived or poor*) W0 (countr* or nation* or population* or world))
S18 TX (Afghanistan OR Albania OR Algeria OR Angola OR Antigua OR Barbuda OR Argentina OR Armenia OR Armenian OR Aruba OR Azerbaijan OR Bahrain OR Bangladesh OR Barbados OR Benin OR Byelarus OR Byelorussian OR Belarus OR Belorussian OR Belorussia OR Belize OR Bhutan OR Bolivia OR Bosnia OR Herzegovina OR Hercegovina OR Botswana OR Brasil OR Brazil OR Bulgaria OR "Burkina Faso" OR "Burkina Fasso" OR "Upper Volta" OR Burundi OR Urundi OR Cambodia OR "Khmer Republic" OR Kampuchea OR Cameroon OR Cameroons OR Cameron OR Camerons OR "Cape Verde" OR "Central African Republic" OR Chad OR Chile OR China OR Colombia OR Comoros OR "Comoro Islands" OR Comores OR Mayotte OR Congo OR Zaire OR "Costa Rica" OR "Cote d'Ivoire" OR "Ivory Coast" OR Croatia OR Cuba OR Cyprus OR Czechoslovakia OR "Czech Republic" OR Slovakia OR "Slovak Republic" OR Djibouti OR "French Somaliland" OR Dominica OR "Dominican Republic" OR "East Timor" OR "East Timur" OR "Timor Leste" OR Ecuador OR Egypt OR "United Arab Republic" OR "El Salvador" OR Eritrea OR Estonia OR Ethiopia OR Fiji OR Gabon OR "Gabonese Republic" OR Gambia OR Gaza OR Georgia OR Georgian OR Ghana OR "Gold Coast" OR Greece OR Grenada OR Guatemala OR Guinea OR Guam OR Guiana OR Guyana OR Haiti OR Honduras OR Hungary OR India OR Maldives OR Indonesia OR Iran OR Iraq OR "Isle of Man" OR Jamaica OR Jordan OR Kazakhstan OR Kazakh OR Kenya OR Kiribati OR Korea OR Kosovo OR Kyrgyzstan OR Kirghizia OR "Kyrgyz Republic" OR Kirghiz OR Kirgizstan OR "Lao PDR" OR Laos OR Latvia OR Lebanon OR Lesotho OR Basutoland OR Liberia OR Libya OR Lithuania OR Macedonia OR Madagascar OR "Malagasy Republic" OR Malaysia OR Malaya OR Malay OR Sabah OR Sarawak OR Malawi OR Nyasaland OR Mali OR Malta OR "Marshall Islands" OR Mauritania OR Mauritius OR "Agalega Islands" OR Mexico OR Micronesia OR "Middle East" OR Moldova OR Moldovia OR Moldovian OR Mongolia OR Montenegro OR Morocco OR Ifni OR Mozambique OR Myanmar OR Myanma OR Burma OR Namibia OR Nepal OR "Netherlands Antilles" OR "New Caledonia" OR Nicaragua OR Niger OR Nigeria OR "Northern Mariana Islands" OR Oman OR Muscat OR Pakistan OR Palau OR Palestine OR Panama OR Paraguay OR Peru OR Philippines OR Philipines OR Phillipines OR Phillippines OR Poland OR Portugal OR "Puerto Rico" OR Romania OR Rumania OR Roumania OR Russia OR Russian OR Rwanda OR Ruanda OR "Saint Kitts" OR "St Kitts" OR Nevis OR "Saint Lucia" OR "St Lucia" OR "Saint Vincent" OR "St Vincent" OR Grenadines OR Samoa OR "Samoan Islands" OR "Navigator Island" OR "Navigator Islands" OR "Sao Tome" OR "Saudi Arabia" OR Senegal OR Serbia OR Montenegro OR Seychelles OR "Sierra Leone" OR Slovenia OR "Sri Lanka" OR Ceylon OR "Solomon Islands" OR Somalia OR Sudan OR Suriname OR Surinam OR Swaziland OR Syria OR Tajikistan OR Tadzhikistan OR Tadjikistan OR Tadzhik OR Tanzania OR Thailand OR Togo OR "Togolese Republic" OR Tonga OR Trinidad OR Tobago OR Tunisia OR Turkey OR Turkmenistan OR Turkmen OR Uganda OR Ukraine OR Uruguay OR USSR OR "Soviet Union" OR "Union of Soviet Socialist Republics" OR Uzbekistan OR Uzbek OR Vanuatu OR "New Hebrides" OR Venezuela OR Vietnam OR "Viet Nam" OR "West Bank" OR Yemen OR Yugoslavia OR Zambia OR Zimbabwe OR Rhodesia)
S17 TX (Africa OR Asia OR Caribbean OR "West Indies" OR "South America" OR "Latin America" OR "Central America")
S16 TI (health* OR medical OR practitioner* OR physician* OR doctor OR doctors OR nurse OR nurses OR hospital OR hospitals) OR AB(health* OR medical OR practitioner* OR physician* OR doctor OR doctors OR nurse OR nurses OR hospital OR hospitals)
S15 S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11 OR S12 OR S13 OR S14

