The effectiveness of interventions to reduce the household economic burden of illness and injury: a systematic review

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Systematic reviews

Abstracts in العربية, French, Russian and Spanish at the end of each article.

Introduction

Each year, globally, around 150 million people struggle to meet the costs of accessing and using health care and approximately 100 million people are driven below the poverty line by such costs.1 Many people delay or avoid health care because it is – or, at least, is perceived to be – unaffordable.2–4 Most of those who struggle to meet the out-of-pocket costs of health care live in low-income countries that have poorly funded health systems and inadequate measures to ensure the financial protection of households against high health-care expenditure. However, the problem is not limited to such countries. In 2007, for example, 62% of the personal bankruptcies recorded in the United States of America (USA) were attributed to medical debt1 and 11% of the individuals found insolvent in Australia cited ill-health or lack of health insurance as the primary reason for their insolvency.5 Substantial and unpredictable one-off health-care payments and a steady flow of unbudgeted medical bills can lead many households – particularly those already marginalized by socioeconomic disadvantage – towards catastrophic health-care expenditure.7

The economic burden of illness in a household is only partly explained by out-of-pocket expenditure. The full evaluation of such burden requires a multidimensional framework – to move beyond absolute spending to incorporate measures that examine the broader impacts of illness or injury on the household economy – e.g. loss of employment – as well as the affordability of care, a household’s response to an injury or illness and the consequences of those responses for the household.4,9 Most research in this area has been observational and has demonstrated that households will employ several strategies – to deal with unbudgeted costs of medical care and unplanned departures from the workforce – when coping with the onset of an illness or injury, especially in the main income earner. Such coping strategies include drawing on available social resources and networks, cutting back on essential living expenses, drawing on savings, selling assets, borrowing money, entering into formal or informal loan agreements, increasing credit or debt and even moving house.3,4 Although these strategies may help leverage the resources needed to pay for care, they can also have adverse effects on treatment-seeking behaviour and the long-term economic well-being and resilience of the household.10–12

The provision of adequate financial protection – from the costs of seeking and using medical care – is a critical marker of the effectiveness of a health-care system.10 The World Health Organization has encouraged its Member States to provide universal health coverage in some form and the United Nations has recently passed a declaration that calls for universal access to health care that does not cause financial hardship.11 Such a goal – like other post-2015 development goals aimed at alleviating poverty – is unlikely to be achieved without further development and implementation of national health-insurance schemes. There is considerable evidence, most notably from the RAND Health Insurance Experiments,12 that indicates how health insurance can protect the finances of households affected by illness or injury, by restricting individual health-care expenditure. However, although such insurance is one of the most important population-based policy interventions to mitigate the economic burden of illness or injury, it is not sufficient, on its own, to provide full protection from catastrophic health expenditure.13,14 The effectiveness of health insurance in protecting individuals who are intense users of medical care – e.g. those with chronic illness or long-term injuries – has yet

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Submitted: 27 March 2014 – Revised version received: 30 October 2014 – Accepted: 30 October 2014 – Published online: 18 November 2014

102 Bull World Health Organ 2015;93:102–1128 | doi: http://dx.doi.org/10.2471/BLT.14.139287
to be elucidated. Furthermore, limited coverage of services and high levels of co-payment can often mean that households with health insurance remain at risk of catastrophic health-care expenditures and economic hardship.\(^{16,17}\)

Evidence of the effectiveness of simple education and support interventions, in both clinic- and community-based settings, has highlighted the potential value of more targeted and patient-focused strategies in reducing the household economic burden of illness. Interventions that help patients and caregivers to navigate through health and social-welfare support systems\(^{16,17}\) and informal loan and microcredit schemes\(^{18-20}\) have the potential to buffer those with illness and injury against financial hardship. As the evidence of the effectiveness and cost-effectiveness of such interventions becomes more robust, opportunities for the development and scale-up of such interventions need to be explored.

There have been few systematic reviews of interventions to reduce the household economic burden of illness or injury. The reviews that have been conducted have tended to take a population-based approach – e.g. they have examined the impact of health-insurance programmes on entire populations – and have often been based on studies that involved retrospective comparisons of before and after data. Furthermore, they have focused either on specific types of interventions – e.g. programmes for the management of chronic illness\(^{21}\) or health-insurance schemes\(^{22-25}\) – or have focused, narrowly, on out-of-pocket payments, as the sole measure of the economic impact of illness.\(^{26}\) We decided to conduct a systematic review to try to determine the nature, scope and effectiveness of all interventions that have been designed to reduce the household economic burden of illness or injury.

