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[Intervention Review]

The impact of user fees on access to health services in low- and middle-income countries

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ABSTRACT

Background

Following an international push for financing reforms, many low- and middle-income countries introduced user fees to raise additional revenue for health systems. User fees are charges levied at the point of use and are supposed to help reduce 'frivolous' consumption of health services, increase quality of services available and, as a result, increase utilisation of services.

Objectives

To assess the effectiveness of introducing, removing or changing user fees to improve access to care in low- and middle-income countries

Search methods

We searched 25 international databases, including the Cochrane Effective Practice and Organisation of Care (EPOC) Group's Trials Register, CENTRAL, MEDLINE and EMBASE. We also searched the websites and online resources of international agencies, organisations and universities to find relevant grey literature. We conducted the original searches between November 2005 and April 2006 and the updated search in CENTRAL (DVD-ROM 2011, Issue 1); MEDLINE In-Process & Other Non-Indexed Citations, Ovid (January 25, 2011); MEDLINE, Ovid (1948 to January Week 2 2011); EMBASE, Ovid (1980 to 2011 Week 03) and EconLit, CSA Illumina (1969 - present) on the 26th of January 2011.

Selection criteria

We included randomised controlled trials, interrupted time-series studies and controlled before-and-after studies that reported an objective measure of at least one of the following outcomes: healthcare utilisation, health expenditures, or health outcomes.

Data collection and analysis

We re-analysed studies with longitudinal data. We computed price elasticities of demand for health services in controlled before-and-after studies as a standardised measure. Due to the diversity of contexts and outcome measures, we did not perform meta-analysis. Instead, we undertook a narrative summary of evidence.

Main results

We included 16 studies out of the 243 identified. Most of the included studies showed methodological weaknesses that hamper the strength and reliability of their findings. When fees were introduced or increased, we found the use of health services decreased significantly in most studies. Two studies found increases in health service use when quality improvements were introduced at the same time as user fees. However, these studies have a high risk of bias. We found no evidence of effects on health outcomes or health expenditure.

Authors' conclusions

The review suggests that reducing or removing user fees increases the utilisation of certain healthcare services. However, emerging evidence suggests that such a change may have unintended consequences on utilisation of preventive services and service quality. The review also found that introducing or increasing fees can have a negative impact on health services utilisation, although some evidence suggests that when implemented with quality improvements these interventions could be beneficial. Most of the included studies suffered from important methodological weaknesses. More rigorous research is needed to inform debates on the desirability and effects of user fees.

PLAIN LANGUAGE SUMMARY

The impact of user fees on access to health services in low- and middle-income countries

Researchers in the Cochrane Collaboration conducted a review of the impact of user fees on people's access to health services in low- and middle-income countries. After searching for all relevant studies, they found 16 studies. Their findings are summarised below.

User fees and people's use of health services

In many countries, people may have to pay a charge, or user fee, for their health services, for instance when visiting the doctor or receiving drugs and other medical supplies.

User fees were introduced in many low- and middle-income countries in the 1980s with the support of UNICEF and the World Bank. A number of reasons were given for the introduction of these fees. One argument is that user fees are expected to stop people from seeking unnecessary health care. They are also seen as a way to raise extra funds that can be used to improve the quality of health services. These extra funds can also be used to expand health services and ensure that the whole population gets access to health care.

Critics have, however, argued that the introduction of user fees prevents poor people from using necessary health services. Recently, several campaigns have advocated the removal of user fees, especially for primary care.

What happens when user fees are introduced or removed?

The studies in this review took place in 12 different countries. They evaluated either the effects of introducing user fees; removing fees; or increasing or decreasing fees. The studies varied according to the type of health services and the level and nature of payment. While some of the studies looked at the impact of large-scale national reforms, other studies looked at small-scale pilot projects.

All of the evidence was of very low quality and the studies showed mixed results:

When user fees were introduced or increased:

- People's use of preventive healthcare services decreased.
- People's use of curative services generally decreased. However, when quality improvements were made to the health services at the same time as fees were introduced, people's use of curative services increased. In addition, poor parts of the population began to use health care services more.

When user fees were removed:

- There was usually no immediate impact on people's use of preventive healthcare services. But in several cases, people's use of these services did increase after some time.
- There was some increase in the number of outpatient visits, but no increase in the number of inpatient visits.

When user fees were decreased:

- There was an increase in the use of preventive and curative healthcare services, ranging from a very small to a large increase.

To summarise, results were mixed and the quality of the evidence was very low. We are therefore uncertain about the effects of user fees on health service use.

SUMMARY OF FINDINGS FOR THE MAIN COMPARISON *[Explanation]*

Population: Anyone using any type of health service in low- and middle-income countries

Settings: Burkina Faso, Kenya, Lesotho, Papua New Guinea.

Intervention: Introducing or increasing user fees

Comparison: No fees.

Outcomes	Relative change in utilisation ¹	Number of studies	Quality of the evidence (GRADE)*	Comments
Health utilisation - preventive care	-15.4% immediately -17% after 12 months	2	⊕⊕⊕⊕ Very low ²	Antenatal care visits dropped in one study where fees were introduced One additional study found a decrease in utilisation of deworming drugs following an introduction of fees, but did not report the results in a way that the relative change in utilisation could be calculated
Health utilisation - curative care	-28% to -51% immediately -9% to +8% after 12 months	6	⊕⊕⊕⊕ Very low ²	All but two studies showed a decrease in the number of outpatient visits in different types of facilities, although not all drops in attendance were statistically significant Two controlled before-and-after studies where fees were introduced with quality improvements reported an increase in utilisation; however, the authors did not report the results in a way that the relative change in utilisation could be calculated
Equity outcome - health utilisation by quartile	N/A	1	⊕⊕⊕⊕ Very low ³	This study where quality improvements were introduced at the same time as user fees found an increase in utilisation for poor groups. The authors did not report the results in a way that the relative change in utilisation could be calculated

*GRADE Working Group grades of evidence

⊕⊕⊕⊕ **High:** We are confident that the true effect lies close to what was found in the research

⊕⊕⊕⊖ **Moderate:** The true effect is likely to be close to what was found, but there is a possibility that it is substantially different

⊕⊕⊖⊖ **Low:** The true effect may be substantially different from what was found

⊕⊖⊖⊖ **Very low:** We are very uncertain about the effect.

1. Results from CBA studies report a relative change compared to the control group, and results from ITS studies report a relative change compared to utilisation levels that would have been expected without the intervention.
2. Most studies used no control or controls that were not equivalent.
3. Only one study, whose analysis suffered from many problems (method of analysis not appropriate and performed on a sample of 61 individuals).

BACKGROUND

As a result of increasing budget deficits throughout the developing world in the 1980s, most low- and middle-income countries witnessed a decline in quantity and quality of publicly subsidised health services. The introduction of user fees was adopted by many countries in the hope that these would yield quality improvements and increase utilisation of services. This was supported both by UNICEF through the Bamako Initiative, which promoted 'community financing' of primary health care (McPake 1993), and by the IMF and the World Bank (World Bank 1987) in a move towards more pro-market reforms.

Description of the intervention

User fees are charges levied at the point of use for any aspect of health services, and may include: registration fees, consultation fees, fees for drugs and medical supplies or charges for any health service rendered. Fees can be paid for each visit or can encompass a whole episode of illness.

How the intervention might work

According to its supporters (World Bank 1987), user fees are supposed to fulfil three objectives: 1) to improve efficiency of use and diminish "frivolous" consumption, 2) to raise revenue to complement traditional funding sources (public budget) and therefore improve personnel motivation and service quality (if used appropriately), and 3) to improve equity of distribution of health services in a given country through the reallocation of resources collected through user fees. The first two objectives are directly linked to the implementation of user fees: as a financial barrier they should deter people from seeking needless health care, and when patients

pay them they constitute a source of revenue for the facility or the system. Conversely, the third goal depends on other decisions and policy implementation.

Economic theory predicts that an increase in the price of a specific good will lead generally to a decrease in its consumption. Advocates of user fees have argued that the collected revenue would, however, improve the quality of services delivered, and hence compensate for the negative effects of user fees. However, increased poverty and poor social indicators in many countries led to growing concerns about the detrimental role played by user fees. In particular, the failure of exemption schemes in cost-recovery systems led to the realisation that a growing part of the population was excluded from the health system while others were facing catastrophic health expenditures (Gertler 1987; Gilson 1988).

Why it is important to do this review

Recently, several campaigns (Commission 2005; Save the Children 2005) have advocated the removal of user fees, especially for primary care. A number of narrative reviews have been undertaken on this topic over the years (Creese 1991; Gilson 1995; Sepehri 2001; Hutton 2004; James 2006; Ridde 2011). However, despite the importance and heat of this debate, no systematic review exists which appraises the methodological quality of empirical evidence on this topic and summarises the findings of this evidence.

OBJECTIVES

This review aims to assess the effectiveness of introducing, removing or changing user fees to improve the access of different populations to care in low- and middle-income countries. This will be

evaluated by looking at changes in healthcare utilisation, health expenditures, and, where possible, health outcomes.

METHODS

Criteria for considering studies for this review

Types of studies

We examined all studies that met the Effective Practice and Organisation of Care (EPOC) Group's inclusion criteria for study design and which compared the effects (on a predetermined range of outcomes) of changing the user fee policy with not changing this policy.

We included three types of studies.

1. Randomised controlled trials (RCT) or cluster-randomised controlled trials (C-RCT).

2. Controlled before-and-after (CBA) studies.

3. Interrupted time-series (ITS) studies provided that:

- the point in time when the intervention/change occurred was clearly defined;
- the number of points before and after the intervention was large enough to detect potential biases arising from seasonal variations in the outcome of interest (except if the intervention had been stopped); for example, monthly data on the use of health services needed to provide at least 10 points before and after the intervention;
- the intervals of time between two points in the dataset were regular and conformed with the recorded outcome; for example, this meant that monthly utilisation data aggregated over a year were excluded, on the grounds that this would not provide sufficient detail, and was likely to lead to spurious results.

Types of participants

The review only includes studies taking place in low-income and middle-income countries as defined by the World Bank ([World Bank 2006](#)).

Units of study are the populations who would potentially access health services. Issues of interest are the populations' access to health services, their utilisation patterns, and possibly their health outcomes. Hence, "participants" could include users and non-users of health services, as well as institutions such as health facilities, where utilisation data could have been collected. Study designs could also have used facilities or districts as units of allocation.

We included studies on all types of providers (governmental or private). We did not limit the scope of our study to a particular level of healthcare delivery and all types of health services could be included in this review. However, we excluded health-related products, such as insecticide-treated nets for malaria prevention

from the scope of the review. Indeed such products are often sold outside of the health system (for example in retail shops), while we sought to study the impact of user fees on health services utilisation and the health system in general.

Types of interventions

This review aimed to evaluate the effect of any change in user fees, e.g. the introduction or removal of fees or variation in the level of fees. User fees must be understood here as a financing mechanism that has two main characteristics: payment is made at the point of use of the health service, and there is no risk sharing. User fees can entail any combination of drug costs, supply and medical material costs, entrance fees or consultation fees. They can be paid for each visit to a healthcare provider or encompass a whole episode of illness.

Types of outcome measures

Primary outcomes

Primary outcomes of interest were changes in the use of health services and health care expenditures.

- We considered changes in the utilisation patterns of health services as a proxy for measuring the impact on the populations' access to care, as such changes would indicate a change in the consumption of health services. Information related to distance travelled or travel time to a health facility was outside the scope of the review.
- We considered changes in health-related expenditure when these reflected direct (and indirect) costs borne by the patient or family, therefore conveying changes in the affordability of health care.

Secondary outcomes

Secondary outcomes included health outcomes and changes in equity of access.

- We considered changes in health outcomes in order to provide information on whether improvement, or deterioration, in financial accessibility has an impact on the health status of a population.
- We included changes in equity outcomes, measured as differentiated outcomes across socio-economic groups, as long as a clear categorisation of the population along a socio-economic scale had been specified and clearly explained.

Search methods for identification of studies

Electronic searches

The search to identify studies for this review was initially done as a part of a much wider review on health financing mechanisms (Lagarde 2006) dealing with the effects of several financing strategies. The broad review has been split into several sub-reviews, including the present one. Therefore the search methodology includes terms that encompass a broader scope than the one defined for this review.

We searched 25 international databases, including the Cochrane Effective Practice and Organisation of Care (EPOC) Group's Trials Register, CENTRAL, MEDLINE and EMBASE. We also searched the websites and online resources of international agencies, organisations and universities to find relevant grey literature. We originally searched the following electronic databases without language or date restrictions:

- The Cochrane EPOC Group Trials Register (and the database of studies awaiting assessment), 20/01/2006
- The Cochrane Central Register of Controlled Trials (CENTRAL) *The Cochrane Library*, 20/01/2006
- MEDLINE, 11/11/2005
- EMBASE (Athens), 19/04/2006
- Popline, 08/12/2005
- African Healthline (bibliographic databases on African health issues), 28/04/2006
- IBSS (International Bibliography in Social Sciences, Athens interface), 19/04/2006
- The Database of Abstracts of Reviews of Effectiveness, 20/01/2006
- BLDS, 03/11/2005
- ID21, 24/11/2005
- ELDIS, 25/11/2005
- The Antwerp Institute of Tropical Medicine database, 26/01/2006
- Jstor, 26/01/2005
- Inter-Science (Wiley), 16/12/2005
- ScienceDirect, 16/12/2005
- IDEAS(Repec), 20/01/2005
- LILACS, 19/04/2006
- CAB-Direct (Global Health), 17/04/2006
- Healthcare Management Information Consortium (HMIC), 17/04/2006
- World Health Organization Library Information System (WHOLIS), 18/04/2006
- MEDCARIB, 19/04/2006
- ADOLEC, 19/04/2006
- FRANCIS, 16/12/2005
- BDSB, 16/12/2005
- USAID database, 04/11/2005.

The dates indicated refer to the original searches performed. We developed the MEDLINE search strategy mainly using reviews cited in the background section of the protocol (Lagarde 2006) and their references. The strategy includes terms for the following types

of interventions: change in financing policies (user fee introduction, removal, increase or decrease in user charges), introduction of insurance or risk-protection mechanisms (pre-payment, community-based insurance), conditional cash transfers or demand-side financial incentives, contracting out or outsourcing of service. We translated this search strategy into the other databases using the appropriate controlled vocabulary, as applicable. Search strategies for electronic databases used selected MeSH terms and free text terms relating to printed health financing literature for low- and middle-income countries. We used a number of free text terms to browse more simple databases or list of studies, such as "health financing", "user fees", "user charges", "cost recovery".

Updated search

We performed an updated search of the following databases on January 26, 2011:

- The Cochrane Central Register of Controlled Trials (CENTRAL DVD-ROM) 2011, Issue 1, part of the *The Cochrane Library*. www.thecochranelibrary.com
- MEDLINE In-Process & Other Non-Indexed Citations, Ovid (January 25, 2011)
- MEDLINE, Ovid (1948 to January Week 2 2011)
- EMBASE, Ovid (1980 to 2011 Week 03)
- EconLit, CSA Illumina (1969 - present)

See [Appendix 1](#) for the full search strategies.

Searching other resources

We also carried out an extensive search of grey literature resources between December 2005 and February 2006 including:

- websites and online resources of UNICEF, USAID and the World Bank, Partnerships for Health Reforms, Abt Associates, Management Sciences for Health (MSH), Oxford Policy Management, Save the Children, Oxfam, and a number of other networks or organisation websites including The Private Sector Partnerships-*One*, the Indian Council for Research on International Economic Relations, Equinet - The Network for Equity in Health in Southern Africa, and the Organisation for Social Science Research in Eastern and Southern Africa (OSSREA).
- websites and online resources (working papers) of numerous university research centres: among others the Institute of Social Studies, The Hague; the University of Southampton; the International Centre for Diarrhoeal Disease Research and the Centre for Health and Population research, Dhaka; the Boston University Institute for Economic Development; Harvard Initiative for Global Health; Cornell Food and Nutrition Policy Programme; the Institute of Development Studies (University of Sussex); the London School of Hygiene and Tropical Medicine (HEFP website); the Institute of Policy Analysis and Research

(IPAR) in Kenya; the Development Policy Research Unit of the University of Cape Town; and the Netherlands Institute for Southern Africa.

We also screened the reference lists of all relevant references retrieved. We contacted the authors of relevant papers or known experts in the fields of interest to identify additional studies, including unpublished and ongoing studies.

Data collection and analysis

Selection of studies

The two review authors (ML and NP) independently selected the studies to be included in the review. We resolved disagreements by discussion.

Data extraction and management

We extracted the following information from included studies using a standardised data extraction form.

- Type of study (RCT, CBA, ITS).
- Study setting (country, key features of the healthcare system or important contextual elements, other health financing options in place, other on-going economic/political/social reforms).
- Characteristics of participants (catchment area size, characteristics of the population, existing health facilities, etc.).
- Characteristics of the intervention (type of fees and level of health services).
- Main outcome measures and results.

We prepared tables for each sub-category of intervention, including the following information: study ID, country and date of the intervention, characteristics of the intervention and the participants (facility/population level), details about contextual factors, and included outcomes.