S14 TI ((chang* OR enhanc* OR improve*) N6 (provider* OR practitioner* OR "health personnel" OR "health care personnel" OR "healthcare personnel" OR "health worker" OR "health workers" OR "health care worker" OR "health care workers" OR "healthcare worker" OR "healthcare workers" OR physician* OR doctor OR doctors OR nurse OR nurses OR "health facility" OR "health facilities" OR "health care facility" OR "health care facilities" OR "healthcare facility" OR "healthcare facilities" OR hospital OR hospitals OR "health service" OR "health services" OR "health care service" OR "health care services" OR "healthcare service" OR "healthcare services" OR "health sector" OR "health sectors" OR "health care sector" OR "health care sectors" OR "healthcare sector" OR "healthcare sectors" OR "health administrations" OR government* OR nongovernment*) N6 performance) OR AB ((chang* OR enhanc* OR improve*) N6 (provider* OR practitioner* OR "health personnel" OR "health care personnel" OR "healthcare personnel" OR "health worker" OR "health workers" OR "health care worker" OR "health care workers" OR "healthcare worker" OR "healthcare workers" OR physician* OR doctor OR doctors OR nurse OR nurses OR "health facility" OR "health facilities" OR "health care facility" OR "health care facilities" OR "healthcare facility" OR "healthcare facilities" OR hospital OR hospitals OR "health service" OR "health services" OR "health care service" OR "health care services" OR "healthcare service" OR "healthcare services" OR "health sector" OR "health sectors" OR "health care sector" OR "health care sectors" OR "healthcare sector" OR "healthcare sectors" OR "health administrations" OR government* OR nongovernment*) N6 performance)
S13 TI ((target OR targets OR targeted) N3 (pay* OR reward*)) OR AB ((target OR targets OR targeted) N3 (pay* OR reward*))
S12 TI (conditional N3 (pay* OR money OR monetary OR cash OR financ* OR fund* OR econom* OR disbursement* OR remunerat* OR reimburs* OR nonmonetary OR voucher* OR token OR tokens OR goods OR reward* OR bonus* OR incentive* OR motivat*)) OR AB (conditional N3 (pay* OR money OR monetary OR cash OR financ* OR fund* OR econom* OR disbursement* OR remunerat* OR reimburs* OR nonmonetary OR voucher* OR token OR tokens OR goods OR reward* OR bonus* OR incentive* OR motivat*))
S11 TI ((incentive* OR compensatory OR reimbursement) W0 (plan OR plans)) OR AB ((incentive* OR compensatory OR reimbursement) W0 (plan OR plans))
S10 TI (pay* W3 quality) OR AB (pay* W3 quality)
S9 TI ((payment OR financial OR monetary OR nonmonetary OR economic OR disbursement OR remuneration OR reimbursement) W0 (reward* OR bonus*)) OR AB ((payment OR financial OR monetary OR nonmonetary OR economic OR disbursement OR remuneration OR reimbursement) W0 (reward* OR bonus*))
S8 TI (incentive W0 payment*) OR AB (incentive W0 payment*)
S7 TI ((payment OR financial OR monetary OR nonmonetary OR economic OR disbursement OR remuneration OR reimbursement OR reward* OR bonus) W0 incentive*) OR AB ((payment OR financial OR monetary OR nonmonetary OR economic OR disbursement OR remuneration OR reimbursement OR reward* OR bonus) W0 incentive*)
S6 TI ((performance OR merit) W0 based) OR AB ((performance OR merit) W0 based)
S5 TI (("result based" OR "results based") W0 (pay* OR fund* OR reward*)) OR AB (("result based" OR "results based") W0 (pay* OR fund* OR reward*))
S4 TI ("p4p" OR (pay* N3 perform*)) OR AB ("p4p" OR (pay* N3 perform*))
S3 (SU(Compensation) AND SU(Incentives))
S2 SU ("Personnel Economics: Compensation and Compensation Methods and Their Effects")
S1 SU ("Compensation Packages; Payment Methods")

LILACS and WHOLIS, Virtual Health Library (VHL) Regional Portal (searched 10 April 2018)

"p4p" OR "pay for performance" OR "paying for performance" OR "Reimbursement Incentive" OR "Reimbursement Incentives" OR "Physician Incentive Plans" OR "Physician Incentive Plan" OR "Employee Incentive Plans" OR "Employee Incentive Plan" OR "Pago por desempeño" OR "Pago basado en resultados" OR "Remuneración basada en desempeño" OR "Reembolso de Incentivo" OR "Planes para Motivación del Personal" OR "Planes de Incentivos para los Médicos" OR "Planos para Motivação de Pessoal" OR "Planos de Incentivos Médicos"

The Grey Literature Report (www.greylit.org/) (individual strategies/searches) (searched June 2018)

ID Search
1 "pay for performance"
2 "p4p"
3 "reimbursement incentive"
4 "payment incentive"
5 "payment reward"
6 "performance incentive"
7 "performance reward"
8 "performance payment"
9 "performance based financing"
10 "result based payment"
11 "result based funding"
12 "result based financing"

BLDS British Library for Development Studies (blds.ids.ac.uk) (individual strategies/searches) (searched 18 June 2018)

ID Search
1 pay for performance

2 paying for performance
3 p4p
4 reimbursement incentive
5 reimbursement incentives
6 payment incentive
7 payment incentives
8 payment reward
9 payment rewards
10 performance incentive
11 performance incentives
12 performance reward
13 performance rewards
14 performance payment
15 performance payments
16 performance based financing
17 result based payment
18 results based payment
19 result based payments
20 results based payments
21 result based funding
22 results based funding
23 result based financing
24 results based financing

OpenGrey (www.opengrey.eu/) (searched June 2018)

ID Search
1 "pay for performance" OR "paying for performance" OR "p4p" OR "reimbursement incentive" OR "reimbursement incentives" OR "payment incentive" OR "payment incentives" OR "payment reward" OR "payment rewards" OR "performance incentive" OR "performance incentives" OR "performance reward" OR "performance rewards" OR "performance payment" OR "performance payments" OR "performance based financing" OR "result based payment" OR "results based payment" OR "result based payments" OR "results based payments" OR "result based funding" OR "results based funding" OR "result based financing" OR "results based financing"

3ie Database of Impact Evaluations (http://www.3ieimpact.org/en/)(individual strategies/searches) (searched 07 June 2018)

ID Search
1 "pay for performance" OR "paying for performance" OR "p4p" OR "reimbursement incentive" OR "reimbursement incentives"
2 "payment incentive" OR "payment incentives" OR "payment reward" OR "payment rewards" OR "performance incentive" OR "performance incentives" OR "performance reward" OR "performance rewards" OR "performance payment" OR "performance payments"
3 "performance based financing"
4 "result based payment" OR "results based payment" OR "result based payments" OR "results based payments" OR "result based funding" OR "results based funding" OR "result based financing" OR "results based financing"

African Development Bank (www.afdb.org/en/) (searched 20/09/2017)

ID Search
1 "pay for performance"
2 "p4p"
3 "reimbursement incentive"
4 "payment incentive"
5 "payment reward"
6 "performance incentive"
7 "performance reward"
8 "performance payment"
9 "performance based financing"
10 "result based payment"
11 "result based funding"
12 "result based financing"

USAID (www.usaid.gov/) (searched 14/09/2017)

ID Search
1 "pay for performance"
2 "paying for performance"

3 "p4p"
4 "reimbursement incentive"
5 "reimbursement incentives"
6 "payment incentive"
7 "payment incentives"
8 "payment reward"
9 "payment rewards"
10 "performance incentive"
11 "performance incentives"
12 "performance reward"
13 "performance rewards"
14 "performance payment"
15 "performance payments"
16 "performance based financing"
17 "result based payment"
18 "results based payment"
19 "result based payments"
20 "results based payments"
21 "result based funding"
22 "results based funding"
23 "result based financing"
24 "results based financing"

CORDAID (www.cordaid.org/en/) (searched 20/09/2017)

ID Search
1 pay for performance
2 paying for performance
3 p4p
4 reimbursement incentive
5 reimbursement incentives
6 payment incentive
7 payment incentives
8 payment reward
9 payment rewards
10 performance incentive
11 performance incentives
12 performance reward
13 performance rewards
14 performance payment
15 performance payments
16 performance based financing
17 result based payment
18 results based payment
19 result based payments
20 results based payments
21 result based funding
22 results based funding
23 result based financing
24 results based financing

Management Sciences for Health (www.msh.org/) (searched 14/09/2017)

ID Search
1 "pay for performance"
2 "p4p"
3 "reimbursement incentive"
4 "payment incentive"
5 "payment reward"
6 "performance incentive"
7 "performance reward"
8 "performance payment"
9 "performance based financing"

10 "result based payment"
11 "result based funding"
12 "result based financing"

Centre for Global Development (www.cgdev.org/) (searched 15/09/2017)

ID Search
1 "pay for performance"
2 "p4p"
3 "reimbursement incentive"
4 "payment incentive"
5 "payment reward"
6 "performance incentive"
7 "performance reward"
8 "performance payment"
9 "performance based financing"
10 "result based payment"
11 "result based funding"
12 "result based financing"

Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) (www.giz.de/de/html/index.html) (searched 20/09/2017)

ID Search
1 "pay for performance"
2 "paying for performance"
3 "p4p"
4 "reimbursement incentive"
5 "reimbursement incentives"
6 "payment incentive"
7 "payment incentives"
8 "payment reward"
9 "payment rewards"
10 "performance incentive"
11 "performance incentives"
12 "performance reward"
13 "performance rewards"
14 "performance payment"
15 "performance payments"
16 "performance based financing"
17 "result based payment"
18 "results based payment"
19 "result based payments"
20 "results based payments"
21 "result based funding"
22 "results based funding"
23 "result based financing"
24 "results based financing"

KfW Entwicklungsbank (www.kfw-entwicklungsbank.de/International-financing/KfW-Entwicklungsbank/) (searched 20/09/2017)

ID Search
1 pay-for-performance
2 paying-for-performance
3 p4p
4 reimbursement-incentive
5 reimbursement-incentives
6 payment-incentive
7 payment-incentives
8 payment-reward
9 payment-rewards
10 performance-incentive
11 performance-incentives
12 performance-reward

13 performance-rewards
14 performance-payment
15 performance-payments
16 performance-based-financing
17 result-based-payment
18 results-based-payment
19 result-based-payments
20 results-based-payments
21 result-based-funding
22 results-based-funding
23 result-based-financing
24 results-based-financing

Department for International Development (www.gov.uk/government/organisations/department-for-international-development) (searched 20/09/2017)

ID Search
1 "pay for performance"
2 "p4p"
3 "reimbursement incentive"
4 "payment incentive"
5 "payment reward"
6 "performance incentive"
7 "performance reward"
8 "performance payment"
9 "performance based financing"
10 "result based payment"
11 "result based funding"
12 "result based financing"

Global Fund to Fight AIDS (www.theglobalfund.org/en/) (searched 15/09/2017)

ID Search
1 "pay for performance"
2 "paying for performance"
3 "p4p"
4 "reimbursement incentive"
5 "reimbursement incentives"
6 "payment incentive"
7 "payment incentives"
8 "payment reward"
9 "payment rewards"
10 "performance incentive"
11 "performance incentives"
12 "performance reward"
13 "performance rewards"
14 "performance payment"
15 "performance payments"
16 "performance based financing"
17 "result based payment"
18 "results based payment"
19 "result based payments"
20 "results based payments"
21 "result based funding"
22 "results based funding"
23 "result based financing"
24 "results based financing"