Assessment of risk of bias in included studies

We slightly adapted the standard criteria recommended by EPOC (EPOC 2002) to match the particularities of the studies found in the field of interest. For example, criteria about follow-up of patients or doctors were not relevant as most of the studies used population survey data. Follow-up surveys, when carried out, would therefore not be done with the same population, but with a new random sample. In addition, we added some specific criteria to account for some of the limitations of the studies found (e.g. no statistical analysis performed or failure to account for clustering effects). Appendix 2 presents the detailed list of all quality criteria used, and explains the amendments we introduced to the original EPOC criteria for each type of design.

We used the following criteria for RCTs and C-RCTs.

1. Concealment of allocation.
2. Protection against exclusion bias.
3. Appropriate sampling strategy.
4. Appropriate analysis.
5. Reliable primary outcomes measures.
6. Protection against detection bias.
7. Baseline measurement of outcomes.
8. Protection against contamination.

We used the following criteria for CBA studies.

1. Baseline measurement of outcomes.
2. Baseline characteristics of studies using second site as control.
3. Protection against exclusion or selection bias.
4. Protection against contamination.
5. Reliable primary outcomes measures.
6. Appropriate analysis of data.

Our criteria for ITS studies included the following.

1. Protection against changes.
2. Appropriate analysis of the data (or re-analysis possible).
3. Protection against selection bias.
4. Reliability of outcome data.
5. Number of points specified.
6. Intervention effect specified.
7. Protection against detection bias.

Both review authors independently assessed the risk of bias in the included studies. We resolved discrepancies in quality ratings by discussion. After assessment of all quality criteria, we classified the studies into three categories according to their risk of bias:

- low risk of bias = all criteria scored as 'done';
- moderate risk of bias = one or two criteria scored as 'not clear' or 'not done';
- high risk of bias = more than two criteria scored as 'not clear' or 'not done'.

Data synthesis

Several studies included as **Interrupted Time-Series studies** provided longitudinal data but had failed to analyse it in a relevant manner - i.e. the authors of these studies often only computed means before and after the intervention, without accounting for trends, which can yield to biases or spurious results (for more details about the limitations of such alternative analyses, please see Lagarde 2011).

Therefore we re-analysed the data when they could be obtained from the authors, had been reported in tables in the paper or could be scanned from any graph (we recomposed point coordinates from a digital scan of the graphs; whenever possible we checked the results obtained with data from the papers and discrepancies were never greater than 1%). We then examined these data series with the following segmented regression model to control for secular trends and potential serial correlation of data, and to detect any significant changes after the policy change:

$$Y_t = \beta_0 + b_1 * \text{Time} + b_2 * \text{intervention} + b_3 * \text{Postslope} + \epsilon_t$$

Where Y_t is the outcome variable at time t . Time is a continuous variable indicating time from the start of the study up to the end, to capture any structural trend. Intervention is coded zero for pre-intervention time points and one for post-intervention time points. Postslope is coded zero up to the last point before the intervention phase and coded sequentially from one thereafter. When we detected auto-correlation by a Durbin-Watson test, we corrected it with a Prais-Winsten regression.

Using the regression results obtained, we then calculated the predicted outcome measure for the date after the intervention and at regular intervals afterwards. We did not predict beyond the scope of the original data series. We then compared these predicted outcomes to the utilisation level that could have been anticipated without the policy change (coefficient on the intervention variable $b_2 = 0$). This gives a measure of the relative impact of the policy change, compared to a counterfactual (Lagarde 2011).

For **Controlled Before-and-After studies**, we present the outcomes measures before and after, in both intervention and control areas whenever they were available in the original studies. Based on those, we easily calculated first the relative change in each area. For example the relative change in the intervention area is given by a simple difference in outcome: $INT_{follow-up} - INT_{baseline}$. Then we calculated the relative change in the intervention area compared with the control area:

$$\text{Relative change} = (100 + \text{relative change in intervention area(s)}) / (100 + \text{relative change in control(s)}) - 1.$$

Finally, we calculated the price elasticities (e_p) of the demand for services, where utilisation outcomes are used as a proxy for the demand for health services:

$$e_p = \% \text{ change in utilisation of services} / \% \text{ change in fees.}$$

We calculated an “absolute” elasticity (just taking into account the relative per cent change in intervention areas) and a ‘net’ elasticity, taking as %change in utilisation of services the relative change as defined above.

Finally, if there were enough data in the included articles, we computed statistics to test the significance of observed changes when the authors of the original papers had failed to do this.

Our confidence in the available estimates of effects was graded using an approach similar to the one recommended by the GRADE Working Group (GRADE 2004). The GRADE quality scores are High, Moderate, Low, and Very Low. When grading the quality of evidence, we initially graded ITS studies as “Low” quality. This was based by our view that those studies had generally used unreliable sources of data, and had not included control sites or had included control sites that were not comparable. We felt that, in the context of health systems interventions, these problems precluded these studies from obtaining reliable measurements of effect. Confidence in estimates of effects can be found in the summary of findings tables (Summary of findings for the main comparison; Summary of findings 2).

RESULTS

Description of studies

See: [Characteristics of included studies](#); [Characteristics of excluded studies](#).

Results of the search

We identified 243 potentially relevant papers on user fees after screening the list of citations retrieved from the search. We excluded most of these studies and papers because they did not meet the study design inclusion criteria. They were primarily descriptive case studies, reviews, modelling or cross-sectional studies. We did not identify any further studies as potentially relevant for the review after we had screened the 2,223 citations identified by this search.

Excluded studies

The excluded studies table ([Characteristics of excluded studies](#)) provides the reasons for the exclusion of those studies that were closest to being included. A number of pilot programs did not have a control site and so could not be considered as controlled before-and-after studies, and most studies using longitudinal data did not provide enough data points to be re-analysed, or scanning was not possible and data were not obtainable from the authors.

Included studies

Seven studies (five controlled before-and-after studies and two cluster-randomised controlled trials) met our inclusion criteria without re-analysis of data. Nine more studies met the criteria after we re-analysed data as described above. Two papers dealt with successive changes in user fees, covering both the effects of introduction and removal in Kenya (Moses 1992; Collins 1996). In total there were eight papers presenting data on the effects of the introduction of user fees, five on the removal of fees and five on the effects of increasing or decreasing fees (see [Table 1](#)).

Some papers reported results from specifically designed studies (Litvack 1993; Ojeda 1994; Diop 1995; Bratt 2002; Abdu 2004; Kremer 2007), while others sought to analyse the effect of nationally implemented strategies using routine data (Bennett 1989; Moses 1992; Mbugua 1995; Collins 1996; Benjamin 2001; Wilkinson 2001; Ridde 2003; Burnham 2004; Issifou 2004; Nabyonga 2005). Two included studies reported the effects of the national removal of fees in Uganda in 2004 (Burnham 2004; Nabyonga 2005). One examined the impact of fee removal in South Africa in 1994 (Wilkinson 2001). Two studies focused on the Kenyan experience in the late 1980s (Moses 1992; Collins 1996).

The studies also included a broad range of study settings (in terms of the level of care) as well as the characteristics of the intervention itself (level of fees and type of services for which patients had to pay). A range of outcome measures was used, often reflecting differences in information systems. For instance, outcome measures for utilisation included new visits, registrations, weekly/quarterly/monthly attendances, and outpatient or inpatient attendance.

Risk of bias in included studies

Overall, the risk of bias in the included evidence was high (see Risk of Bias Assessment tables: CBA studies (Table 2); ITS (Table 3); and RCTs (Table 4)).

The biggest risk of bias in most studies was the presence of confounding factors that were not accounted for. These included shifts in health financing policy that occurred at the same time as economic crises (or broader health system reforms, both (Moses 1992; Mbugua 1995; Collins 1996; Wilkinson 2001; Burnham 2004; Nabyonga 2005)); the presence of high inflation in two studies from Latin America, which may have confused the effects of price variations in two experiments (Leon 1993; Bratt 2002); and the fact that most studies providing longitudinal data (re-analysed as ITS) did not provide evidence that the intervention had occurred without concomitant changes.

In the controlled before-and-after studies there may have been problems controlling whether free care was really free in control areas (Ellis 1994). Controlled before-and-after studies also suffered from non-equivalence between control and intervention sites, reflected either by significant differences in either outcomes at baseline or socio-economic characteristics (see Table 2).

Many findings were also limited by the statistical analysis methods used. Generalisability of the conclusions was often limited by small sample sizes (for example, Litvack 1993 based a regression analysis on a sample of 61 individuals). Several studies failed to check the statistical significance of the results they calculated while others did not use appropriate statistical analysis methods (for example, Litvack 1993 specifies different models for each quintile instead of unique quantile regression, or regression including quantile dummies). In addition, none of the original studies that used longitudinal data had analysed these rigorously, and the re-analysis we conducted for this review could not compensate for the small samples used or the lack of reliability of the data collected.

Overall, for each type of intervention, we drew the following conclusions.

- We considered the evidence on the removal of user fees to be at high risk of bias. In particular, the presence of confounding factors (concurrent policy changes), the lack of reliability of routine data and limited sample sizes weaken the evidence base.
- Evidence on the introduction of user fees also suffered from high risk of bias, with the exception of one C-RCT (Kremer 2007). The two included CBAs had a number of limitations that reduce the confidence one can have in their results.

- We also considered that the evidence on increasing or diminishing user fees to be at high risk of bias. In particular, the effects of the change in price in several studies may have been confounded by high inflation rates at the time of the interventions.

Effects of interventions

See: [Summary of findings for the main comparison Summary of Findings - Introducing user fees](#); [Summary of findings 2 Summary of Findings - Increasing user fees](#); [Summary of findings 3 Summary of Findings - Removing user fees](#); [Summary of findings 4 Summary of Findings - Decreasing user fees](#)

Impacts of increasing user fees

We included three studies reporting the effects of increasing user fees (see Table 5). One studied an increase of user fees in the public sector (Bennett 1989) and two studied the effects in private facilities (Bratt 2002; Issifou 2004). We re-analysed data from two of the studies (Bennett 1989; Issifou 2004).

Re-analysed longitudinal data from Lesotho (Bennett 1989) showed that increasing user fees led to a drop in utilisation, while at the same time the uptake of services in private not-for-profit facilities did not change. In Gabon, consultation fees were increased twice in a private hospital and there was a drop in outpatient visits (Issifou 2004). The first increase by 66% led to a drop in utilisation by almost 50%, and a further increase of 20% caused another 44% decline in utilisation. Corresponding elasticities confirm that the demand was very sensitive to a change in prices only after the second increase in consultation fees (see Table 5), which suggests a threshold effect. Finally, an experiment in Ecuador (Bratt 2002) tested the effects of increasing fees on the uptake of reproductive health services (obstetrics-gynaecology, antenatal care and intrauterine device (IUD) use) in private clinics. Overall, they found that demand was inelastic to changes in prices: for a medium increase of price they found that demand for IUD insertions was that of a luxury good, i.e. it increased despite the increase in price.

Impacts of decreasing user fees

We included two studies reporting on the effect of decreasing fees (see Table 6). Abdu 2004 reported a range of effects for three different levels of decrease in user fees in Sudan. They found that decreasing user fees by 25% and 75% led to a more than proportional change (i.e. more than 25% and 75%) in the number of pregnant women (respectively +52% and +130%) and children (respectively +64% and +280%) seen in health centres. The authors found a similar but smaller impact for a decrease in fees of 50% (+32% for children and +28% for women). The corresponding values of elasticities that we computed concur with the authors' conclusion of an elastic demand for health services in only

two out of three cases. This small difference in findings could possibly come from differences in catchment area characteristics or facilities. The authors also include evidence that patients tended to delay their treatment less after the reduction of prices, and were more often able to afford the full course of necessary drugs. [Ojeda 1994](#) reported on the effect of decreasing the price of IUDs in Colombia. Decreasing prices by 25% and 50% led to an increase in the number of users of 180% and 210% respectively. This also indicates a highly sensitive price elasticity of demand. However, high inflation at the time in Colombia may have amplified the size of the change in real terms.

Impacts of introducing user fees

We included eight studies that reported effects of the introduction of user fees (see [Table 7](#)).

Our re-analysis of five studies suggested that introducing user fees resulted in a decrease in utilisation of health services ranging from 5% to about 51% immediately after the intervention, and 8% to 55% six months after the intervention took place. Newly introduced user charges decreased curative service uptake in Kenya ([Moses 1992](#); [Mbugua 1995](#); [Collins 1996](#)). Though not statistically significant, utilisation levels in Burkina Faso and Papua New Guinea also decreased ([Benjamin 2001](#); [Ridde 2003](#)), while they increased in the control areas (see [Table 7](#)). Two results from Kenyan studies suggest that in the long term, the negative effects of user fees might be overcome as utilisation trends increase again after a significant drop in utilisation immediately following the introduction of fees ([Mbugua 1995](#); [Collins 1996](#)). As a result, while the immediate impact of the introduction of user fees led to a decrease of 28%, one year after the change the utilisation of services was estimated to be 8% higher than it would have been without the change.

Two CBA studies ([Litvack 1993](#); [Diop 1995](#)) examined the effects of introducing user fees alongside quality improvements. Both studies used household surveys before and after the interventions to measure service uptake by the population. In Niger, [Diop 1995](#) compared utilisation under the existing system (free care) with two variations of user fees (a mixed system of local taxation and fees; and higher fees alone). According to the authors of the studies, both interventions were accompanied by quality improvements which consisted in providing an initial stock of drugs at the beginning of the study, as well as some basic training on diagnosis and treatment protocols for staff ([Litvack 1993](#); [Diop 1995](#)). The mixed system yielded 73% more outpatient visits, compared with a 16% increase

for the higher fees alone and a 4% increase for continued 'free' care. The mixed system also showed positive effects in terms of equity, the proportion of people in the poorest quartile who had visited a health facility doubled in the "mixed" site but remained unchanged in the other two sites.

The second CBA study was implemented around five health centres in Cameroon ([Litvack 1993](#)). It also concluded that introducing user fees and quality improvement (full stock of drugs and the establishment of management committees) yielded positive outcomes in terms of utilisation and equity.

In a high quality C-RCT, [Kremer and Miguel \(2007\)](#) studied impacts on uptake of a worm prevention treatment at primary schools in Kenya when fees were introduced. Descriptive data show that 19% of pupils took the drugs after fees were introduced, while the uptake rate of free drugs was 75%. In a regression analysis, the authors found that introduction of cost-sharing was responsible for the major part of this reduction in uptake.

Impacts of removing user fees

Five studies using longitudinal data reported the effects of the removal of user fees on utilisation of health services ([Moses 1992](#); [Collins 1996](#); [Wilkinson 2001](#); [Burnham 2004](#); [Nabyonga 2005](#)). We re-analysed these studies to detect changes in outcomes after the policy change (see results in [Table 8](#)).

Overall, this re-analysis suggests a significant increase in the utilisation of most curative services following national policy changes in Kenya ([Moses 1992](#); [Collins 1996](#)), Uganda ([Burnham 2004](#)) and South Africa ([Wilkinson 2001](#)), ranging from 30% to 50% immediately after the policy change, and 18% to 93% 12 months later (see [Table 8](#)). However, this increase in utilisation was not uniform across all curative services, and in particular no significant change was recorded in the number of inpatient admissions ([Nabyonga 2005](#)).

Three studies ([Wilkinson 2001](#); [Burnham 2004](#); [Nabyonga 2005](#)) reported the impact of fee removal on preventive services, and our re-analysis of the data showed mixed effects (see [Table 8](#)). We found a positive increase in utilisation immediately after the intervention in only one of these studies, where the monthly number of antenatal care visits was found to have increased by 65% ([Wilkinson 2001](#)). However, in the three studies we found that the effect in preventive services was more favourable in the long run (12 months after the intervention), where increases in preventive care visits varied between 5% and 92%.

ADDITIONAL SUMMARY OF FINDINGS *[Explanation]*

Population: Anyone using any type of health service in low- and middle-income countries Settings: Ecuador, Gabon Intervention: Increasing user fees Comparison: Previous user fees				
Outcomes	'Net' elasticity of the demand for services ¹	Number of studies	Quality of the evidence (GRADE)*	Comments
Health utilisation - curative care	-0.2 to -2.8	2	⊕⊕⊕⊕ Very low	Each study had 2 arms - in three out of four arms, the results showed elasticities smaller than -1
Health utilisation - preventive care	-0.1 to -0.2	1	⊕⊕⊕⊕ Very low	
*GRADE Working Group grades of evidence ⊕⊕⊕⊕ High: We are confident that the true effect lies close to what was found in the research ⊕⊕⊕⊕: Moderate: The true effect is likely to be close to what was found, but there is a possibility that it is substantially different ⊕⊕⊕⊕: Low: The true effect may be substantially different from what was found ⊕⊕⊕⊕: Very low: We are very uncertain about the effect.				

1. Calculated as relative % change in utilisation of services/% change in fees. This represents the degree to which use of health services changes when user fees are changed.