University of Cape Town (www.uct.ac.za/search/) (searched 18/09/2017)

ID Search
1 "pay for performance"
2 "paying for performance"
3 "p4p"

4 "reimbursement incentive"
5 "reimbursement incentives"
6 "payment incentive"
7 "payment incentives"
8 "payment reward"
9 "payment rewards"
10 "performance incentive"
11 "performance incentives"
12 "performance reward"
13 "performance rewards"
14 "performance payment"
15 "performance payments"
16 "performance based financing"
17 "result based payment"
18 "results based payment"
19 "result based payments"
20 "results based payments"
21 "result based funding"
22 "results based funding"
23 "result based financing"
24 "results based financing"

Kenya Institute of Policy Analysis and Research (IPAR) (iparkenya.blogspot.co.uk/) (searched 18/09/2017)

ID Search
1 "pay for performance"
2 "paying for performance"
3 "p4p"
4 "reimbursement incentive"
5 "reimbursement incentives"
6 "payment incentive"
7 "payment incentives"
8 "payment reward"
9 "payment rewards"
10 "performance incentive"
11 "performance incentives"
12 "performance reward"
13 "performance rewards"
14 "performance payment"
15 "performance payments"
16 "performance based financing"
17 "result based payment"
18 "results based payment"
19 "result based payments"
20 "results based payments"
21 "result based funding"
22 "results based funding"
23 "result based financing"
24 "results based financing"

Institute of Tropical Medicine Belgium (www.itg.be/E) (searched 20/09/2017)

ID Search
1 pay for performance
2 paying for performance
3 p4p
4 reimbursement incentive
5 reimbursement incentives
6 payment incentive
7 payment incentives
8 payment reward
9 payment rewards
10 performance incentive

11 performance incentives
12 performance reward
13 performance rewards
14 performance payment
15 performance payments
16 performance based financing
17 result based payment
18 results based payment
19 result based payments
20 results based payments
21 result based funding
22 results based funding
23 result based financing
24 results based financing

Appendix 5. Data extraction template

Category	Extracted data	Page/Figure /Location in Text	Reviewer notes	Procedural notes
Doubts over inclusion?				
Comment on any inclusion criteria you think this paper may violate				If you have serious doubts, discuss before proceeding!
General descriptors				
Name of reviewer				
Date				dd/mm/yyyy
Study ID				surname of first author and year first full report of study was published e.g. Smith 2001
Other reports of this study (entire reference)				
First author				Surname, Initial
Year of publication				yyyy
Publication type				
Report author contact details				Name; Email; Phone; Address
Data repository				
Funders of study				
Setting				

(Continued)

Country	Free text

PBF scheme		**Exact data or NR or unclear (specify page)**
Level at which PBF incentive is paid?		
How are the PBF incentives used and cascaded?		Describe the mechanism of payment to everyone involved
Scale of PBF intervention + rationale		Descriptive: e.g. national to X districts, or populations
Context		E.g. urban and rural, poverty levels, etc
Sector		E.g. public, private, mixes, faith based organizations
Clinical or population group targeted		E.g. MCH or TB patients or mothers attending with children under 5
Type of PBF		
Who set the targets/how were the targets set?		E.g. Who made the decisions re: targets and based on what?
Payment frequency		
Payment formula		
Measurement of targets: how and where from?		E.g. Data source for measurement
Verification mechanisms		E.g. how is the data verified, by whom?
Magnitude of incentives		E.g price per indicator (if table then copy in separate sheet and link)
Relative size of incentive		E.g. compared to health worker salary, overall funding of health facility
Are incentives additional to normal wage/funding?		Extract data on the whole scheme budget + the facility/health worker incentive elements
Ancillary components:	*Yes if done*	
Increased funding		
Increased health facility autonomy		

(Continued)

Training	
Supervision	
Supplies	
Technical support	
Management support	
Other quality improvement strategies	
Increasing salaries	
Construction of new facilities	
Improvements in information systems	
Changes in governance, priority setting or rationing	
Processes to involve stakeholders	Specify if consumers/others are involved
Complementary demand-side incentives	
Other (specify)	
Overall cost	E.g. Per person budget or national cost of scheme
Source of funding	
More details	Optional to fill in
Impact evaluation: Participants, methods, data and analysis	
Type of study	
Aim of study	Describe aim
Location of care	
Sector	
Urban or rural areas?	
Choice of study setting selection	Describe why the study settings were chosen

(Continued)

Data	
Data collection methods	
Data source	E.g. house hold surveys, DHS
Who collected data?	E.g study authors, survey company, DHS etc
Time of baseline data collection	
Time of endline data collection	
Follow-up of the PBF scheme	
Participants	
Level at which outcomes are assessed	
Description of patient-group(s) affected by the intervention	Inclusion/exclusion criteria relating to participants
Total sample	
Number of providers	Specify number of health care workers
Number of patients	
Number of episodes of care	
Clustering level (overall)	Copy rows as much as needed to capture all clustering
Level 1	From the most macro to micro
Units per level 1	e.g. 17 households
Level 2	
Units per level 2	
Level 3	
Units per level 3	
Proportion of eligible providers (or allocation	

(Continued) units) who participated in evaluation		
Other setting-specific factors that may be of relevance when assessing external validity		
Analytic methods		
Unit of allocation (EPOC item: 6.1)		
Unit of analysis (EPOC item: 6.2)		
Power calculation (EPOC item: 6.3)		Score done if the study is powered; not done if underpowered; unclear if calculation missing + COPY calculation
Type of statistical analysis		
Equations		Copy it here!
Group descriptions	**COPY OVER FOR EACH GROUP**	
Study arm/group	Intervention group 1	
Description of study arm/group intervention		E.g. scheme detailed above + payments to demand side OR control description
Participant characteristics in group		
Baseline		
Number of providers		
Number of patients		
Number of episodes of care		
Notes		Any notes on participant groups that may affect generalizability
Clustering level (overall)		Copy rows as much as needed to capture all clustering
Level 1		e.g. households

(Continued)

Units per level 1		e.g. 17 households
Level 2		
Units per level 2		
Endline (+ copy if needed for follow up)		
Number of providers		
Number of patients		
Number of episodes of care		
Notes		Any notes on participant groups that may affect generalizability
Clustering level (overall)		Copy rows as much as needed to capture all clustering
Level 1		e.g. households
Units per level 1		e.g. 17 households
Level 2		
Units per level 2		
More detail about intervention		If it deviates from the normal scheme then add in more info here

Results	**COPY OVER FOR EACH OUTCOME**	
Type of outcome		
Specific indicator		List the exact indicator assessed
Summative findings		Interpretation of findings (direction, magnitude)
Explanatory notes		
Comments from authors		E.g. what to keep in mind when interpreting
Comments from us		
	COPY THE RESULTS	

(Continued)

Overall interpretation/ implications	
Comments from authors	
Comments from us	

QUALITY CRITERIA: RISK OF BIAS (Cochrane EPOC, 'Suggested risk of bias criteria for EPOC reviews', 2017)	
Risk of bias for studies with a separate control group (randomized trials; non-randomized trials; controlled before-after studies)	
Random sequence generation	Score "Low risk" if a random component in the sequence generation process is described (e.g. Referring to a random number table). Score "High risk" when a nonrandom method is used (e.g. performed by date of admission). Non-randomized trials and controlled before-after studies should be scored "High risk". Score "Unclear risk" if not specified in the paper.
Allocation concealment	Score "Low risk" if the unit of allocation was by institution, team or professional and allocation was performed on all units at the start of the study; or if the unit of allocation was by patient or episode of care and there was some form of centralized randomization scheme, an on-site computer system or sealed opaque envelopes were used. Controlled before-after studies should be scored "High risk". Score "Unclear risk" if not specified in the paper.
Baseline outcome measurement similar	Score "Low risk" if performance or patient outcomes were measured prior to the intervention, and no important differences were present across study groups. In randomized trials, score "Low risk" if imbalanced but appropriate adjusted analysis was performed (e.g. Analysis of covariance). Score "High risk" if important differences were present and not adjusted for in analysis. If randomized trials have no baseline measure of outcome, score "Unclear risk".
Baseline characteristics similar	Score "Low risk" if baseline characteristics of the study and control providers are reported and similar. Score "Unclear risk" if it is not clear in the paper (e.g. characteristics are mentioned in text but no data were presented). Score "High risk" if there is no report of characteristics in text or tables or if there are differences between control and intervention providers. Note that in some

(Continued)

	cases imbalance in patient characteristics may be due to recruitment bias whereby the provider was responsible for recruiting patients into the trial.
Incomplete outcome data	Score "Low risk" if missing outcome measures were unlikely to bias the results (e.g. the proportion of missing data was similar in the intervention and control groups or the proportion of missing data was less than the effect size i.e. unlikely to overturn the study result). Score "High risk" if missing outcome data was likely to bias the results. Score "Unclear risk" if not specified in the paper (Do not assume 100% follow up unless stated explicitly).
Knowledge of the allocated interventions adequately prevented during study (blinding)	Score "Low risk" if the authors state explicitly that the primary outcome variables were assessed blindly, or the outcomes are objective, e.g. length of hospital stay. Primary outcomes are those variables that correspond to the primary hypothesis or question as defined by the authors. Score "High risk" if the outcomes were not assessed blindly. Score "Unclear risk" if not specified in the paper.
Protection against contamination	Score "Low risk" if allocation was by community, institution or practice and it is unlikely that the control group received the intervention. Score "High risk" if it is likely that the control group received the intervention (e.g. if patients rather than professionals were randomized). Score "Unclear risk" if professionals were allocated within a clinic or practice and it is possible that communication between intervention and control professionals could have occurred (e.g. physicians within practices were allocated to intervention or control)
Selective outcome reporting	Score "Low risk" if there is no evidence that outcomes were selectively reported (e.g. all relevant outcomes in the methods section are reported in the results section). Score "High risk" if some important outcomes are subsequently omitted from the results. Score "Unclear risk" if not specified in the paper.
Other risks of bias	Score "Low risk" if there is no evidence of other risk of biases.
Risk of bias for interrupted time series studies	
Intervention independent of other changes	Score "Low risk" if there are compelling arguments that the intervention occurred in-

(Continued)