Population: Anyone using any type of health service in low- and middle-income countries Settings: Kenya, South Africa, Uganda Intervention: Removing user fees Comparison: Previous user fees				
Outcomes	Relative change in utilisation ¹	Number of studies	Quality of the evidence (GRADE)*	Comments
Health service utilisation - preventive care	+1.3% to +249% immediately +5% to +92% after 12 months	3	⊕⊕⊕⊕ Very low ²	The immediate impacts were not statistically significant except in one study, but there were several cases where there was a statistically significant increase in the uptake of preventive services after some time
Health service utilisation - curative care	+30% to +50% immediately +18% to +93% after 12 months	5	⊕⊕⊕⊕ Very low ²	There was an increase in the uptake of outpatient visits across studies, although it was not always statis-

tically significant. Inpatient visits did not increase in the one study that measured this

*GRADE Working Group grades of evidence

- ⊕⊕⊕⊕ **High:** We are confident that the true effect lies close to what was found in the research
- ⊕⊕⊕⊖ **Moderate:** The true effect is likely to be close to what was found, but there is a possibility that it is substantially different
- ⊕⊕⊖⊖ **Low:** The true effect may be substantially different from what was found
- ⊕⊖⊖⊖ **Very low:** We are very uncertain about the effect.

1. Results from CBA studies report a relative change compared to the control group, and results from ITS studies report a relative change compared to utilisation levels that would have been expected without the intervention.
2. Most studies were interrupted time series studies suffering from many biases; particularly absence or non-equivalence of a control and concurrent changes in the health system.

Population: Anyone using any type of health service in low- and middle-income countries

Settings: Colombia, Sudan

Intervention: Decreasing user fees

Comparison: Previous user fees

Outcomes	'Net' elasticity of the demand of services ¹	Number of studies	Quality of the evidence (GRADE)*
Health service utilisation - curative and preventive care	0 to -6.23	2	⊕⊖⊖⊖ Very low

*GRADE Working Group grades of evidence

- ⊕⊕⊕⊕ **High:** We are confident that the true effect lies close to what was found in the research
- ⊕⊕⊕⊖ **Moderate:** The true effect is likely to be close to what was found, but there is a possibility that it is substantially different
- ⊕⊕⊖⊖ **Low:** The true effect may be substantially different from what was found
- ⊕⊖⊖⊖ **Very low:** We are very uncertain about the effect.

1. Calculated as relative % change in utilisation of services/% change in fees. This represents the degree to which use of health services changes when user fees are changed.

DISCUSSION

Summary of main results

This review is the first of its type to address this important policy question for health financing. Some of the included studies dealt with the change in price of a specific good, while others dealt with charges for basic health services more generally. Studies also cov-

ered both public and private sector charges. Some studies are the result of specially designed experiments, while others attempted to study the effects of a 'real world' policy change after this had been implemented.

We found evidence to suggest that removing user fees increases the utilisation of curative healthcare services, usually in the form of one sharp step up following fee removal. We also found that this policy change could potentially have a positive impact on the uptake of preventive services in the long run. Reducing fees

was systematically found to have a positive impact on the uptake of health services, but the effect size varied with the size of fee reduction.

In addition, the review found some evidence that introducing user fees decreased utilisation, but it is unclear whether this reduction persisted over time. Two studies suggested that the combination of user fees and improvements in quality can increase utilisation. Finally, the evidence suggested that an increase (or a decrease) in the level of fees led to a more than proportional decrease (or an increase) in the utilisation of health services, denoting that the demand for health care is elastic.

Overall completeness and applicability of evidence

Many studies used routinely collected data to analyse the effects of the policy change. However, these aggregated patient data from facility registers allow a limited understanding of this phenomenon, as they usually fail to provide information on patient characteristics. Also, all of these results suffered from a high risk of bias due to the presence of confounding factors, including major socio-economic changes potentially affecting unaccounted-for households. The reasons behind the absence of significant change in utilisation of services after the removal of user charges (Moses 1992; Collins 1996; Nabyonga 2005) were never systematically explored by the authors of the included studies. However, some reported some anecdotal evidence on the persistence of “hidden” costs such as informal charges, food, lodging, and drugs (Burnham 2004).

The study design inclusion criteria precluded the inclusion of other types of studies that may also be informative regarding the interventions of interest. Observational, costing, or qualitative studies can provide valuable information to understand other relevant implementation aspects, such as the feasibility or applicability of a policy change, or the possibility of scaling up an intervention (Ridde 2011). For example, studies underscoring the limited revenue generated by user fees (Vogel 1988; Creese 1991; Barnum 1993; Nolan 1995), as well as issues of management and capacity constraints in their retention at facility level (Huber 1993; McPake 1993; Thomason 1994; Gilson 1995), can help explain why improvements in quality implemented in two pilot studies (Litvack 1993; Diop 1995) may not have happened or been sustained at the national level.

Similarly, some of the unintended consequences of removing user fees that are suggested by the included studies included in our review can be better explained by case studies. Such evidence suggests that the contexts in which the removal of fees has been inadequately planned or resourced may be particularly vulnerable to adverse effects (Gilson 2005; Ridde 2009). Planning for the additional resources required, for example in terms of increased drug supply; managing the motivation of health workers faced with increased workload; and monitoring potential informal charging by

health workers are all necessary steps to ensure a successful policy change (Gilson 2005).

However these studies, albeit critical to understand all aspects of the policy question, did not provide evidence of the effectiveness of the policy changes of interest. They were therefore excluded from the scope of the present review.

Quality of the evidence

A major finding of this review is the poor quality of existing studies. Most studies were poorly designed, had small sample sizes and utilised data that were often not very reliable. Important biases that we found across many of the studies included the presence of confounding factors as well as a failure to control for secular changes occurring during the period of the observation.

Many of the included studies were interrupted time-series studies using routine health utilisation data. Such observational designs have limitations, stemming from the often inadequate reliability of routine information systems in low-income and middle-income countries (such as the data obtained from registers) and, more critically, from the importance of confounding external factors that may have played a role during the period of study.

The few controlled before-and-after studies identified often suffered from a lack of equivalence between the control and intervention groups, even when carefully designed as an operational research experiment. This may have been caused by the small number of units used in the experiments.

The large heterogeneity of outcome measures (new visits, registrations, weekly/quarterly/monthly attendances, outpatient or inpatient, users of a particular service or product, etc.) did not allow us to carry out any quantitative synthesis of the results. Included studies often used different types of outcomes, and utilisation data were usually not precise enough to distinguish the different types of health services used. Moreover, types of facilities and category of patients were also very different across studies.

For the particular case of the elasticities calculated, a generalisation regarding the link between the level of change in user fees and the magnitude of change in demand is not reasonably possible. Indeed, differences in economic contexts, starting price, threshold effect and, most importantly, divergences in the nature and measure of health services assessed would lead to flawed or spurious conclusions.

Potential biases in the review process

We carried out an extensive search of the literature in order to make sure that all relevant studies were identified and included. However, it is possible that we may have missed some unpublished studies.

We purposefully restricted the scope of the review to studies looking at fees for health services, not health products such as bednets.

Although some might argue that this distinction was irrelevant and led us to exclude some good quality studies, we believe that the implications for health systems are very different for these two types of interventions, which is why we chose to focus on one aspect only.

Agreements and disagreements with other studies or reviews

Although they did not systematically appraise the evidence with transparent criteria, some reviews on user fees have underlined the dearth of good quality evidence on this topic (Sepehri 2001; James 2006). These reviews and others (Creese 1991; Hutton 2004) concur with our findings that, overall, the evidence base suggests that fees have a detrimental effect on health service utilisation.

The evidence reviewed here suggests that user fees will decrease utilisation unless there is a concomitant increase in the quality of the services offered. Although this review was not able to link changes in levels of expenditure to a particular change in health financing policy, evidence from other types of studies, using cross-sectional surveys, confirms the detrimental effects of user fees (O'Donnell 2005; Van Doorslaer 2005; Su 2006; Xu 2006).

Most modelling studies using household surveys to calculate elasticities have found that demand for health services is not elastic (Heller 1982; Akin 1986; Yoder 1989; Mocan 2000); that is the elasticity of the demand for health services is smaller than one (a change in the level of fees yields a loss rather than a proportional change in utilisation of services). The results found in this review tend to be more consistent with the findings of Gertler 1987 and Sauerborn 1994, who reported higher values of elasticities for most groups of service users, which means that individuals are more sensitive to changes in price of health services. In particular, the values we found for the two Latin American experiences (Ojeda 1994; Bratt 2002) suggest a high price elasticity, but both may have been severely biased by high inflation in the study contexts. Where it was possible to calculate this, we found that if aggregate demand for health services is inelastic to an increase in prices, it is very responsive to a decrease in prices. This discrepancy may be a result of the differences in methods used across these studies, and may prove the limits of modelling studies to predict the factors affecting demand.

AUTHORS' CONCLUSIONS

Implications for practice

Our findings broadly support the view that user fees present a barrier to access to curative health services for those groups who would be eligible to pay them. Therefore policy-makers willing

to introduce user fees, should do so whilst bearing in mind the potential risks for access to health care for these populations.

The conclusions of Litvack 1993 and Diop 1995 have often been cited as some evidence suggesting that the effective quality improvement allowed by user fees could counter the adverse effects of the introduction of these fees. However, these findings may not be reliable due to serious methodological limitations and statistical flaws in these studies. In addition, these studies were conducted on a small scale with technical assistance and support, and do not address the sustainability of the quality improvements made in parallel with the introduction of fees. Decision-makers should therefore be cautious about basing a decision to introduce user fees on the findings of these studies.

Implications for research

This literature review confirms the dearth of carefully designed and analysed studies on the effects of charging for health services in low-income countries. Only one study (Kremer 2007) was found to be of high quality, while all others had important risks of bias. Several studies that have been highly influential in policy making and are often quoted (for example, Litvack 1993; Diop 1995) failed a rigorous quality appraisal. This suggests that enhanced quality standards should be disseminated and rigorous evaluations of policy change in this field encouraged and funded. Well-conducted trials can reduce the risk of bias and could be used to evaluate policy interventions, especially for equity and health expenditure outcomes at household level where we found no evidence. Phased implementation of pilot programmes can provide ideal conditions for randomised controlled trials and before-and-after studies to inform both the effectiveness and the consequences of a new financing option that a government is willing to test. Alternatively, when a reform is implemented at national level without a pilot phase, interrupted time-series studies with some equivalent control sites (usually not-for-profit private facilities are the closest match for public facilities) can provide some useful information on the effectiveness of the new policy, provided the collected data are reliable.

In addition, critical questions for the debate on user fees remain unanswered. Based on the two pilot studies from Niger and Cameroon, user fees are still regularly claimed to be an important conduit for improving quality and health worker motivation through increased revenue. Yet, none of the studies we came across evaluated the potential effects of introduction or removal of fees on the presence of drugs in facilities or health workers' attitudes, or both. More generally, the link between user fee policies and the cost of quality primary health services has been under-researched.

Finally, the policy issues raised by the debate on user fees go beyond the question of their effects, which was the focus of this review. Issues of implementation have been underlined as key to under-

standing the reasons for the success or failure of such policies, in particular when they are implemented at the national level, in the complexity of a health system. Recently, several methodological developments have emerged which may help to translate the principles of Cochrane systematic reviews of effectiveness into broader questions, which would help to incorporate both qualitative and quantitative evidence (Dixon-Woods 2006) or better account for the complexity of interventions (Pawson 2005) in systematic reviews. Future research along these lines could encompass broader issues regarding the effects of policy changes in health financing.

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* Indicates the major publication for the study

CHARACTERISTICS OF STUDIES

Characteristics of included studies [ordered by study ID]

Abdu 2004

Methods	Controlled before-and-after study.
Participants	8 health centres, Sinnar State, Sudan. 2 household surveys, before and after.
Interventions	Decrease in user fees e.g. introduction of different levels of exemptions, for all patients equivalent to a reduction of user fees of 25%, 50%, 75% or none
Outcomes	Healthcare utilisation (medical records and household survey)
Notes	Percentages after not mentioned in the paper: had to assess them by scanning. Other results on health-seeking behaviour and health consumption useless due to the lack of data provided in the paper. Drugs were supplied in all control and experiment facilities during the time of the trial

Risk of bias

Item	Authors' judgement	Description
Baseline Characteristics	No	Few details about baseline characteristics. Very small sample for women
Equivalent Control Site	No	Important differences between control size and treatment areas (catchment area size, urban versus rural, etc.)
Protection against exclusion or selection bias	Unclear	Not clear how the health centres were chosen.
Protection against contamination	Yes	Done.
Reliability/quality of Outcome Measures	Yes	Health service utilisation measured by medical records and household survey
Appropriate Analysis	Yes	Original analysis weak, but data re-analysed.

Benjamin 2001

Methods	Interrupted time-series.
Participants	Routine data from 1 public referral hospital (treatment), and 4 urban public clinics (control)
Interventions	Introduction of user fees for antenatal care visits.
Outcomes	Healthcare utilisation (number of monthly visits).
Notes	Non-equivalence of control and treatment groups.

Risk of bias

Item	Authors' judgement	Description
Protection against exclusion or selection bias	No	Unclear how/why study sites were chosen, and extremely small sample
Reliability/quality of Outcome Measures	Unclear	Data from facility registers - not clear whether they are reliable
Appropriate Analysis	Yes	Data scanned and re-analysed.
Protection against changes	Unclear	No mention of lack of concurrent events, other parallel events that could have affected the outcomes
Number of points specified	Yes	Clear period of analysis.
Intervention effect specified	Yes	Clear timing of interventions.
Protection against Detection Bias	Yes	No change in data collection before and after, no incentive for staff to over/under-report

Bennett 1989

Methods	Interrupted time-series.
Participants	Routine data from 4 district hospitals and 3 private not-for-profit hospitals acting as controls
Interventions	Increase of user fees.
Outcomes	Healthcare utilisation (total weekly outpatient visits).
Notes	

Risk of bias

Item	Authors' judgement	Description
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Bennett 1989 (Continued)

Protection against exclusion or selection bias	No	Very small sample, not clearly justified how facilities were chosen
Reliability/quality of Outcome Measures	Unclear	Data from facility registers - not clear whether they are reliable
Appropriate Analysis	Yes	Data re-analysed.
Protection against changes	Unclear	No mention of lack of concurrent events, other parallel events that could have affected the outcomes
Number of points specified	No	Period of analysis not clearly justified and not accounting for seasonal variations
Intervention effect specified	Yes	Clear timing of interventions.
Protection against Detection Bias	Yes	No change in data collection before and after, no incentive for staff to over/under-report

Bratt 2002

Methods	Cluster-randomised controlled trial.
Participants	5 blocks of 3 clinics that were randomly assigned to control or treatments. Routine data 3 months before and 3 months after, and patient surveys before and after.
Interventions	Increase of user fees.
Outcomes	Healthcare utilisation (average number of monthly visits over 3 months before and after)
Notes	High level of inflation at the time, during the whole period of the study

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Unclear	No possibility to conceal allocation to particular treatment
Baseline Characteristics	Yes	Baseline measurements done and accounted for.
Protection against exclusion or selection bias	Yes	
Protection against contamination	Yes	Blocks of clinics sufficiently far away from each other.
Appropriate Analysis	Unclear	Unclear if analysis took clustering into account.

Bratt 2002 (Continued)

Appropriate Sampling (clustering)	Unclear	Unclear if sampling took clustering into account.
Protection against Detection Bias	Unclear	Since study relied on facility records, not clear whether they may have changed or not (private facilities may have been tempted to over-report?)

Burnham 2004

Methods	Interrupted time-series.
Participants	Aggregated data from 78 facilities in 10 districts.
Interventions	Removal of user fees at national level.
Outcomes	Healthcare utilisation (new visits, re-attendances, for children under 5 and other patients)
Notes	Massive external support and increase of national spending (+22% in 2001) as well as parallel reforms constitute major confounding factors. More minor issue: data from 78 facilities among which 8 were non-governmental ones (with their own drug supply)

Risk of bias

Item	Authors' judgement	Description
Protection against exclusion or selection bias	Yes	Large sample of facilities, nationally representative.
Reliability/quality of Outcome Measures	Unclear	Data from facility registers - not clear whether they are reliable
Appropriate Analysis	Yes	Data scanned and re-analysed.
Protection against changes	No	Many concurrent reforms happening in Uganda at the same time
Number of points specified	Unclear	Not clear why the period was chosen (availability of data?).
Intervention effect specified	Yes	Intervention clearly timed and defined.
Protection against Detection Bias	Yes	No change in data collection before and after, no incentive for staff to over/under-report

Collins 1996

Methods	Interrupted time-series.
Participants	Aggregated data from 4 districts and 3 provincial hospitals.
Interventions	Introduction and removal of user fees.
Outcomes	Healthcare utilisation (medical records: number of general outpatient attendances)
Notes	A number of modifications occurred as this new cost-sharing policy was not well accepted by the population

Risk of bias

Item	Authors' judgement	Description
Protection against exclusion or selection bias	Unclear	Unclear how/why these districts/provincial hospitals were chosen
Reliability/quality of Outcome Measures	Unclear	Data from facility registers - not clear whether they are reliable
Appropriate Analysis	Yes	Data scanned and re-analysed.
Protection against changes	No	Economic and structural adjustment as a background of the study
Number of points specified	Unclear	Seems like a random number of data points were chosen (10 before, 9 after, etc.) without necessarily accounting for seasonality
Intervention effect specified	Yes	Intervention clearly timed and defined.
Protection against Detection Bias	Yes	No change in data collection before and after, no incentive for staff to over/under-report

Diop 1995

Methods	Controlled before-and-after study.
Participants	The intervention was implemented in 3 districts, 2 close to each other and the control one further
Interventions	Introduction of user fees and quality improvements.
Outcomes	Healthcare utilisation (household survey) and health-seeking behaviour
Notes	Informal fees existed before and still exist in the control area

Risk of bias

Diop 1995 (Continued)

Item	Authors' judgement	Description
Baseline Characteristics	Unclear	Few details provided on baseline characteristics of both treatment and control groups
Equivalent Control Site	No	Important differences between control and treatment areas (incl. informal fees in control areas)
Protection against exclusion or selection bias	Yes	
Protection against contamination	Yes	Control and treatment sites far from each other.
Reliability/quality of Outcome Measures	Unclear	Health service utilisation measured by household surveys (self-reported)
Appropriate Analysis	Yes	Original analysis satisfying.