	dependently of other changes over time and the outcome was not influenced by other confounding variables/historic events during study period. If Events/variables identified, note what they are. Score "High risk" if reported that intervention was not independent of other changes in time.
Shape of the intervention effect pre-specified	Score "Low risk" if point of analysis is the point of intervention OR a rational explanation for the shape of intervention effect was given by the author(s). Where appropriate, this should include an explanation if the point of analysis is NOT the point of intervention. Score "High risk" if it is clear that the condition above is not met.
Intervention unlikely to affect data collection	Score "Low risk" if reported that intervention itself was unlikely to affect data collection (for example, sources and methods of data collection were the same before and after the intervention); Score "High risk" if the intervention itself was likely to affect data collection (for example, any change in source or method of data collection reported).
Knowledge of the allocated interventions adequately prevented during the study	Score "Low risk" if the authors state explicitly that the primary outcome variables were assessed blindly, or the outcomes are objective, e.g. length of hospital stay. Primary outcomes are those variables that correspond to the primary hypothesis or question as defined by the authors. Score "High risk" if the outcomes were not assessed blindly. Score "Unclear risk" if not specified in the paper.
Incomplete outcome data adequately addressed	Score "Low risk" if missing outcome measures were unlikely to bias the results (e.g. the proportion of missing data was similar in the pre- and post-intervention periods or the proportion of missing data was less than the effect size i.e. unlikely to overturn the study result). Score "High risk" if missing outcome data was likely to bias the results. Score "Unclear risk" if not specified in the paper (Do not assume 100% follow up unless stated explicitly).
Selective outcome reporting	Score "Low risk" if there is no evidence that outcomes were selectively reported (e.g. all relevant outcomes in the methods section are reported in the results section). Score "High risk" if some important outcomes are subsequently omitted from the results. Score "Unclear risk" if not specified in the paper.
Other risks of bias	Score "Low risk" if there is no evidence of other risk of biases. E.g. should consider if

(Continued)

	seasonality is an issue (i.e. if January to June comprises the pre-intervention period and July to December the post, could the "seasons' have caused a spurious effect).

Appendix 6. Risk of bias supporting judgements

Table 1. Risk of bias – studies with a control group

Country	Study ID	Study design	Random sequence generation (low = random, high = not random, unclear if not specified)	Allocation concealment	Baseline outcome measurement similar	Baseline characteristics similar	Incomplete outcome data
Argentina	Gertler 2014	CBA	High – as per guidance.	High – as per guidance.	Low – analysis methods adjusted for differences	Low except high for neonatal mortality (noted imbalance only for this outcome).	Low: paper mentioned missingness of 3%, similar across groups. Complete-case analyses were conducted, which may compromise results but no reporting of missingness by outcome.
Burkina Faso	Steenland 2017	CBA	High – as per guidance.	High – as per guidance.	Low – analysis methods adjusted for differences.	High – Table 1 suggested differences between comparison and intervention existed, e.g. number of health facilities/100,000 people consistently higher in intervention than in comparator group.	Low – see Appendix Table 4 of Steenland 2017.
Burundi	Bonfrer 2014a	CBA	High – as per guidance.	High – as per guidance.	Low – analysis methods adjusted for differences.	High – appendix Table 6 of Bonfrer 2014a suggests differences existed between the different districts, e.g. population characteristics (poverty) varied between 28.7% and 82.3%.	Unclear: not specified.
	Bonfrer 2014b	CBA	High – as per guidance.	High – as per guidance.	Low – analysis methods adjusted for differences.	Low – comparable.	Unclear: not specified.
	Falisse 2015	CBA	High – as per guidance.	High – as per guidance.	Low – analysis methods adjusted for differences.	High – data not presented.	Low – authors noted outcomes to focus on cho-

(Continued)

							sen based on completeness and sensitivity analyses conducted.
	Rudasingwa 2014	CBA	High – as per guidance.	High – as per guidance.	Low – analysis methods adjusted for differences.	High – data not presented.	Low – authors noted outcomes to focus on chosen based on completeness.
Cambodia	Van de Poel 2016	CBA	High – as per guidance.	High – as per guidance.	Low – analysis methods adjusted for differences.	Low – comparable.	Unclear: not specified.
Cameroon	Zang 2015	CBA	High – as per guidance.	High – as per guidance.	Low – analysis methods adjusted for differences.	Low – comparable.	Unclear: not specified.
China	Yao 2008	CBA	High – as per guidance.	High – as per guidance.	Paper reanalyzed; reanalyzed results noted as low (analysis methods adjusted for differences).	High – Table 1 of Yao 2008 suggests the intervention was performed in areas that were more populated and poorer compared to control.	Unclear: not specified.
Democratic Republic of the Congo	Zeng 2018	CBA	High – as per guidance.	High – as per guidance.	Low – analysis methods adjusted for differences.	High – Table 3 of Zeng 2018 suggests significant differences, e.g. in household size, daily spending and age of mother.	Unclear: not specified.
	Soeters 2011	CBA	High – as per guidance.	High – as per guidance.	Low – analysis methods adjusted for differences.	High – not specified.	Unclear: not specified.
El Salvador	Bernal 2018	CBA	High – as per guidance.	High – as per guidance.	Low – analysis methods adjusted for differences.	High – Table 2 and page 9 of Bernal 2018 highlight the differences between results-based aid provinces and those with national funding.	Unclear: not specified.
Haiti	Zeng 2013	CBA	High – as per guidance.	High – as per guidance.	Low – analysis methods adjusted for differences.	High – data not presented.	Unclear: not specified.

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Multiple – Burkina Faso, Ghana and Tanzania	Duysburgh 2016	CBA	High – as per guidance.	High – as per guidance.	Paper reanalyzed; re-analyzed results noted as low (analysis methods adjusted for differences).	High – appendix Table S1 of Duysburgh 2016 suggested differences between intervention and control sites but unclear what effect this would have on outcomes.	Unclear: not specified.
Tanzania	Binyaruka 2015	CBA	High – as per guidance.	High – as per guidance.	Low – analysis methods adjusted for differences.	Low except for: ANC visits and IPT during ANC, outpatient visits per month < or > 5, patient assessments of staff kindness, probability of payment for delivery care, satisfaction with interpersonal care.	High: authors noted this may have biased results.
	Binyaruka 2017	CBA	High – as per guidance.	High – as per guidance.	Low – analysis methods adjusted for differences.	Low except for: availability and stockouts of medicines and medical supplies	Unclear: not specified.
	Binyaruka 2018b	CBA	High – as per guidance.	High – as per guidance.	Low – analysis methods adjusted for differences.	Low except for: ANC visits and IPT during ANC, outpatient visits per month < or > 5, patient assessments of staff kindness, probability of payment for delivery care, satisfaction with interpersonal care.	High: authors noted that this may have biased results.
	Mayumana 2017	CBA	High – as per guidance.	High – as per guidance.	Low – analysis methods adjusted for differences.	Low except for: medical supply stockouts, disruptions due to broken equipment, governance outcomes (committee meetings, content of supervision, existence of community health fund).	High: authors noted that this may have biased results.
Zimbabwe	Das 2017	CBA	High – as per guidance.	High – as per guidance.	Low – analysis methods adjusted for differences.	Low – comparable.	High: subset analyses with particularly small samples.
Benin	Lagarde 2015	Quasi/non-randomized trial	Unclear: not specified.	Unclear: not specified.	High – analyses methods did not adjust for baseline differences in outcomes, but do adjusted for facility and	High – appendix Table 6 of Lagarde 2015 suggested differences exist between the different districts, e.g. population character-	Unclear: not specified.

(Continued)

					health worker differences.	istics (poverty) varied between 28.7% and 82.3%.	
Cameroon	de Walque 2017	Quasi/non-randomized trial	Low – sequence described in sufficient detail.	Low – assignment by province/district/cluster.	Low – analysis methods adjusted for differences.	Low – comparable.	Unclear: not specified.
China	Powell-Jackson 2014	Quasi/non-randomized trial	High – no randomization, though matching occurred.	Low – assignment by province/district/cluster.	Low – analysis methods adjusted for differences.	Low – comparable.	Unclear: not specified.
	Sun 2016	Quasi/non-randomized trial	High – randomization compromised.	Low – assignment by province/district/cluster.	Low – analysis methods adjusted for differences.	Low – comparable.	Unclear: not specified.
Peru	Cruzado de la Vega 2017	Quasi/non-randomized trial	High – no randomization.	Low – assignment by province/district/cluster.	Low – analysis methods adjusted for differences.	Low – comparable.	Unclear: not specified.
Rwanda	Basinga 2011	Quasi/non-randomized trial	High – randomization compromised.	Low – assignment by province/district/cluster.	Low – analysis methods adjusted for differences.	Low – comparable.	Unclear: not specified.
	Lannes 2016	Quasi/non-randomized trial	High – randomization compromised.	Low – assignment by province/district/cluster.	Low – analysis methods adjusted for differences.	Low – comparable.	Unclear: not specified.
	Priedeman Skiles 2013	Quasi/non-randomized trial	High – randomization compromised.	Low – assignment by province/district/cluster.	Low – analysis methods adjusted for differences.	Low – comparable.	Unclear: not specified.
	Priedeman Skiles 2015	Quasi/non-randomized trial	High – randomization compromised.	Low – assignment by province/district/cluster.	Low – analysis methods adjusted for differences.	Low – comparable.	Unclear: not specified.

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	Sherry 2017	Quasi/non-randomized trial	High – randomization compromised.	Low – assignment by province/district/cluster.	Low – analysis methods adjusted for differences.	Low – comparable.	Unclear: not specified.
	Lannes 2015	Quasi/non-randomized trial	High – randomization compromised.	Low – assignment by province/district/cluster.	Unclear: not specified.	High – not specified.	Unclear: not specified, using data from Basinga 2011.
	Gertler 2013	Quasi/non-randomized trial	High – randomization compromised.	Low – assignment by province/district/cluster.	Low – analysis methods adjusted for differences.	Low – comparable.	Low – authors noted similar levels of attrition.
	de Walque 2015	Quasi/non-randomized trial	High – randomization compromised.	Low – assignment by province/district/cluster.	Low – analysis methods adjusted for differences.	Low – comparable.	Unclear: not specified.
Swaziland	Kliner 2015	Quasi/non-randomized trial	High – no randomization.	High – allocation was pragmatic.	Low – analysis methods adjusted for differences.	High – Table 2 of Kliner 2015 suggested differences in populations and outcomes exist.	Unclear: not specified.
Tanzania	Brock 2018	Quasi/non-randomized trial	Low – sequence described in sufficient detail.	Low – assignment by healthcare professional, done after baseline assessment.	Low – comparable.	High – Tables 2 and 3 of Brock 2018 suggested some differences between providers and patients.	Low – dropout before assignment 12%, but after only 3%.
Zimbabwe	Friedman 2016b	Quasi/Non-randomized trial	High – no randomization, though stratification and matching.	High – allocation was done by Ministry if Health via matching.	Low – analysis methods adjusted for differences.	Low – comparable. (Appendix 3 of Friedman 2016b tested parallel trends, though baseline characteristics were dissimilar at times).	Unclear: not specified (authors noted that for household expenditure data there was high missingness).

ANC: antenatal care; CBA: controlled before-after; IPT: intermittent preventive treatment.

Table 2. Risk of bias – interrupted time series studies

Country	Study ID	Study design	Intervention independent of other changes	Shape of the intervention effect pre-specified	Intervention unlikely to affect data collection	Knowledge of the allocated interventions adequately prevented during the study	Incomplete outcome data adequately addressed	Selective outcome reporting	Other risks of bias
Brazil	Viñuela 2015	ITS	Unclear: other reforms were happening in the education and justice sectors that could have contributed as well.	Low – specified as per guidance.	Unclear: intervention may have affected data collection.	Low: unlikely allocation affected data collection.	Unclear: not specified.	Low	Note: data were aggregated at high level – this may have impacted analyses and findings.
Cambodia	Ir 2015	ITS	High: multiple PBF reforms introduced alongside voucher schemes and changes to health service delivery (more trained professionals) also occurred.	High – as per guidance, effect shape not specified.	Unclear: intervention may have affected data collected as same source was used for payments and for outcome assessment.	Unclear: health workers themselves appeared to be reporting.	Unclear: not specified.	Low	Low
	Khim 2018a	ITS	Unclear: not specified.	Low – specified as per guidance.	Unclear: intervention may have affected data collection.	Low: unlikely allocation affected data collection.	Unclear: not specified.	Low	Note: several other schemes were implemented at the same time and high variability in implementation of this scheme noted.