Issifou 2004

Methods	Controlled before-and-after study.
Participants	One private hospital and one public hospital.
Interventions	Increase in user fees in the private hospital by 66%, then 20%
Outcomes	Healthcare utilisation (number of outpatient visits per year)
Notes	Non-equivalence of the two sites assumed.

Risk of bias

Item	Authors' judgement	Description
Baseline Characteristics	Unclear	Few details about baseline characteristics.
Equivalent Control Site	No	Important differences between control size and treatment areas (one public versus one private facility)
Protection against exclusion or selection bias	No	Choice of only one facility (and one control) might be very misleading
Protection against contamination	Yes	The two facilities are not close to each other.

Issifou 2004 (Continued)

Reliability/quality of Outcome Measures	Unclear	Health service utilisation measured by facility records whose reliability might be problematic (or at least different in the two facilities)
Appropriate Analysis	Unclear	Original analysis weak, but data re-analysed.

Kremer 2007

Methods	Randomised controlled trial.
Participants	Busia district, children from 75 schools, 25 in intervention group, 50 in control groups
Interventions	Introduction of user fees for preventive drugs.
Outcomes	Drug use (number of children who take preventive deworming treatment) assessed with a household survey
Notes	No baseline before, assumption is that randomisation is perfect

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Unclear	Unclear how allocation to treatment/control could have been concealed
Baseline Characteristics	No	No baseline measurement undertaken.
Protection against exclusion or selection bias	Yes	Very large random sample.
Protection against contamination	Yes	Pupils attending schools and cannot change.
Appropriate Analysis	Yes	Analysis accounts for clustering.
Appropriate Sampling (clustering)	Yes	Number of clusters and clustering taken into account.
Protection against Detection Bias	Yes	

Leon 1993

Methods	Controlled before-and-after study.
Participants	17 not-for-profit clinics in 15 cities.
Interventions	Increase of user fees.

Leon 1993 (Continued)

Outcomes	Number of new patients.	
Notes	Not clear on many aspects and important confounding external factors (high inflation that raises question of change in real prices)	
<i>Risk of bias</i>		
Item	Authors' judgement	Description
Baseline Characteristics	No	Hardly any information on baseline characteristics.
Equivalent Control Site	No	Important differences between control size and treatment sites as shown by the little data available
Protection against exclusion or selection bias	Yes	
Protection against contamination	Unclear	Possible contamination in some cities (17 clinics in 15 cities meaning than more than 1 clinic in 2 cities)
Reliability/quality of Outcome Measures	Unclear	Health service utilisation measured by facility records.
Appropriate Analysis	No	No statistical significance of results provided.

Litvack 1993

Methods	Controlled before-and-after study.	
Participants	3 treatment health centres and 2 controls, Adamaoua province	
Interventions	Introduction of user fees (+quality improvements).	
Outcomes	Health-seeking behaviour.	
Notes	Statistical analysis and data from the paper do not provide adequate results: no comparison before and after (except one table without statistical significance), and disparate linear regressions	
<i>Risk of bias</i>		
Item	Authors' judgement	Description
Baseline Characteristics	Unclear	Few details about baseline characteristics.

Litvack 1993 (Continued)

Equivalent Control Site	Unclear	Not clear that informal charges did not exist before (and may still do in control sites); very small sample raising doubts about equivalence of control and intervention sites
Protection against exclusion or selection bias	Yes	
Protection against contamination	Yes	
Reliability/quality of Outcome Measures	Unclear	Health service utilisation measured by 2 household surveys, before and after (hence self-reported measures)
Appropriate Analysis	Unclear	No statistical significance for some results; some analysis (quantile regression) seems a little far-fetched considering the small sample size - fishing for a significant result?

Mbugua 1995

Methods	Interrupted time-series.
Participants	Kibwezi division (rural), one hospital and two health centres (treatment) and 4 dispensaries (control)
Interventions	Introduction of user fees.
Outcomes	Healthcare utilisation (medical records: outpatient versus interrupted time-series)
Notes	Only 10 months after the introduction of fees.

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	Unclear	N/A.
Protection against exclusion or selection bias	Unclear	Unclear how/why study sites were chosen.
Reliability/quality of Outcome Measures	Unclear	Data from facility registers - not clear whether they are reliable
Appropriate Analysis	Yes	Data scanned and re-analysed.
Protection against changes	No	Important socio-economic changes in parallel (economic crisis, structural adjustment)

Mbugua 1995 (Continued)

Number of points specified	Unclear	Not clear why the period of analysis was chosen.
Intervention effect specified	Unclear	Clear timing of interventions.
Protection against Detection Bias	Yes	No change in data collection before and after, no incentive for staff to over/under-report

Moses 1992

Methods	Interrupted time-series.
Participants	Data from one referral centre for sexual diseases (registers)
Interventions	Introduction then removal of user fees in a health education program where drugs were previously provided for free
Outcomes	Healthcare utilisation.
Notes	

Risk of bias

Item	Authors' judgement	Description
Protection against exclusion or selection bias	No	Only one study site, unclear why this one was chosen. External validity likely to be weak
Reliability/quality of Outcome Measures	Unclear	Data from facility registers - not clear whether they are reliable
Appropriate Analysis	Yes	Data scanned and re-analysed.
Protection against changes	Unclear	Important socio-economic changes in parallel (economic crisis, structural adjustment)
Number of points specified	Unclear	Not clear why the period of analysis was chosen.
Intervention effect specified	Yes	Clear timing of interventions.
Protection against Detection Bias	Yes	No change in data collection before and after, no incentive for staff to over/under-report

Nabyonga 2005

Methods	Interrupted time-series.
Participants	Aggregated data from 62 public facilities and 34 PNFP facilities
Interventions	Removal of user fees at national level.
Outcomes	Healthcare utilisation (average monthly outpatient attendances)
Notes	Massive external support and increase of national spending (+22% in 2001) as well as parallel reforms constitute major confounding factors

Risk of bias

Item	Authors' judgement	Description
Protection against exclusion or selection bias	Yes	Large sample of facilities, nationally representative.
Reliability/quality of Outcome Measures	Unclear	Data from facility registers - not clear whether they are reliable
Appropriate Analysis	Yes	Data scanned and re-analysed.
Protection against changes	No	Many concurrent reforms happening in Uganda at the same time
Number of points specified	Unclear	Not clear why the period was chosen (availability of data?).
Intervention effect specified	Yes	Intervention clearly timed and defined.
Protection against Detection Bias	Yes	No change in data collection before and after, no incentive for staff to over/under-report

Ojeda 1994

Methods	Controlled before-and-after study.
Participants	4 comparable groups of 3 clinics, 1 control and 3 different interventions
Interventions	Decrease in user fees: same price, same price but payment in 2 instalments, reduction of 25% and reduction of 50%
Outcomes	Healthcare utilisation: number of new users of the contraceptive product
Notes	The study focused on the uptake of a contraceptive method.

Risk of bias

Ojeda 1994 (Continued)

Item	Authors' judgement	Description
Baseline Characteristics	Yes	Good baseline, with good amount of information.
Equivalent Control Site	No	Introduction of the contraceptives did not happen at the same time in all sites; some differences in characteristics
Protection against exclusion or selection bias	Yes	
Protection against contamination	Unclear	Not clear from text.
Reliability/quality of Outcome Measures	Unclear	Health service utilisation measured by facility registers.
Appropriate Analysis	Yes	Partial re-analysis.

Ridde 2003

Methods	Interrupted time-series.
Participants	Kongoussi Health district, 15 health centres, from January 1995 to June 2000
Interventions	Introduction of user fees.
Outcomes	Healthcare utilisation (medical records: monthly new consultations for curative care)
Notes	Intervention did not exactly happen at the same time in all facilities. Important epidemic before introduction of user fees may confuse the analysis

Risk of bias

Item	Authors' judgement	Description
Protection against exclusion or selection bias	Yes	All facilities in one district.
Reliability/quality of Outcome Measures	Unclear	Data from facility registers - not clear whether they are reliable
Appropriate Analysis	Yes	Data scanned and re-analysed.
Protection against changes	Unclear	Some concurrent events mentioned that could have affected outcomes (e.g. measles epidemic)
Number of points specified	Yes	Clear period of analysis, encompassing similar seasons to account for seasonal variations

Ridde 2003 (Continued)

Intervention effect specified	No	Timing of intervention varied from one facility to the other
Protection against Detection Bias	Yes	No change in data collection before and after, no incentive for staff to over/under-report

Wilkinson 2001

Methods	Interrupted time-series.
Participants	Hlabisa health district, KwaZulu/Natal, one mobile unit of health care services (serving 14 communities); data from 1992 to 1998
Interventions	Removal of user fees for children under 5 and pregnant & lactating women, then removal of user fees for all primary services, at national level
Outcomes	Healthcare utilisation (medical records: new registrations and attendances for antenatal care, curative services)
Notes	Very weak sample, many confounding factors.

Risk of bias

Item	Authors' judgement	Description
Protection against exclusion or selection bias	No	Unit of analysis and sample very peculiar - one mobile clinic
Reliability/quality of Outcome Measures	Unclear	Data from facility registers - not clear whether they are reliable
Appropriate Analysis	Yes	Data scanned and re-analysed.
Protection against changes	No	Many concurrent reforms happening in South Africa to reform the health system at the same time
Number of points specified	Unclear	Not clear why the period was chosen (availability of data?).
Intervention effect specified	Yes	Intervention clearly timed and defined.
Protection against Detection Bias	Yes	No change in data collection before and after, no incentive for staff to over/under-report

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

Study	Reason for exclusion
Akashi 2004	Utilisation data could have been re-analysed but 2 months are missing, right after the moment of the intervention
Cohen 2010	Randomised controlled trial of a change in price for insecticide-treated bednets
Deininger 2005	Modelling study using household surveys before and after the abolition of user fees: lack of control
Ellis 1994	Other paper but same study as Diop 1995 . Relevant complementary were used.
Jacobs 2004	Absence of control site.
Leighton 1994	Absence of control site.
Levy-Bruhl 1997	Absence of control site.
Matee 2000	Absence of control site.
Mpuga 2002	Absence of control site.
Osuga 1993	Comparison of two 6-month periods before and after the introduction of cost-sharing (Kenya) without control
Soucat 1997	Absence of control site.
Willis 1995	Other paper but same study as Diop 1995 . Relevant complementary information were used.
Wouters 1995	Other paper but same study as Diop 1995 . Relevant complementary information were used.
Xu 2006	Modelling study using household surveys before and after the abolition of user fees; absence of control
Yazbeck 1994	Other paper but same study as Diop 1995 . Relevant complementary information were used.
Yazbeck 1995	Other paper but same study as Diop 1995 . Relevant complementary information were used.
Yoder 1989	Absence of control, increase in prices differ from one facility to another and 3-month period compared are likely to suffer seasonal bias

DATA AND ANALYSES

This review has no analyses.

ADDITIONAL TABLES

Table 1. Description of contextual elements

Study ID/ Intervention period in study	Nature of intervention and control sites	Individual contextual factors	Broader contextual factor
Ridde 2003 Burkina Faso: data series from January 1995 to June 2000, intervention from July 1997 onwards	Introduction of user fees in 9 Health and Wealth Centres (HWC), 5 other HWC remaining without fees (control)	Construction of 6 other HWC in the district between 1997 (beginning of the intervention) and 2000 (end of the data series) Fees introduced in the 9 facilities which had “a functional and dynamic management as well as an efficient essential drug depot” while the control centres had only established their EDD a few months before July 1997 Fees introduced to “contribute to the operating costs” of the drug depot	Adoption of the Bamako initiative (introduction of user fees) at national level in 1994-5 Outbreak of measles and meningitis in the first half of year 1996
Mbugua 1995 Kenya: data series from December 1988 to November 1990	Introduction of fees (“registration fee” = fee per episode of illness and daily charge for inpatient care) in government hospitals and health centres (nation wide) in December 1989, then removed in September 1990 (not the charges for inpatient care) Dispensaries remained free: they are used here as “control”.	In dispensaries (possible “control” here) “patients frequently had to purchase medicines from drug stores and shops because they were out of stock” Civil servants were exempted in January 1990. One dispensary was opened in September 1989. Three pre-existing mission facilities already charged the same fee per illness that was introduced in government health centres and hospitals	Reduction of fees after the independence (1963). Economic difficulties since mid-1970s led to structural adjustment programs which favoured cuttings in health spending and increase in cost recovery (hence decision of December 1989)
Collins 1996 Kenya: data series from December 1989 to July 1993. Intro-	Introduction of registration fees (fee per episode of illness and daily charge for inpatient care),	The phase of introduction of user fees was not well accepted, and there was no adequate	Economic difficulties since mid-1970s led to structural adjustment pro-

Table 1. Description of contextual elements (Continued)

<p>duction of outpatient and inpatient fees in December 1989, removal of outpatient registration fee in September 1990</p>	<p>then removal of registration fees No control site.</p>	<p>training of staff, nor enough supervision. Besides, revenue generation from user fees was weak Inconsistent perception of change in quality: overall no change detected by the authors, except for provincial hospitals where drug availability seems to have improved. Yet the differences between provincial and district hospitals may come from the difference in survey intervals</p>	<p>grams which favoured cuttings in health spending and increase in cost recovery (hence decision of December 1989) Civil servants were exempted from all fees in April 1990. Existence of a National Health Insurance Fund, that reimburses patients, but whose rates fluctuated during the period of the study</p>
<p>Moses 1992 Kenya, data series from January 1988 to November 1993, user fees period from December 1989 to August 1990 (incl.)</p>	<p>Introduction of outpatient fees (fee for initial visit or registration fee) Intervention site: Nairobi's special treatment Clinic for Sexually Transmitted Diseases, national referral structure for STDs No control.</p>	<p>Civil servants were exempted in April 1990.</p>	<p>Economic difficulties since mid-1970s led to structural adjustment programs which favoured cuttings in health spending and increase in cost recovery (hence decision of December 1989)</p>
<p>Benjamin 2001 Papua New Guinea Introduction of user fees for antenatal care in February 1996, data series from January 1994 to December 1997</p>	<p>Introduction of user charges per antenatal care visits (K 1.00 = US\$ 0.35) Intervention site: the Port Moresby General Hospital (public) Control sites: aggregated data derived from antenatal visits in the 4 other public urban clinics of the area where antenatal care remained free</p>	<p>Small fees (K 1.00 = US\$ 0.35), in comparison with delivery fees (K20.00), equivalent to 1/100th of the income of the majority of the population (approx. K200.00/month)</p>	<p>Decrease in health care spending from 10% of total government expenditure in 1985 to 8.1% in 1995 Another study from Papua New Guinea (Thomason 1994) suggests that practices may not reflect the theoretical policy and that exemptions and charging practices may vary a lot</p>
<p>Diop 1995 Niger, Boboye, Say and Illela districts. 1993-1994. Introduction of 2 types of official user fees for curative care and quality improvements</p>	<p>Introduction of user fees with quality and management improvements (= staff training on diagnosis and treatment protocols, provision of an initial batch of drugs, establishment of a drug inventory and financial management system) Intervention site: 1/Boboye dis-</p>	<p>Very little use of the formal sector: only 2.7% of the population in the three districts sought care in the formal sector at baseline Some differences in control and intervention sites: 1/Differences in the proportions of different ethnic groups</p>	<p>End of the 1980s.</p>

Table 1. Description of contextual elements (Continued)

	<p>tract: annual tax (200 FCFA US \$0.66 per adult) + small fee-per-episode (50FCFA US \$0.16 for adults, 25FCFA US \$0.08 for children) 2/Say district: pure fee-per-episode of illness (200FCFA US \$0.66 for adults, 50FCFA US \$0.16 for children)</p> <p>Control site: Illela district, no fees (at least no formal) and no quality improvement</p>	<p>(Zarma, Fulani and Hausa) in the three districts while this characteristic may play a role in health seeking behaviour (see Yazbeck 1995),</p> <p>2/differences in informal payments. Pre-existence of informal fees before the experiment and certainly during for the control site as attested by a number of other studies (Willis 1995, Ellis 1994, Yazbeck 1995). This informal practice seems not systematic (Willis 1995) and it is hard to assess its extent. However detailed results in Ellis 1994 show two important facts: 1/the average price paid for formal treatments decreased in all districts which suggest that the cost recovery systems introduced were below the reported payments actually made by the patients before the experiment; 2/before the intervention the patients paid twice as much in the control district when they sought formal care, possibly due to unavailability of drugs at facility level</p> <p>3/differences in quality (availability of drugs) at baseline. See Ellis 1994, exhibit 4.1 for complete results. Ellis mentions that similar patterns were found in the second survey, but evidence of this is not provided</p>	
<p>Litvack 1993 Cameroon, Adamaoua province. Introduction of user fees in the control sites in December 1990, data were collected in Oct-Nov 1990 and May-June 1991</p>	<p>Introduction of user fees (consultation fee of FCFA 80 = US\$0.8 and fee for drug on average FCFA 1000 = US\$ 4, with a mark-up of 250% to support all) with quality and management improvements: availability of drugs (vs. widespread shortage usually) and establish-</p>	<p>2 different periods (October and May) were chosen for baseline and follow-up: even though the authors claim they are equivalent, one can argue that they are not, as displayed by the utilisation data given for the year 1990</p>	<p>Deterioration of the economic situation had lead to a dropout in health services utilisation since 1988. Economic reforms were implemented and had some repercussions on the population</p>