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	Matsuoka 2014	ITS	Unclear: not specified.	Low – specified as per guidance.	Unclear: intervention may have affected data collection.	Unclear: not specified.	Unclear: not specified.	Low	Note: data reanalyzed.
China	Chang 2017	ITS	High: other interventions concurrent (including further PBF and introduction of database).	Low – specified as per guidance.	High: intervention introduced alongside an HMIS intervention.	Unclear: not specified.	Unclear: not specified.	Low	Note: 3 PBF schemes implemented buy only 1 assessed.
	Wu 2014	ITS	Unclear: other reforms happening but robustness checks performed to ascertain impacts and effects were consistent.	Low – specified as per guidance.	Low: no effects on data collection.	Low: unlikely allocation affected data collection.	Unclear: not specified.	Low	Note: not generalizable, study conducted in 1 setting.
	Liu 2005	ITS	High: other changes in the country likely to affect trends.	Low – specified as per guidance.	Low: no effects on data collection.	Low: blinded and random assessments.	Low: panel dataset.	Low	Low
Rwanda	Rusa 2009a	ITS	High: other changes in the country (user fee removal) likely to affect trends.	Low – specified as per guidance.	Unclear: intervention may have affected data collection.	Unclear: not specified.	Unclear: not specified.	Low	Low
Zambia	Chansa 2015	ITS	Unclear: not specified.	Low – specified as per guidance.	High: intervention introduced alongside audits.	Low: unlikely allocation affected data collection.	Low: HMIS data.	Low	Low
Malawi	McMahon 2016	CBA and ITS	Unclear: not specified.	Low – specified as per guidance.	High: intervention directly targets improvements in data.	Unclear: not specified.	High: several indicators excluded due to missingness.	Low	Low

CBA: controlled before-after; HMIS: health management information system; ITS: interrupted time series; PBF: performance-based funding.

WHAT'S NEW

Date	Event	Description
10 May 2021	Amended	Correction to characteristics of included study

HISTORY

Protocol first published: Issue 3, 2009
Review first published: Issue 2, 2012

Date	Event	Description
16 December 2020	Feedback has been incorporated	Addressed reviewer comments.
12 March 2020	New search has been performed	This is the first update of the Cochrane review published in 2012. We have conducted a new search and have updated other content.
12 March 2020	New citation required and conclusions have changed	This update includes 59 new studies. Previous study inclusion criteria have changed and we have excluded 9 studies previously included in the review from this update; changes to results and conclusions, summary of findings tables, GRADE. New review authors have contributed to this update.
13 February 2012	Amended	Minor edits

CONTRIBUTIONS OF AUTHORS

All authors reviewed and updated the protocol.

AV and JF developed the search strategies with the EPOC information specialist.

KD, AV and JF selected the studies and undertook data extraction.

KD led in the drafting of the review, with the support of SW and AF.

All authors reviewed and commented on the final draft.

DECLARATIONS OF INTEREST

KD: none.

JF: none.

AV: none.

AF: none.

SW: none.

SOURCES OF SUPPORT

Internal sources

- Norwegian Institute of Public Health, Norway

External sources

- Institute of Global Health and Development, Queen Margaret University, UK

  The Institute offered necessary infrastructure and staff time for undertaking the review.
- Foreign, Commonwealth and Development Office, UK

  Project number 300342-104

DIFFERENCES BETWEEN PROTOCOL AND REVIEW

The following represent deviations from the protocol (Witter 2009), and original review (Witter 2012).

Search strategies have been altered to include further up-to-date terms referring to paying for performance (see Appendix 4).

The following databases were added to the search process for this review version:

- CINAHL;
- 3ie Database of Impact Evaluations;
- BLDS British Library for Development Studies;
- Global Health;
- Grey Literature report;
- OpenGrey;
- International Clinical Trials Registry Platform (ICTRP);
- ClinicalTrials.gov.

The following databases searched for the 2012 review version were not rerun:

- Database of Abstracts of Reviews of Effectiveness (DARE);
- Sociological Abstracts;
- Social Services Abstracts.

Given the volume of data retrieved, we restricted our analyses and synthesis to those indicators that were comparable (i.e. indicators similarly formulated, calculated and which could speak to similar underlying populations to minimize indirectness) and discussed across two or more studies.

Subgroup analyses: given inconsistencies in reporting of characteristics intended to be used for subgroup analyses, we used scheme design as the primary criterion by which to conduct subgroup analyses.

Given the volume of impact evaluations, the findings of health economic evaluations or qualitative studies conducted alongside impact evaluations have not been included. We will attempt to include these studies in further work exploring the mechanisms behind P4P impacts.

INDEX TERMS

Medical Subject Headings (MeSH)

Bias; Controlled Before-After Studies; *Developing Countries; Interrupted Time Series Analysis; Non-Randomized Controlled Trials as Topic; Quality Improvement [*economics] [standards]; Quality of Health Care [economics] [standards]; *Reimbursement, Incentive

MeSH check words

Humans