Table 1. Description of contextual elements (Continued)

	<p>ment of community health and management committees</p> <p>Intervention sites : 3 health centre areas</p> <p>Control sites: 2 health centre areas</p> <p>NB: the method used to choose the health centres is not specified. Yet the authors mention that they were chosen as similar as possible according to a set of criteria (population number and density, community socio-economic status, motivation of health staff, etc.), however not mentioned in the paper</p>	<p>Prior to the experiment and most probably during the experiment for the control sites, “the treatments are, in theory, free of charge”. Informal payments may occur, and due to the absence of drug supply in public facilities the patients need to buy the drugs in pharmacies</p> <p>One study health centre was eventually dropped because a number of problems were reported regarding the staff’s attitude and perception by the population</p>	<p>The country experienced some political trouble in 1991.</p>
<p>Kremer 2007 Kenya, Busia district 1998-2001</p>	<p>Introduction of fees for deworming drugs in a school health program funded by an NGO; implemented in 75 schools in rural Kenya</p>	<p>The program started in January 1998, and implementation was phased in: 25 schools (group 1) participated from 1998 to 2001, another 25 school participated from 1999 to 2001, and the third group participated in 2001 only. The project consisted mainly of health education activities but also provided “periodic treatment with deworming drugs at all schools where helminth prevalence was sufficiently high”</p> <p>At the initial phase of the program, the drugs were provided for free. In 2001, 25 schools from groups 1 and 2 were randomly assigned to a fee per family (30 or 100 Kenyan Shillings = US\$ 0.40 or 1.30 depending on the kind of drugs provided: 1/3 of the sample was assigned to the 100 shillings option)</p> <p>No baseline knowledge on treatment take-up before the in-</p>	<p>Cost-sharing policy enforced at national level (therefore increased interest to use free drugs offered at schools and no incentive to buy</p>

Table 1. Description of contextual elements (Continued)

		roduction of cost-sharing. Besides, the “control” schools are very heterogeneous: they seem to be constituted by schools from groups 1 and 2 not assigned to cost sharing AND schools from group 3 that just started the program in 2001	
<p>Issifou 2004 Gabon, Lambaréné Increase by 66% on February 1999, then increase by 20% in June 2002</p>	<p>Intervention site = Albert Schweitzer Hospital (ASH), a privately funded hospital</p> <p>Control site = a public hospital, 6km from ASH in the same area</p>	<p>Though not mentioned by the authors, differences between the two hospitals may be important, notably regarding the quality of care received</p> <p>Aggregate data do not allow a refined comparison.</p>	
<p>Bratt 2002 Ecuador Prices were increased in Nov 1996.</p>	<p>Increase of user fees associated with family reproductive health services (IUD, ob-gyn, antenatal care)</p> <p>5 blocks of 3 clinics: in each block one clinic is randomly assigned to control and the 2 others to the 2 different treatments</p> <p>The control group increased its prices by 20% to keep up with the inflation pace, while 1 treatment was an increase of user fees by 40% and the other by 60%</p>	<p>A former study (Bratt 1998) mentions that the patients of CEMOPLAF clinics are increasingly from the wealthiest categories of the population</p>	<p>High level of inflation.</p>
<p>Bennett 1989 Lesotho, weekly data series from January 1988 to December 1988, user fees were augmented in July 1988</p>	<p>Increase of user fees in July 1988 (variation not known).</p> <p>Intervention site: 4 districts hospitals (2 mountainous, 2 lowland) out of the 9 existing</p> <p>Control sites: in one district (Qacha'sNek) 3 private not-for-profit facilities located around one of the government facility are analysed</p>	<p>In PHAL facilities (Private Health Association of Lesotho = controls) in the same time food aid was withdrawn in October 1988</p>	<p>Use fees increased in government facilities to reduce utilisation of over-crowded public facilities and increase utilisation in private PHAL facilities (after the increase the fees in these facilities and the public sector were similar), and rationalize health services utilisation (health centres to be used more and district hospitals less)</p> <p>The weekly data do not allow to control effectively for seasonal</p>

Table 1. Description of contextual elements (Continued)

			patterns
<p>Leon 1993 Ecuador, 1991 Increase of fees for IUDs</p>	<p>In July 1991, 3 clinics (Portoviejo, Ambato and Manta) increased IUDs prices by 61%, 1 clinic (Chone) increased them by 48%, 7 clinics (Babahoyo, Loja, La libertad, Daule, La Troncal, Mapasingue) raised their IUD prices by 7%-16%, and 6 clinics maintained the same prices</p>	<p>Almost no information of differences between the clinics; authors mention non-equivalence of experimental and control clinics as non-randomised Average number of IUDs clients show that 3 of the biggest clinics (in terms of number of IUD clients) are control facilities</p>	<p>High level of inflation at the time in Ecuador (author mentions annual rate of 45%), so that impossible to really assess changes in real prices (and nominal prices may be misleading). Yet comparisons remain valid</p>
<p>Wilkinson 2001 South Africa June 1994: removal of user fees, quarterly data from January 1992 to December 1998 Same study (follow up) as Wilkinson 1997</p>	<p>National policy implemented everywhere from June 1994. Unit of study is a mobile unit in KwaZulu/Natal, South Africa No control site.</p>	<p>Mobile unit of health care serving 14 “widely dispersed” communities, in a district where there are 10 PHC clinics and 1 hospital In the late 1996, 2 “clinic points” previously served by the mobile unit were converted into fixed clinics. This led to another limitation: individual records were used for the 12 remaining clinic points after 1994, but disaggregated data were not available before 1994, so approximations were made Curative services are “mostly used by children”, therefore not entirely?</p>	<p>HIV epidemic. End of apartheid: impact on end of discrimination hence on utilisation? Preventive services were already free before. Evidence of the authors suggests a growing discontent from health workers, which could have negatively affected health services utilisation, especially for preventive care</p>
<p>Nabyonga 2005 Uganda March 2001: removal of user fees, data series from January 2000 to December 2002</p>	<p>National policy announced in all the media and implemented in March 2001 Intervention sites: sample of 13 public referral facilities + 59 public health centres from 6 purposely selected districts (out of the 56 existing) Control facilities were chosen in the same district and 4 referral</p>		<p>A number of important concomitant reforms took place in Uganda at the same time in the health system: increase in wages, increase in health public spending, donor support, increase of drug stocks, etc</p>

Table 1. Description of contextual elements (Continued)

	facility + 30 health centres were used		
Burnham 2004 Uganda March 2001: removal of user fees, data from July 2000 to March 2002	<p>National policy announced in all the media and implemented in March 2001</p> <p>8 health centres by district were selected from 10 districts: 3 HCII units (outpatient services), 3 HCIII units (outpatient services and maternity) and 2 HCIV units (outpatient, maternity, inpatient and a medical officer). Out of these 80 facilities only 78 were kept in the analysis</p> <p>No control.</p>	<p>8 of the facilities from the original sample are non governmental facilities “receiving governmental support”. It is not clear to what extent these facilities are similar to government ones, one difference being that they have their own source of drugs</p> <p>The sample mixes rural and peri-urban facilities, but most of them are rural</p> <p>Facility data are aggregated hence losing a significant part of the information</p>	<p>A number of important concomitant reforms took place in Uganda at the same time in the health system: increase in wages, increase in health public spending, donor support, increase of drug stocks, etc</p>
Moses 1992 Kenya, data series from January 1988 to November 1993, user fees period from December 1989 to August 1990 (incl.)	<p>Introduction of outpatient fees (fee for initial visit or registration fee)</p> <p>Intervention site: Nairobi’s special treatment Clinic for Sexually Transmitted Diseases, national referral structure for STDs</p> <p>No control.</p>	<p>Civil servants were exempted in April 1990.</p>	<p>Economic difficulties since mid-1970s led to structural adjustment programs which favoured cuttings in health spending and increase in cost recovery (hence decision of December 1989)</p>
Collins 1996 Kenya: data series from December 1989 to July 1993. Introduction of outpatient and inpatient fees in December 1989, removal of outpatient registration fee in September 1990	<p>Introduction of registration fees (fee per episode of illness and daily charge for inpatient care), then removal of registration fees</p> <p>No control site.</p>	<p>The phase of introduction of user fees was not well accepted, and there was no adequate training of staff, nor enough supervision. Revenue generation was weak hence no</p> <p>Inconsistent perception of change in quality: overall no change detected by the authors, except for provincial hospitals where drug availability seems to have improved. Yet the differences between provincial and district hospitals may come from the difference in survey intervals</p>	<p>Economic difficulties since mid-1970s led to structural adjustment programs which favoured cuttings in health spending and increase in cost recovery (hence decision of December 1989)</p> <p>Civil servants were exempted from all fees in April 1990.</p> <p>Existence of a National Health Insurance Fund, that reimburses patients, but whose rates fluctuated during the period of the study</p>

Table 1. Description of contextual elements (Continued)

<p>Abdu 2004 Sudan Different decreases in user fees (-25%, -50%, -75%), July 2001 to July 2002</p>	<p>8 public health centres randomly selected from all centres in the state: 2 chosen as control (1 urban, 1 rural) 2 HC with 25% exemption rate (1 urban, 1 rural) ; 2 HC with 50% exemption rate (1 urban, 1 rural) ; 2 HC with 275% exemption rate (1 urban, 1 rural)</p>	<p>3 urban and 5 rural HC chosen. Important variations in population served (from approx. 53,000 inhabitants for one control to 12,000 for one rural) Publicity for exemptions schemes made in treatment areas, and health education around seriousness of malaria and need to treat early in both treatment and control areas Existence of health insurance schemes, but members were excluded from the household survey</p>	<p>Macroeconomic adjustment (1990-2001) resulting in declining public spending Area of the experiment (Sinnar state) has the highest mortality rate for malaria</p>
<p>Ojeda 1994 Colombia Decrease of user fees Experimental study took place from September 1992 to August 1993</p>	<p>4 groups of 3 clinics were designed. One (G1) did not change the price of the contraceptive; the three others modified the pricing policy as follows: G2 maintained the same price but allowed payment in 2 instalments, G3 reduced the price by 25% and G4 reduced the price by 50%</p> <p>Due to inflation, the prices were constantly readjusted (a net increase of 50% was observed during the experimental period, but the relative differences remained the same</p>	<p>The comparability of the 4 groups was tested using several criteria: geographic region (each group contained one coastal, one Andean and one pacific clinic), number of users of the different types of contraceptive methods, and level of relative poverty in the region (based on an existing national study)</p> <p>It is not clear whether the prices of the contraceptive studies were exactly similar: “before the first semester of 1992, the price fluctuated between US \$30 and US \$35”</p> <p>The period of comparison was September 1991 to August 1992, hence allowing a satisfactory comparison</p>	<p>High level of inflation at the time (30.4% in average in 1991, 27% in 1992 and 22.4% in 1993 according to the Institute of International Finance); potential effects on households’ perceptions and decisions?</p>

Table 2. Risk of bias assessment - Controlled Before and After studies

Study ID	Base-line characteristics	Equivalent control site	Protection against exclusion or selection bias	Protection against contamination	Reliability of outcome measures	Appropriate analysis	Overall assessment	Notes
Abdu 2004	NOT DONE	NOT DONE	NOT CLEAR	DONE	DONE	DONE (reanalysis)	High risk of bias	Important differences between control site and treatment sites (catchment area size, rural/urban, outcome results) ? weakness of sample for women at baseline ? poor overall statistical analysis
Issifou 2004	NOT CLEAR	NOT DONE	NOT DONE	NOT CLEAR	NOT CLEAR	DONE (reanalysis)	High risk of bias	Aggregate data may be misleading ? non-equivalence of the two sites
Litvack 1993	NOT CLEAR	NOT CLEAR	DONE	DONE	DONE	NOT DONE	High risk of bias	Gratuity of care before dubious, hence potential non-equivalence of control site; statistical analysis does not give information on evolutions

Table 2. Risk of bias assessment - Controlled Before and After studies (Continued)

Diop 1995	NOT CLEAR	NOT DONE	DONE	DONE	NOT CLEAR	DONE	High risk of bias	See additional table 5 for details on non equivalence of control and intervention sites, as well as discrepancies at baseline level on the existence and level of informal fees
Ojeda 1994	DONE	NOT DONE	DONE	NOT CLEAR	NOT CLEAR	DONE (partial reanalysis)	High risk of bias	Net prices may be misleading due to the important inflation at the time, which may also have influence individual behaviours. Some minor differences between baseline and control groups (introduction of the contraceptive did not happen at the same time exactly) . Statistical significance computed by the reviewers

Table 2. Risk of bias assessment - Controlled Before and After studies (Continued)

Leon 1993	NOT DONE	NOT DONE	DONE	NOT CLEAR	NOT CLEAR	NOT DONE	High risk of bias	Only one figure provides information on the “baseline” (average number of IUDs clients in the past 3 years), and it shows significant differences in control and experimental areas ; possible contamination in some cities (article mentions 17 clinics in 15 cities) ; no statistical significance provided
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Table 3. Risk of Bias Assessment - Interrupted Time-Series

Study ID	Protection against changes	Appropriate analysis	No selection bias in the sample framing	Quality of outcome data	Number of points specified	Intervention effect specified	Detection bias	Overall assessment	Notes
Wilkinson 2001	NOT DONE	DONE (reanalysis)	NOT DONE	NOT CLEAR	NOT CLEAR	DONE	DONE	High risk of bias	Many important historical factors (HIV epidemic, end of apartheid), unit

Table 3. Risk of Bias Assessment - Interrupted Time-Series (Continued)

									of analysis very particular (1 mobile unit) and changes in scope of the villages served
Nabyonga 2005	NOT DONE	DONE (re-analysis)	DONE	NOT CLEAR	NOT CLEAR	DONE	DONE	High risk of bias	Important confounding factors and changes occurred at the same time (profound reforms of the health care system) ? Weak reliability of the information system
Burnham 2004	NOT DONE	DONE (re-analysis)	DONE	NOT CLEAR	NOT CLEAR	DONE	DONE	High risk of bias	Important confounding factors and changes occurred at the same time (profound reforms of the health care system) ? Few points before (only 8) ? Weak reliability of the information system

Table 3. Risk of Bias Assessment - Interrupted Time-Series (Continued)

Ridde 2003	NOT CLEAR	DONE (reanalysis)	DONE	NOT CLEAR	DONE	NOT DONE	DONE	High risk of bias	Opening of health centres ? non-equivalence of control and treatment groups ? data from registers ? point of intervention varied slightly among facilities
Mbugua 1995	NOT DONE	DONE (reanalysis)	DONE	NOT CLEAR	NOT CLEAR	DONE	DONE	High risk of bias	Economic crisis and structural adjustment as a background - few observations (11 before, 9 after) - reason for number of data points not given ? “control” absolutely not equivalent
Moses 1992	NOT DONE	DONE (reanalysis)	NOT DONE	NOT CLEAR	NOT CLEAR	DONE	DONE	High risk of bias	Economic crisis and structural adjustment as a background ? few observations for

Table 3. Risk of Bias Assessment - Interrupted Time-Series (Continued)

									the phase of intervention (23 before, 9 during the phase of registration fees, 15 points without fees) ? 1 participating unit (referral centre for STI)
Collins 1996	NOT DONE	DONE (reanalysis)	NOT CLEAR	NOT CLEAR	NOT CLEAR	DONE	DONE	High risk of bias	Economic crisis and structural adjustment as a background ? few observations for different stages (10 before, 9 during 1st phase of registration fees, 22 points without fees, 12 points in the 2nd phase with treatment fees)
Benjamin 2001	NOT CLEAR	DONE (reanalysis)	NOT DONE	NOT CLEAR	DONE	DONE	DONE	High risk of bias	Other studies suggest no consistent practices in user fees

Table 3. Risk of Bias Assessment - Interrupted Time-Series (Continued)

									and exemptions schemes
Bennett 1989	NOT CLEAR	DONE (reanalysis)	NOT DONE	NOT CLEAR	NOT DONE	DONE	DONE	High risk of bias	Weekly series over 1 year only, does not allow to allow properly for seasonal variations? contextual factors not properly informed

Table 4. Risk of Bias Assessment - Randomised Controlled Trial

Study ID	Concealment of allocation	Protection against exclusion bias	Sampling	Appropriate Analysis	Quality/reliability of the data	Protection against detection bias	Baseline Measurement	Protection against contamination	Overall assessment
Kremer 2007 ¹	NOT CLEAR	DONE	DONE	DONE	DONE	DONE	NOT DONE	DONE	Moderate risk of bias
Bratt 2002 ²	NOT CLEAR	DONE	NOT DONE	NOT CLEAR	NOT CLEAR	NOT CLEAR	DONE	DONE	High risk of bias

¹No baseline measurement seems to have been done before the introduction of cost-sharing options; it is not clear whether the surveys were done blindly

²Very limited number of clusters (3 groups of 5 clinics), while the authors do not mention having addressed problems of power of their analysis. Clustering mentioned only for comparisons of socio-economic categories of clients. Discrepancies between control and intervention groups seem to exist, but the paper does not provide enough information

Table 5. Effects of Increasing user fees

Study	Outcome measure	Fee variation	Change in intervention area(s)	'Absolute' elasticity	Change in control area (s)	Relative change in the intervention area ^a	'Net' elasticity
Issifou 2004	Utilisation of curative services - Num-	+66 %	-47.4 % ***	-0.7	-13.3 %	-39.3 %	- 0.6

Table 5. Effects of Increasing user fees (Continued)

	ber of outpa- tient visits						
		+20% ^b	-44.5 % ***	-2.2	+26.9 %	-56.7 %	- 2.8
Bratt 2002	Utilisation of curative ser-	+53.5 %	-25.9%	-0.48 ^c	-16.7% ^d	-11.0%	- 0.2
	Utilisation of preventive ser- vices - Avera- ge number of antenatal care visits	+36.9 %	-5.0 %	-0.14 ^c	- 3.0% ^d	-2.1%	- 0.1
		+54.6 %	-13.4 %	-0.25 ^c	- 3.0% ^d	-10.7%	- 0.2

^b This is the change in the intervention areas relative to the changes in the control area - see methods section for the detailed calculation.

Table 6. Effects of Decreasing user fees

Study	Outcome measure	Fee variation	Change in in- tervention area(s)	'absolute' elasticity	Change control (s)	in area	Rela- tive change in the interven- tion area ^a	'Net'elasticity
Abdu 2004	Number of children seen in health cen-	-50 %	+32.3 % ***	-0.6	+31%	+1.0%	- 0.0	
		-75%	+280.4% ***	-3.7	+31%	+190.4%	- 2.5	
	Number of pregnant women seen in health centres for malaria	-25 %	+52.1 % ***	-2.1	+6.2%	+43.2%	- 1.7	
		-50 %	+27.9 % ***	-0.6	+6.2%	+20.4%	- 0.4	
		-75%	+131.4% ***	-1.7	+6.2%	+117.9%	- 1.6	
Ojeda 1994	Num- ber of monthly new IUD users ^b	-25 %	+254.8 % ***	-10.2	+72.6%	+105.6%	- 4.2	
		-50 %	+287.3 % ***	-5.7	+72.6%	+124.4%	- 2.5	
		-25 %	+236.5 % ***	-9.5	+30.8%	+157.3%	- 6.3	
		-50 %	+241.2 % ***	-4.8	+30.8%	+160.9%	- 3.2	

^a This is the change in the intervention areas relative to the changes in the control area - see methods section for the detailed calculation.

^b The first two rows compares changes between the period of Sept. 1991-Feb 1992 vs. Sept. 1992-Feb 1993, while the last two compare the periods of March-August 1992 vs. March-Aug. 1993.

Table 7. Impact of Introducing or Increasing user fees - results from re-analysis of longitudinal data

Study ID	Outcome	Impact just after the intervention ^a	Impact 6 months after the intervention	Impact 12 months after the intervention	Impact 18 months after the intervention	Impact 24 months after the intervention
Bennett 1989 ^b	Utilisation of curative services - weekly number of outpatient visits, all age groups (intervention sites)	-37.91%***	-46.80%	-	-	-
	Utilisation of curative services - weekly number of outpatient visits, all age groups (control sites)	-5.54%	-32.63%	-	-	-
Benjamin 2001	Utilisation of preventive services - antenatal care visits (intervention sites)	-15.4%**	-16.3%**	-17.2%**	-18.0%**	-
	Utilisation of preventive services - antenatal care visits (control sites)	38.6%**	32.6%	26.7%	20.7%	-
Moses 1992	Utilisation of curative services - new monthly outpatient visits by women (intervention sites)	-42.93%***	-25.72%	-	-	-
	Utilisation of curative services - new monthly outpatient visits by men (intervention sites)	-51.22%***	-55.11%	-	-	-

Table 7. Impact of Introducing or Increasing user fees - results from re-analysis of longitudinal data (Continued)

Ridde 2003	Utilisation of curative services - monthly number of new outpatient visits (intervention sites)	-5.97%	-7.63%	-9.29%	-10.95%	-12.62%
	Utilisation of curative services - monthly number of new outpatient visits (control sites)	22.65%	28.63%	34.60%	40.57%	46.54%
Collins 1996	Utilisation of curative services - monthly average number of general outpatient visits in district hospitals	-44.55%**	-36.99%	-	-	-
	Utilisation of curative services - monthly average number of general outpatient visits in provincial hospitals	-34.18%***	-34.26%	-	-	-
Mbugua 1995	Utilisation of curative services - number of new outpatient visits in hospitals and health centres (intervention site)	-27.66%*	-10.99%*	8.49%*	-	-
	Utilisation of curative services - number of new outpatient visits in dispensaries (control site)	39.46%*	58.57%	81.40%	-	-

The results show the percent change in utilisation relative to the level of utilisation that would have been expected without the policy change (counterfactual).

Significance levels: *** P < 0.001 ** P < 0.01 * P < 0.05;

^a This corresponds to the percent change in utilisation relative to the level of utilisation that would have been expected without the policy change (counterfactual) - see methods for more details about the calculation.

^b Unlike all other studies in the table, this one refers to an increase in user fees (not introduction). It is included in this table because re-analysis of longitudinal data was undertaken.

Table 8. Impact of Removing user fees - results from re-analysis of longitudinal data

Study ID	Outcome	Impact just after the intervention ^a	Impact 6 months after the intervention ^a	Impact 12 months after the intervention ^a	Impact 18 months after the intervention ^a
Moses 1992	Utilisation of curative services - new monthly outpatient visits by women (intervention sites)	43.63%	66.13%	88.63%	-
	Utilisation of curative services - new monthly outpatient visits by men (intervention sites)	49.23%***	58.71%	68.20%	-
Nabyonga 2005	Utilisation of preventive services - average monthly total of 1st antenatal care visits (intervention sites)	-5.75%	-0.16%	4.69%	10.28%
	Utilisation of preventive services - average monthly total of 1st antenatal care visits (control sites)	-9.87%	-6.87%	-3.08%	-0.07%
	Utilisation of curative services - number of inpatient admissions (intervention sites)	-10.41%	-6.26%*	-2.11%*	2.04%*
	Utilisation of curative services - number of inpatient admissions (control)	-9.70%	-3.70%	1.09%	7.09%

Table 8. Impact of Removing user fees - results from re-analysis of longitudinal data (Continued)

	sites)				
Collins 1996	Utilisation of curative services - monthly average number of general outpatient visits in district hospitals	48.39%**	56.22%*	64.04%*	71.86%*
	Utilisation of curative services - monthly average number of general outpatient visits in provincial hospitals	29.61%***	23.85%***	18.09%***	12.33%***
Burnham 2004	Utilisation of curative services - average total of new monthly outpatient visits of patients < 5 years	32.16%**	30.28%	29.23%	-
	Utilisation of curative services - average total of new monthly outpatient visits of all patients	38.87%**	41.09%	41.27%	-
	Utilisation of preventive services - immunization	17.98%	28.21%*	41.57%*	-
	Utilisation of preventive services - average total of monthly antenatal care visits	16.61%	29.90%***	44.52%***	-
	Utilisation of preventive services - average total of monthly family planning visits	43.63%	66.13%***	85.23%***	-

Table 8. Impact of Removing user fees - results from re-analysis of longitudinal data (Continued)

Wilkinson 2001	Utilisation of curative services - total number of monthly outpatient visits by adults (intervention)	50.84%*	71.73%*	92.63%*	113.52%*
	Utilisation of preventive services - total number of monthly visits (immunization and growth monitoring for children) by children < 6 years (intervention)	7.12%	9.51%	11.90%	14.30%
	Utilisation of preventive services - total number of monthly antenatal care visits (intervention)	65.15%*	50.71%	36.27%	21.82%

Significance levels: *** P < 0.001 ** P < 0.01 * P < 0.05;

^a This corresponds to the percent change in utilisation relative to the level of utilisation that would have been expected without the policy change (counterfactual) - see methods for more details about the calculation.

APPENDICES

Appendix I. Search strategy

Original search

The search in PubMed was also restricted to all the developing countries listed on the World Bank website, by selecting all relevant geographical categories as exploded terms.

Some pilot searches led us to use quite general (exploded) MeSH terms, as it was noticed that several relevant articles were indexed with generic MeSH terms, or not particularly appropriate ones. For example, a study on Ghana would not be referenced under “Ghana” but under “Africa”. Besides, since including “Africa[MeSH]” would also include all MeSH terms of lower levels, it was decided to include mainly higher level MeSH terms for delimiting the geographic scope of the study (see #1 below). A few countries were excluded (see #6).

A similar approach was taken for specifying the topic filters of the search. Generic MeSH terms were used (see #2), and more selective terms that are currently used in the literature were added as free text references (see #3). However, because this was potentially return a large number of irrelevant studies, it was decided to limit this by excluding some irrelevant studies (see #4).

These different filters were then rearranged together (see #7, #8 and #9).

1	Search “Developing countries”[MeSH] OR “Africa”[MeSH] OR “Central America”[MeSH] OR “South America”[MeSH] OR “Latin America”[MeSH] OR “Mexico”[MeSH] OR “Asia”[MeSH] OR “Commonwealth of Independent States”[MeSH] OR “Pacific Islands”[MeSH] OR “Indian Ocean Islands”[MeSH] OR “Europe, Eastern”[MeSH]
2	Search (“Economics”[MeSH] OR “Economics”[SH] OR “socioeconomic factors”[MeSH]) AND (“Delivery of health care”[MeSH] OR “health services research”[MeSH] OR “health planning”[MeSH] OR “health services ”[MeSH] OR “utilization”[SH])
3	Search “Fees and charges”[MeSH] OR user fee[TIAB] OR user fees[TIAB] OR social insurance[TIAB] OR health insurance[TIAB] OR community-based insurance[TIAB] OR prepayment plan[TIAB] OR prepayment plans[TIAB] OR prepayment scheme[TIAB] OR prepayment schemes[TIAB] OR conditional cash transfers[TIAB] OR cost recovery[TIAB] OR prepayment[TIAB] OR contracting out [TIAB] OR output-based contract[TIAB] OR pay for performance [TIAB]
4	Search “Personnel Downsizing”[MeSH] OR “workplace”[MeSH] OR “health planning guidelines”[MeSH] OR “patient freedom of choice laws ”[MeSH] OR “preferred provider organizations”[MeSH] OR “provider-sponsored organizations”[MeSH] OR “emergency Medical Service Communication Systems”[MeSH] OR “Genetic Services”[MeSH] OR “Medical Errors”[MeSH] OR Chemicals and Drugs Category[MAJR] OR “Drug industry”[MAJR] OR “epidemiology”[MAJR] OR “Patents”[MAJR] OR “War”[MAJR] OR Anatomy Category[MAJR] OR “Child Abuse”[MeSH] OR (“Technology and Food and Beverages Category”[MAJR] NOT “food supply”[MeSH])
5	Search Practice Guideline[ptyp] OR Letter[ptyp] OR Editorial[ptyp] “Clinical Trial”[ptyp] OR “Clinical Trial, Phase I”[ptyp] OR “Clinical Trial, Phase II”[ptyp] OR “Clinical Trial, Phase III”[ptyp] OR “Clinical Trial, Phase IV”[ptyp]
6	Search “Japan”[MeSH] OR “Korea”[MeSH] OR “Taiwan”[MeSH] OR “New Zealand”[MeSH] OR “Singapore”[MeSH] OR “Israel”[MeSH]
7	Search #1 AND #2 NOT #4 NOT #5 NOT #6
8	Search #1 AND #3 NOT #4 NOT #5 NOT #6
9	Search #8 OR #7

This search strategy was translated into the other databases using the appropriate controlled vocabulary, as applicable.

Updated search

CENTRAL (DVD-ROM)

ID	Search
#1	MeSH descriptor Fees and Charges this term only
#2	MeSH descriptor Fees, Dental this term only
#3	MeSH descriptor Fees, Medical this term only
#4	MeSH descriptor Fees, Pharmaceutical this term only
#5	MeSH descriptor Prescription Fees this term only

(Continued)

#6	MeSH descriptor Hospital Charges this term only
#7	MeSH descriptor Capitation Fee this term only
#8	MeSH descriptor Fee-for-Service Plans this term only
#9	MeSH descriptor Cost Sharing this term only
#10	MeSH descriptor Contract Services this term only
#11	MeSH descriptor Outsourced Services this term only
#12	MeSH descriptor Prepaid Health Plans this term only
#13	MeSH descriptor Prospective Payment System this term only
#14	MeSH descriptor Insurance, Health explode all trees
#15	((medical in Title, Abstract or Keywords or dental in Title, Abstract or Keywords or pharmac* in Title, Abstract or Keywords or dispensing in Title, Abstract or Keywords or drug in Title, Abstract or Keywords or drugs in Title, Abstract or Keywords or medicament* in Title, Abstract or Keywords or medicine* in Title, Abstract or Keywords or prescript* in Title, Abstract or Keywords or consultation* in Title, Abstract or Keywords or treatment* in Title, Abstract or Keywords or registration* in Title, Abstract or Keywords or hospital* in Title, Abstract or Keywords or care in Title, Abstract or Keywords) and (fee in Title, Abstract or Keywords or fees in Title, Abstract or Keywords or charge* in Title, Abstract or Keywords))
#16	((user in Title, Abstract or Keywords or users in Title, Abstract or Keywords or patient* in Title, Abstract or Keywords or outpatient* in Title, Abstract or Keywords or inpatient* in Title, Abstract or Keywords) and (fee in Title, Abstract or Keywords or fees in Title, Abstract or Keywords or charge* in Title, Abstract or Keywords or pay* in Title, Abstract or Keywords))
#17	(“fee for service” in Title, Abstract or Keywords or “fee for services” in Title, Abstract or Keywords)
#18	capitation in Title, Abstract or Keywords
#19	((pay* in Title, Abstract or Keywords or cash in Title, Abstract or Keywords or money in Title, Abstract or Keywords or monetary in Title, Abstract or Keywords or economic in Title, Abstract or Keywords or financial in Title, Abstract or Keywords) and incentive* in Title, Abstract or Keywords)
#20	(pay* in Title, Abstract or Keywords near/3 performance in Title, Abstract or Keywords)
#21	p4p in Title, Abstract or Keywords
#22	(result* next based in Title, Abstract or Keywords or performance next based in Title, Abstract or Keywords)
#23	((result* in Title, Abstract or Keywords or performance in Title, Abstract or Keywords or output in Title, Abstract or Keywords or “out put” in Title, Abstract or Keywords) and (financ* in Title, Abstract or Keywords or pay* in Title, Abstract or Keywords or incentive* in Title, Abstract or Keywords or initiative* in Title, Abstract or Keywords or bonus* in Title, Abstract or Keywords))

(Continued)

#24	((cash in Title, Abstract or Keywords or pay* in Title, Abstract or Keywords) and (condition* in Title, Abstract or Keywords or contingent in Title, Abstract or Keywords or requirement* in Title, Abstract or Keywords))
#25	((cash in Title, Abstract or Keywords or pay* in Title, Abstract or Keywords or monetary in Title, Abstract or Keywords or money in Title, Abstract or Keywords) and transfer* in Title, Abstract or Keywords)
#26	“cost sharing” in Title, Abstract or Keywords
#27	cost next recover* in Title, Abstract or Keywords
#28	price next change* in Title, Abstract or Keywords
#29	(contract in Title, Abstract or Keywords or contracts in Title, Abstract or Keywords or contracting in Title, Abstract or Keywords)
#30	(outsourc* in Title, Abstract or Keywords or out next sourc* in Title, Abstract or Keywords)
#31	(“risk sharing” in Title, Abstract or Keywords or shared next risk* in Title, Abstract or Keywords)
#32	(prospective next pay* in Title, Abstract or Keywords or prospective next reimbursement* in Title, Abstract or Keywords)
#33	(prepay* in Title, Abstract or Keywords or pre next pay* in Title, Abstract or Keywords or prepaid in Title, Abstract or Keywords or pre next paid in Title, Abstract or Keywords)
#34	(health* next insurance* in Title, Abstract or Keywords or “health care” next insurance* in Title, Abstract or Keywords or medical next insurance* in Title, Abstract or Keywords)
#35	((social in Title, Abstract or Keywords or community in Title, Abstract or Keywords) and (insurance* in Title, Abstract or Keywords or financ* in Title, Abstract or Keywords))
#36	“demand side” in Title, Abstract or Keywords
#37	“supply side” in Title, Abstract or Keywords
#38	(financ* next strategy in Title, Abstract or Keywords or financ* next strategies in Title, Abstract or Keywords)
#39	(Africa in Title, Abstract or Keywords or Asia in Title, Abstract or Keywords or Caribbean in Title, Abstract or Keywords or “West Indies” in Title, Abstract or Keywords or “South America” in Title, Abstract or Keywords or “Latin America” in Title, Abstract or Keywords or “Central America” in Title, Abstract or Keywords)
#40	(Afghanistan in Title, Abstract or Keywords or Albania in Title, Abstract or Keywords or Algeria in Title, Abstract or Keywords or Angola in Title, Abstract or Keywords or Antigua in Title, Abstract or Keywords or Barbuda in Title, Abstract or Keywords or Argentina in Title, Abstract or Keywords or Armenia in Title, Abstract or Keywords or Armenian in Title, Abstract or Keywords or Aruba in Title, Abstract or Keywords or Azerbaijan in Title, Abstract or Keywords or Bahrain in Title, Abstract or Keywords or Bangladesh in Title, Abstract or Keywords or Barbados in Title, Abstract or Keywords or Benin in Title, Abstract or Keywords or Byelarus in Title, Abstract or Keywords or Byelorussian in Title, Abstract or Keywords or Belarus in Title, Abstract or Keywords or Belorussian in Title, Abstract or Keywords or Belorussia in Title, Abstract or Keywords or Belize in

(Continued)

	Title, Abstract or Keywords or Bhutan in Title, Abstract or Keywords or Bolivia in Title, Abstract or Keywords or Bosnia in Title, Abstract or Keywords or Herzegovina in Title, Abstract or Keywords or Hercegovina in Title, Abstract or Keywords or Botswana in Title, Abstract or Keywords or Brazil in Title, Abstract or Keywords or Brasil in Title, Abstract or Keywords or Bulgaria in Title, Abstract or Keywords or “Burkina Faso” in Title, Abstract or Keywords or “Burkina Fasso” in Title, Abstract or Keywords or “Upper Volta” in Title, Abstract or Keywords or Burundi in Title, Abstract or Keywords or Urundi in Title, Abstract or Keywords or Cambodia in Title, Abstract or Keywords or “Khmer Republic” in Title, Abstract or Keywords or Kampuchea in Title, Abstract or Keywords or Cameroon in Title, Abstract or Keywords or Camerons in Title, Abstract or Keywords or Cameron in Title, Abstract or Keywords or Camerons in Title, Abstract or Keywords or “Cape Verde” in Title, Abstract or Keywords or “Central African Republic” in Title, Abstract or Keywords or Chad in Title, Abstract or Keywords or Chile in Title, Abstract or Keywords or China in Title, Abstract or Keywords or Colombia in Title, Abstract or Keywords or Comoros in Title, Abstract or Keywords or “Comoro Islands” in Title, Abstract or Keywords or Comores in Title, Abstract or Keywords or Mayotte in Title, Abstract or Keywords or Congo in Title, Abstract or Keywords or Zaire in Title, Abstract or Keywords or “Costa Rica” in Title, Abstract or Keywords or “Cote d’Ivoire” in Title, Abstract or Keywords or “Ivory Coast” in Title, Abstract or Keywords or Croatia in Title, Abstract or Keywords or Cuba in Title, Abstract or Keywords or Cyprus in Title, Abstract or Keywords or Czechoslovakia in Title, Abstract or Keywords or “Czech Republic” in Title, Abstract or Keywords or Slovakia in Title, Abstract or Keywords or “Slovak Republic” in Title, Abstract or Keywords)
#41	(Djibouti in Title, Abstract or Keywords or “French Somaliland” in Title, Abstract or Keywords or Dominica in Title, Abstract or Keywords or “Dominican Republic” in Title, Abstract or Keywords or “East Timor” in Title, Abstract or Keywords or “East Timur” in Title, Abstract or Keywords or “Timor Leste” in Title, Abstract or Keywords or Ecuador in Title, Abstract or Keywords or Egypt in Title, Abstract or Keywords or “United Arab Republic” in Title, Abstract or Keywords or “El Salvador” in Title, Abstract or Keywords or Eritrea in Title, Abstract or Keywords or Estonia in Title, Abstract or Keywords or Ethiopia in Title, Abstract or Keywords or Fiji in Title, Abstract or Keywords or Gabon in Title, Abstract or Keywords or “Gabonese Republic” in Title, Abstract or Keywords or Gambia in Title, Abstract or Keywords or Gaza in Title, Abstract or Keywords or Georgia in Title, Abstract or Keywords or Georgian in Title, Abstract or Keywords or Ghana in Title, Abstract or Keywords or “Gold Coast” in Title, Abstract or Keywords or Greece in Title, Abstract or Keywords or Grenada in Title, Abstract or Keywords or Guatemala in Title, Abstract or Keywords or Guinea in Title, Abstract or Keywords or Guam in Title, Abstract or Keywords or Guiana in Title, Abstract or Keywords or Guyana in Title, Abstract or Keywords or Haiti in Title, Abstract or Keywords or Honduras in Title, Abstract or Keywords or Hungary in Title, Abstract or Keywords or India in Title, Abstract or Keywords or Maldives in Title, Abstract or Keywords or Indonesia in Title, Abstract or Keywords or Iran in Title, Abstract or Keywords or Iraq in Title, Abstract or Keywords or “Isle of Man” in Title, Abstract or Keywords or Jamaica in Title, Abstract or Keywords or Jordan in Title, Abstract or Keywords or Kazakhstan in Title, Abstract or Keywords or Kazakh in Title, Abstract or Keywords or Kenya in Title, Abstract or Keywords or Kiribati in Title, Abstract or Keywords or Korea in Title, Abstract or Keywords or Kosovo in Title, Abstract or Keywords or Kyrgyzstan in Title, Abstract or Keywords or Kirghizia in Title, Abstract or Keywords or “Kyrgyz Republic” in Title, Abstract or Keywords or Kirghiz in Title, Abstract or Keywords or Kirgizstan in Title, Abstract or Keywords or “Lao PDR” in Title, Abstract or Keywords or Laos in Title, Abstract or Keywords or Latvia in Title, Abstract or Keywords or Lebanon in Title, Abstract or Keywords or Lesotho in Title, Abstract or Keywords or Basutoland in Title, Abstract or Keywords or Liberia in Title, Abstract or Keywords or Libya in Title, Abstract or Keywords or Lithuania in Title, Abstract or Keywords)
#42	(Macedonia in Title, Abstract or Keywords or Madagascar in Title, Abstract or Keywords or “Malagasy Republic” in Title, Abstract or Keywords or Malaysia in Title, Abstract or Keywords or Malaya in Title, Abstract or Keywords or Malay in Title, Abstract or Keywords or Sabah in Title, Abstract or Keywords or Sarawak in Title, Abstract or Keywords or Malawi in Title, Abstract or Keywords or Nyasaland in Title, Abstract or Keywords or Mali in Title, Abstract or Keywords or Malta in Title, Abstract or Keywords or “Marshall Islands” in Title, Abstract or Keywords or Mauritania in Title, Abstract or Keywords or Mauritius in Title, Abstract or Keywords or “Agalega Islands” in Title, Abstract or Keywords or Mexico in Title, Abstract or Keywords or Micronesia in Title, Abstract or Keywords or “Middle East” in Title, Abstract or Keywords or Moldova in Title, Abstract or Keywords or Moldavia in Title, Abstract or Keywords or Moldovan in Title, Abstract or Keywords or Mongolia in Title, Abstract or Keywords or Montenegro in Title, Abstract or Keywords or Morocco in Title, Abstract or Keywords or Ifni

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	in Title, Abstract or Keywords or Mozambique in Title, Abstract or Keywords or Myanmar in Title, Abstract or Keywords or Myanma in Title, Abstract or Keywords or Burma in Title, Abstract or Keywords or Namibia in Title, Abstract or Keywords or Nepal in Title, Abstract or Keywords or “Netherlands Antilles” in Title, Abstract or Keywords or “New Caledonia” in Title, Abstract or Keywords or Nicaragua in Title, Abstract or Keywords or Niger in Title, Abstract or Keywords or Nigeria in Title, Abstract or Keywords or “Northern Mariana Islands” in Title, Abstract or Keywords or Oman in Title, Abstract or Keywords or Muscat in Title, Abstract or Keywords or Pakistan in Title, Abstract or Keywords or Palau in Title, Abstract or Keywords or Palestine in Title, Abstract or Keywords or Panama in Title, Abstract or Keywords or Paraguay in Title, Abstract or Keywords or Peru in Title, Abstract or Keywords or Philippines in Title, Abstract or Keywords or Philipines in Title, Abstract or Keywords or Phillipines in Title, Abstract or Keywords or Phillippines in Title, Abstract or Keywords or Poland in Title, Abstract or Keywords or Portugal in Title, Abstract or Keywords or “Puerto Rico” in Title, Abstract or Keywords)
#43	(Romania in Title, Abstract or Keywords or Rumania in Title, Abstract or Keywords or Roumania in Title, Abstract or Keywords or Russia in Title, Abstract or Keywords or Russian in Title, Abstract or Keywords or Rwanda in Title, Abstract or Keywords or Ruanda in Title, Abstract or Keywords or “Saint Kitts” in Title, Abstract or Keywords or “St Kitts” in Title, Abstract or Keywords or Nevis in Title, Abstract or Keywords or “Saint Lucia” in Title, Abstract or Keywords or “St Lucia” in Title, Abstract or Keywords or “Saint Vincent” in Title, Abstract or Keywords or “St Vincent” in Title, Abstract or Keywords or Grenadines in Title, Abstract or Keywords or Samoa in Title, Abstract or Keywords or “Samoan Islands” in Title, Abstract or Keywords or “Navigator Island” in Title, Abstract or Keywords or “Navigator Islands” in Title, Abstract or Keywords or “Sao Tome” in Title, Abstract or Keywords or “Saudi Arabia” in Title, Abstract or Keywords or Senegal in Title, Abstract or Keywords or Serbia in Title, Abstract or Keywords or Montenegro in Title, Abstract or Keywords or Seychelles in Title, Abstract or Keywords or “Sierra Leone” in Title, Abstract or Keywords or Slovenia in Title, Abstract or Keywords or “Sri Lanka” in Title, Abstract or Keywords or Ceylon in Title, Abstract or Keywords or “Solomon Islands” in Title, Abstract or Keywords or Somalia in Title, Abstract or Keywords or Sudan in Title, Abstract or Keywords or Suriname in Title, Abstract or Keywords or Surinam in Title, Abstract or Keywords or Swaziland in Title, Abstract or Keywords or Syria in Title, Abstract or Keywords or Tajikistan in Title, Abstract or Keywords or Tadzhiestan in Title, Abstract or Keywords or Tadjikistan in Title, Abstract or Keywords or Tadzhiik in Title, Abstract or Keywords or Tanzania in Title, Abstract or Keywords or Thailand in Title, Abstract or Keywords or Togo in Title, Abstract or Keywords or “Togolese Republic” in Title, Abstract or Keywords or Tonga in Title, Abstract or Keywords or Trinidad in Title, Abstract or Keywords or Tobago in Title, Abstract or Keywords or Tunisia in Title, Abstract or Keywords or Turkey in Title, Abstract or Keywords or Turkmenistan in Title, Abstract or Keywords or Turkmen in Title, Abstract or Keywords or Uruguay in Title, Abstract or Keywords or USSR in Title, Abstract or Keywords or “Soviet Union” in Title, Abstract or Keywords or “Union of Soviet Socialist Republics” in Title, Abstract or Keywords or Uzbekistan in Title, Abstract or Keywords or Uzbek in Title, Abstract or Keywords or Vanuatu in Title, Abstract or Keywords or “New Hebrides” in Title, Abstract or Keywords or Venezuela in Title, Abstract or Keywords or Vietnam in Title, Abstract or Keywords or “Viet Nam” in Title, Abstract or Keywords or “West Bank” in Title, Abstract or Keywords or Yemen in Title, Abstract or Keywords or Yugoslavia in Title, Abstract or Keywords or Zambia in Title, Abstract or Keywords or Zimbabwe in Title, Abstract or Keywords or Rhodesia in Title, Abstract or Keywords)
#44	((developing in Title, Abstract or Keywords or less* next developed in Title, Abstract or Keywords or “under developed” in Title, Abstract or Keywords or underdeveloped in Title, Abstract or Keywords or “middle income” in Title, Abstract or Keywords or low* next income in Title, Abstract or Keywords or underserved in Title, Abstract or Keywords or “under served” in Title, Abstract or Keywords or deprived in Title, Abstract or Keywords or poor* in Title, Abstract or Keywords) and (count* in Title, Abstract or Keywords or nation* in Title, Abstract or Keywords or population* in Title, Abstract or Keywords or world in Title, Abstract or Keywords))
#45	((developing in Title, Abstract or Keywords or less* next developed in Title, Abstract or Keywords or “under developed” in Title, Abstract or Keywords or underdeveloped in Title, Abstract or Keywords or “middle income” in Title, Abstract or Keywords or low* next income in Title, Abstract or Keywords) and (economy in Title, Abstract or Keywords or economies in Title, Abstract or Keywords))

(Continued)

#46	(low* next gdp in Title, Abstract or Keywords or low* next gnp in Title, Abstract or Keywords or low* next “gross domestic” in Title, Abstract or Keywords or low* next “gross national” in Title, Abstract or Keywords)
#47	(low in Title, Abstract or Keywords and middle in Title, Abstract or Keywords and countr* in Title, Abstract or Keywords)
#48	(lmic in Title, Abstract or Keywords or lmics in Title, Abstract or Keywords or “third world” in Title, Abstract or Keywords or “lami country” in Title, Abstract or Keywords or “lami countries” in Title, Abstract or Keywords)
#49	(“transitional country” in Title, Abstract or Keywords or “transitional countries” in Title, Abstract or Keywords)
#50	(#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 or #25 or #26 or #27 or #28 or #29 or #30 or #31 or #32 or #33 or #34 or #35 or #36 or #37 or #38)
#51	(#39 or #40 or #41 or #42 or #43 or #44 or #45 or #46 or #47 or #48 or #49)
#52	(#50 and #51)

MEDLINE

1. “Fees and Charges”/
2. Fees, Dental/
3. Fees, Medical/
4. Fees, Pharmaceutical/
5. Prescription Fees/
6. Hospital Charges/
7. Capitation Fee/
8. Fee-for-Service Plans/
9. “Cost Sharing”/
10. Contract Services/
11. Outsourced Services/
12. Prepaid Health Plans/
13. Prospective Payment System/
14. Insurance, Health/
15. ((medical or dental or pharmac\$ or dispensing or drug or drugs or medicament? or medicine? or prescript\$ or consultation? or treatment? or registration? or hospital? or care) adj3 (fee? or charge?)).tw.
16. ((user? or patient? or outpatient? or inpatient?) adj3 (fee? or charge? or pay\$)).tw.
17. fee for service?.tw.
18. capitation.tw.
19. ((pay\$ or cash or money or monetary or economic or financial) adj3 incentive?).tw.
20. (pay\$ adj3 performance).tw.
21. p4p.tw.
22. ((result? or performance) adj based).tw.
23. ((result? or performance or output or out put) adj2 (financ\$ or pay\$ or incentive? or initiative? or bonus\$)).tw.
24. ((cash or pay\$) adj3 (condition\$ or contingent or requirement?)).tw.
25. ((cash or pay\$ or monetary or money) adj3 transfer\$).tw.
26. cost sharing.tw.
27. cost recover\$.tw.
28. price change?.tw.

29. (contract or contracts or contracting).tw.
30. (outsourc\$ or out sourc\$).tw.
31. (risk sharing or shared risk?).tw.
32. (prospective adj (pay\$ or reimbursement?)).tw.
33. (prepay\$ or pre pay\$ or prepaid or pre paid).tw.
34. ((health or medical) adj insurance?).tw.
35. ((social or community) adj3 (insurance? or financ\$)).tw.
36. demand side.tw.
37. supply side.tw.
38. (financ\$ adj (strategy or strategies)).tw.
39. or/1-38
40. Developing Countries/
41. (Africa or Asia or Caribbean or West Indies or South America or Latin America or Central America).hw,kf,ti,ab,cp.
42. (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 Brazil or Brasil 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 Sudan or Suriname or Surinam or Swaziland or Syria or Tajikistan or Tadjhikistan or Tadjikistan or Tadjhik 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.
43. ((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.
44. ((developing or less* developed or under developed or underdeveloped or middle income or low* income) adj (economy or economies)).ti,ab.
45. (low* adj (gdp or gnp or gross domestic or gross national)).ti,ab.
46. (low adj3 middle adj3 countr*).ti,ab.
47. (lmic or lmics or third world or lami countr*).ti,ab.
48. transitional countr*.ti,ab.
49. or/40-48
50. randomized controlled trial.pt.
51. random\$.tw.
52. intervention\$.tw.
53. control\$.tw.
54. evaluat\$.tw.
55. effect?.tw.

56. or/50-55
57. Animals/
58. Humans/
59. 57 not (57 and 58)
60. 56 not 59
61. 39 and 49 and 60

MEDLINE In-Process & Other Non-Indexed Citations

1. "Fees and Charges"/
2. Fees, Dental/
3. Fees, Medical/
4. Fees, Pharmaceutical/
5. Prescription Fees/
6. Hospital Charges/
7. Capitation Fee/
8. Fee-for-Service Plans/
9. "Cost Sharing"/
10. Contract Services/
11. Outsourced Services/
12. Prepaid Health Plans/
13. Prospective Payment System/
14. Insurance, Health/
15. ((medical or dental or pharmac\$ or dispensing or drug or drugs or medicament? or medicine? or prescript\$ or consultation? or treatment? or registration? or hospital? or care) adj3 (fee? or charge?)).tw.
16. ((user? or patient? or outpatient? or inpatient?) adj3 (fee? or charge? or pay\$)).tw.
17. fee for service?.tw.
18. capitation.tw.
19. ((pay\$ or cash or money or monetary or economic or financial) adj3 incentive?).tw.
20. (pay\$ adj3 performance).tw.
21. p4p.tw.
22. ((result? or performance) adj based).tw.
23. ((result? or performance or output or out put) adj2 (financ\$ or pay\$ or incentive? or initiative? or bonus\$)).tw.
24. ((cash or pay\$) adj3 (condition\$ or contingent or requirement?)).tw.
25. ((cash or pay\$ or monetary or money) adj3 transfer\$).tw.
26. cost sharing.tw.
27. cost recover\$.tw.
28. price change?.tw.
29. (contract or contracts or contracting).tw.
30. (outsourc\$ or out sourc\$).tw.
31. (risk sharing or shared risk?).tw.
32. (prospective adj (pay\$ or reimbursement?)).tw.
33. (prepay\$ or pre pay\$ or prepaid or pre paid).tw.
34. ((health or medical) adj insurance?).tw.
35. ((social or community) adj3 (insurance? or financ\$)).tw.
36. demand side.tw.
37. supply side.tw.
38. (financ\$ adj (strategy or strategies)).tw.
39. or/1-38
40. Developing Countries/
41. (Africa or Asia or Caribbean or West Indies or South America or Latin America or Central America).hw,kf,ti,ab,cp.
42. (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 Brazil or Brasil 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 Moldavia or Moldovan 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 Tadjikistan or Tadjikistan or Tadjik 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.

43. ((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.

44. ((developing or less* developed or under developed or underdeveloped or middle income or low* income) adj (economy or economies)).ti,ab.

45. (low* adj (gdp or gnp or gross domestic or gross national)).ti,ab.

46. (low adj3 middle adj3 countr*).ti,ab.

47. (lmic or lmic3 or third world or lami countr*).ti,ab.

48. transitional countr*.ti,ab.

49. or/40-48

50. randomized controlled trial.pt.

51. random\$.tw.

52. intervention\$.tw.

53. control\$.tw.

54. evaluat\$.tw.

55. effect?.tw.

56. or/50-55

57. 39 and 49 and 56

EMBASE

1. Fee/

2. Medical Fee/

3. Hospital Charge/

4. Hospital Billing/

5. Capitation Fee/

6. Prospective Payment/

7. Health Insurance/

8. ((medical or dental or pharmac\$ or dispensing or drug or drugs or medicament? or medicine? or prescript\$ or consultation? or treatment? or registration? or hospital? or care) adj3 (fee? or charge?)).tw.

9. ((user? or patient? or outpatient? or inpatient?) adj3 (fee? or charge? or pay\$)).tw.

10. fee for service?.tw.

11. capitation.tw.

12. ((pay\$ or cash or money or monetary or economic or financial) adj3 incentive?).tw.
13. (pay\$ adj3 performance).tw.
14. p4p.tw.
15. ((result? or performance) adj based).tw.
16. ((result? or performance or output or out put) adj2 (financ\$ or pay\$ or incentive? or initiative? or bonus\$)).tw.
17. ((cash or pay\$) adj3 (condition\$ or contingent or requirement?)).tw.
18. ((cash or pay\$ or monetary ot money) adj3 transfer\$).tw.
19. cost sharing.tw.
20. cost recover\$.tw.
21. price change?.tw.
22. (contract or contracts or contracting).tw.
23. (outsourc\$ or out sourc\$).tw.
24. (risk sharing or shared risk?).tw.
25. (prospective adj (pay\$ or reimbursement?)).tw.
26. (prepay\$ or pre pay\$ or prepaid or pre paid).tw.
27. ((health or medical) adj insurance?).tw.
28. ((social or community) adj3 (insurance? or financ\$)).tw.
29. demand side.tw.
30. supply side.tw.
31. (financ\$ adj (strategy or strategies)).tw.
32. or/1-31
33. Developing Country.sh.
34. (Africa or Asia or Caribbean or West Indies or South America or Latin America or Central America).hw,ti,ab,cp.
35. (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 Brazil or Brasil 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 Sabah or Sarawak or Malawi or Niasaland 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 Tadjhikistan or Tadjikistan or Tadjhik 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.
36. ((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 (countn* or nation? or population? or world)).ti,ab.
37. ((developing or less* developed or under developed or underdeveloped or middle income or low* income) adj (economy or economies)).ti,ab.
38. (low* adj (gdp or gnp or gross domestic or gross national)).ti,ab.

39. (low adj3 middle adj3 countr*).ti,ab.
40. (lmic or lmics or third world or lami countr*).ti,ab.
41. transitional countr*.ti,ab.
42. or/33-41
43. Randomized Controlled Trial/
44. Controlled Clinical Trial/
45. Time Series Analysis/
46. (randomis* or randomiz* or randomly).tw.
47. time series.tw.
48. intervention*.tw.
49. control*.tw.
50. evaluat*.tw.
51. effect*.tw.
52. impact?.tw.
53. or/43-52
54. Nonhuman/
55. 53 not 54
56. 32 and 42 and 55

EconLit

((DE=(Capitation or Outsourcing or Outsource or Payment Method or Pay Performance or Financing or Compensation or Insurance or Compensation Packages, Payment Methods (J330) or Personnel Economics: Compensation and Compensation Methods and Their Effects (M520)) and DE=(Healthcare or Health or Medical Care or Dentistry or Hospital)) or(KW=(payment system* or payment incentive* or payment method* or payment strategy or payment strategies or monetary incentive* or economic incentive* or financial incentive* or financial strategy or financial strategies or financing or fee or fees or charges or capitation or per capita or pay for performance or p4p or performance based or result based or results based or output based or out put based or bonus* or cost sharing or cost recover* or price chang* or contract or contracts or contracting or outsourc* or risk sharing or shared risk* or prospective pay* or prospective reimbursement* or prepay* or pre pay* or prepaid or pre paid or demand side or supply side) and KW=(health or healthcare or medical or dental or pharmaceutical or drug or drugs or medicament* or medicine* or hospital or prescrip* or prescrib*)) or(KW=(cash or pay*) and KW=(condition* or contingent or requirement*) and KW=(health or healthcare or medical or dental or pharmaceutical or drug or drugs or medicament* or medicine* or hospital or prescrip* or prescrib*)) or(KW=(cash or pay* or monetary or money or finance*) and KW=(transfer*) and KW=(health or healthcare or medical or dental or pharmaceutical or drug or drugs or medicament* or medicine* or hospital or prescrip* or prescrib*)) or(KW=(health insurance or healthcare insurance or health care insurance or medical insurance or social insurance))) and((KW=(Africa or Asia or Caribbean or West Indies or South America or Latin America or Central America)) or(KW=(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 Brazil or Brasil 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 Camerons 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 Sudan or Suriname or Surinam or Swaziland or Syria or Tajikistan or Tadjikistan or Tadjikistan or Tadjik 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)) or(KW=(developing or less* developed or under developed or underdeveloped or middle income or low* income or underserved or under served or deprived or poor*) and KW=(countr* or nation or nations or population* or world)) or(KW=(developing economy or less* developed economy or under developed economy or underdeveloped economy or middle income economy or low* income economy or developing economies or less* developed economies or under developed economies or underdeveloped economies or middle income economies or low* income economies)) or(KW=(low* gdp or low* gnp or low* gross domestic or low* gross national or lmic or lmic or third world or lami countr* or transitional countr*)) or(KW=(low within 3 middle within 3 countr*)) and(KW=(randomiz* or randomis* or randomly or intervention* or control* or effect* or evaluat* or impact*))

Appendix 2. Criteria for appraising included studies

This appendix presents details of all of the criteria used in the appraisal of included studies.

CBA studies

In the following list, criteria one, two and four are directly taken from the list of standard criteria of the EPOC Group. Criteria three and five are adapted from the original criteria to make them more relevant to the specificities of the studies included in this review. We re-phrased standards to judge the risk of exclusion or selection bias to be more adapted to the types of population-based studies that might be included in the review. We also adapted the criterion on quality and reliability of data to reflect better the risks of bias relating to the type of outcomes that were the primary focus of the review.

We added criterion six following preliminary findings which showed that statistical significance of studies was not systematically computed or available in the studies found.

Finally, we omitted a standard criterion of the *Cochrane Handbook for Systematic Reviews of Interventions* on the blinded assessment of primary outcomes. We judged that this was not relevant for the types of outcomes this review focused on.

1. **Baseline outcome characteristics:** DONE if outcomes were measured prior to the intervention, and no substantial differences were present across study groups (e.g. where multiple pre intervention measures describe similar trends in intervention and control groups); NOT CLEAR if baseline measures are not reported, or if it is unclear whether baseline measures are substantially different across study groups; NOT DONE if there are differences at baseline in main outcome measures likely to undermine the post intervention differences (e.g. are differences between the groups before the intervention similar to those found post intervention?).

2. **Equivalent control sites:** DONE if characteristics of study and control sites are reported and similar (in terms of 1/population 2/facilities and 3/external influence characteristics); NOT CLEAR if it is not clear in the paper e.g. characteristics are mentioned in the text but no data are presented; NOT DONE if there is no report of characteristics either in the text or a table OR if baseline characteristics are reported and there are differences between study and control providers.

3. **Protection against exclusion or selection bias:** DONE if outcome measures obtained from the whole population or a representative sample of the population (and the control group) was studied; NOT CLEAR if not specified in the paper; NOT DONE if outcome measures were not obtained from a representative sample.

4. **Protection against contamination:** DONE if allocation was by community, institution, or practice and is unlikely that the control group received the intervention; NOT CLEAR if communication (i.e. individuals present in one control group cannot move and benefit from the interventions in experimental areas) between treatment and control group was likely to occur; NOT DONE if it is likely that the control group received the intervention (e.g. cross-over studies or if patients rather than providers were randomised).

5. **Quality/reliability of outcome measures:** scored DONE if the outcome is obtained from some automated system (e.g. length of hospital stay) or comes from another objective source; NOT CLEAR if reliability is not reported for outcome measures that are obtained by chart extraction or collected by an individual (will be treated as NOT DONE if information cannot be obtained from the authors); and NOT DONE if the primary data is reportedly of a poor quality.

6. **Appropriate analysis:** DONE if statistical significance of differences in outcomes was tested and/or statistical analysis was appropriate. NOT CLEAR if statistical significance of results is not specified in the paper or if the analysis chosen was not appropriate; NOT DONE if statistical significance of results was not tested.

Randomised Controlled Trials

All the following criteria are taken from the standard EPOC criteria (EPOC 2002), except for criteria three and four. Indeed, we judged important to add specific criteria for cluster-randomised for two reasons. Firstly because interventions of interest would be more likely to be implemented at community level, they would require such study designs. Secondly, issues regarding sampling and analysis have identified as particular concerns that might lead to biases when analysing cluster-randomised trials (Ukoununne 1999). We also omitted one criterion on exclusion bias concerning the follow-up of professionals. It was judged not relevant for the focus of our review (where studies are all focusing on populations).

1. **Concealment of allocation:** DONE if the unit of allocation was by institution, team or professional and any random process is described explicitly, e.g. the use of random number tables or coin flips; OR the unit of allocation was by patient or episode of care and there was some form of centralised randomisation scheme, an on-site computer system or sealed opaque envelopes were used. NOT CLEAR if the unit of allocation is not described explicitly OR the unit of allocation was by patient or episode of care and the authors report using a 'list' or 'table', 'envelopes' or 'sealed envelopes' for allocation. NOT DONE if the authors report using alternation such as reference to case record numbers, dates of birth, day of the week or any other such approach (as in CCTs) OR the unit of allocation was by patient or episode of care and the authors report using any allocation process that is entirely transparent before assignment such as an open list of random numbers or assignments OR allocation was altered (by investigators, professionals or patients).

2. **Protection against exclusion bias:** DONE if outcome measures obtained for 80% to 100% of subjects randomised (or a biased sample) or for patients who entered the trial (do not assume 100% follow-up unless stated explicitly); NOT CLEAR if not specified in the paper; NOT DONE if outcome measures obtained for less than 80% of subjects randomised (or a biased, non-representative sample).

3. **Sampling (for cluster-randomised trials):** DONE if sampling took cluster effects/bias into account or if the sample is large enough to provide robust results; NOT CLEAR if not specified in the paper; NOT DONE if the sampling is too small to provide robust results.

4. **Appropriate Analysis (for cluster-randomised trials):** DONE if the analysis accounted for cluster effects/bias; NOT CLEAR if not specified in the paper; NOT DONE if the analysis did not account for cluster effects/bias.

5. **Quality/reliability of the data:** scored DONE if the outcome is obtained from some automated system (e.g. length of hospital stay) or comes from another objective source; NOT CLEAR if reliability is not reported for outcome measures that are obtained by chart extraction or collected by an individual (will be treated as NOT DONE if information cannot be obtained from the authors); and NOT DONE if the primary data is reportedly of a poor quality.

6. **Protection against detection bias:** DONE if the authors state explicitly that the primary outcome variables were assessed blindly OR the outcome variables are objective, e.g. length of hospital stay, drug levels as assessed by a standardised test; NOT CLEAR if not specified in the paper; NOT DONE if the outcome(s) were not assessed blindly.

7. **Baseline Measurement:** DONE if performance or patient outcomes were measured prior to the intervention, and no substantial differences were present across study groups (e.g. where multiple pre intervention measures describe similar trends in intervention and control groups); NOT CLEAR if baseline measures are not reported, or if it is unclear whether baseline measures are substantially different across study groups; NOT DONE if there are differences at baseline in main outcome measures likely to undermine the post intervention differences (e.g. are differences between the groups before the intervention similar to those found post intervention?).

8. **Protection against contamination:** DONE if allocation was by community, institution or practice and it is unlikely that the control received the intervention; NOT CLEAR if professionals were allocated within a clinic or practice and it is possible that communication between experimental and group professionals could have occurred; NOT DONE if it is likely that the control group received the intervention (e.g. cross-over trials or if patients rather than professionals were randomised).

ITS studies

We decided to modify slightly the criteria proposed by EPOC, and have provided some explanation on why we decided to do this. Basically, we argue that health service utilisation data (which are the longitudinal data used for the ITS included here) are subject to seasonal variation. In order to account for this potential bias, we decided to include studies that provided data where seasonal variation

could be minimally accounted for (hence the requirement for example for 12 months before and after the intervention in the case of monthly data).

1. **Protection against changes:** DONE if the intervention occurred independently of other changes over time; NOT CLEAR if not specified (NOT DONE if information cannot be obtained from the authors); NOT DONE if reported that intervention was not independent of other changes in time.

2. **Appropriate analysis:** DONE if ARIMA (Auto-Regressive Integrated Moving Average) models were used OR time series regression models were used to analyse the data and serial correlation was adjusted/tested for OR if reanalysis performed; NOT CLEAR if not specified; NOT DONE if it is clear that neither of the conditions above not met.

3. **No selection bias in the sample framing:** DONE if outcome measures are obtained from the whole population or a representative sample of the population studied; NOT CLEAR if not specified (will be treated as NOT DONE if information cannot be obtained from the authors); NOT DONE if data set is not drawn from a representative sample.

4. **Quality/reliability of outcome data:** scored DONE if the outcome is obtained from some automated system (e.g. length of hospital stay) or comes from another objective source; NOT CLEAR if reliability is not reported for outcome measures that are obtained by chart extraction or collected by an individual (will be treated as NOT DONE if information cannot be obtained from the authors); and NOT DONE if the primary data is reportedly of a poor quality.

5. **Number of points specified:** DONE if monthly data for at least 12 months (or more) pre- and post-intervention were used (or an equivalent number allowing the analysis of seasonal variations), NOT CLEAR if less data points are given with a convincing argument that no seasonal variations occurred, NOT DONE if few data points are provided and seasonal variations are likely to have occurred.

6. **Intervention effect specified:** DONE if point of analysis was the point of intervention OR a rational explanation for the timing of intervention effect was given by the author(s).

7. **Detection bias:** DONE if it is 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).

HISTORY

Review first published: Issue 4, 2011

CONTRIBUTIONS OF AUTHORS

M Lagarde prepared the protocol; conducted the searches; applied the inclusion criteria, assessed the quality and extracted the data for the included studies; further developed quality criteria (based on the Effective Practice and Organisation of Care (EPOC) criteria) for interrupted time-series (ITS) and conducted the statistical re-analyses for the included ITS studies; and prepared the final review.

N Palmer prepared the protocol; applied the inclusion criteria, assessed the quality and extracted the data for the included studies; and provided extensive comments on the final review.

DECLARATIONS OF INTEREST

None known.

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INDEX TERMS

Medical Subject Headings (MeSH)

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MeSH check words

Humans