### Methods

We searched electronic databases, using a predefined search strategy and confining the search to reports published on or before 31 January 2014 (Box 1). The reference lists of retrieved articles were screened to identify additional studies, and investigators known to be carrying out relevant research were contacted for unpublished data. Non-English articles were translated where necessary.

To be included in our review, a study (i) had to be a prospective controlled trial of one or more interventions – i.e. a randomized or nonrandomized controlled trial, an interrupted time series study with control, or a controlled before-and-after study; (ii) involve a study population with any, chronic or acute, communicable or noncommunicable disease or injury; and (iii) use a study outcome that was a measure of the household economic burden of illness or injury – e.g. out-of-pocket expenditure or level of economic hardship.

Interventions directed at the individual, household or population and delivered in any setting were eligible for inclusion. Studies that were primarily treatment or medical interventions – e.g. cataract surgery or chemotherapy – were excluded even if they included economic measures as additional outcomes.

Two authors carried out the literature search and screened titles and abstracts using a standardized eligibility assessment form based on our inclusion criteria. The full texts of articles of potential interest were reviewed by two authors and a final decision on which studies to include was confirmed by consensus. A third author provided arbitration if consensus was not reached.

One author used a predefined form\(^{25,26}\) to extract data from each included study. The data extraction was verified by a second author. Authors of included studies were contacted for any missing information or data. Where possible, effect estimates were calculated as standardized mean differences between the intervention and control groups, with 95% confidence intervals.\(^{27}\) Where reported, data on the impact of the interventions on health-service utilization – e.g. numbers of hospital admissions or medical appointments – and medication adherence were also collected.

The risk of bias in each of the included studies was assessed by one author – using the criteria suggested for Effective Practice and Organisation of Care reviews\(^{28}\) – and verified by a second author.

Quantitative analysis of the data was deemed inappropriate because of the heterogeneity in the collected data, designs and settings of the included studies.

### Results

The initial literature search identified 4330 citations. There were 90 articles of potential interest and, after examination of the full texts, nine articles described studies that met all of our inclusion criteria (Fig. 1). Each of the nine articles – seven conducted in the USA\(^ {29-35}\) one in Finland\(^ {36}\) and one in China\(^ {37}\) – described a single study. Most of the included studies had investigated adult urban patients with noncommunicable disease (6/9) and had involved data from more than 1000 participants (7/9; Table 1). Illness and injury inclusion criteria had been assessed using diagnostic codes, the health-service use reported in insurance claims, clinical presentations or self-reporting.

Seven of our included studies had evaluated policy interventions that involved health-insurance schemes (Table 2). Of these, three had involved the reduction or elimination of co-payments for disease-specific medications or outpatient care.\(^ {29,30,34}\) Another three studies had evaluated the effectiveness of a similar intervention – that offered parity in service coverage for mental health and substance use disorders – in different subgroups.\(^ {29,32,33}\) One study had investigated the extension of coverage of an existing health-insurance scheme to a new patient population.\(^ {35}\)

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**Box 1. Basic literature search strategy for systematic review of interventions to reduce the household economic burden of illness**

The following databases were searched: CENTRAL, CINAHL, Econlit, Embase, MEDLINE, PreMEDLINE and PsycINFO

**Search terms:**

1. “intervention” OR “program” OR “programme” OR “policy” OR “scheme”
2. “catastrophic” AND “finance OR cost OR medical OR expenditure”
3. “finance OR economic” AND “hardship OR strain OR stress OR well-being”
4. “burden” AND “household financial OR household economic”
5. “household” AND “economic impact”
6. “out-of-pocket” AND “cost OR expenditure OR spend OR payment OR catastrophic”

A detailed search strategy for each database is available from the authors.
The other two studies trialled different models of delivering patient-focused education and support – e.g. by web- or telephone-based communication or in-person.35,36

Out-of-pocket expenditure had been the primary outcome in six of our included studies – including one post-hoc analysis – and a supplementary outcome in another two (Table 1). The researchers involved in most of the studies had ascertained out-of-pocket expenditures from databases of insurance claims. Household economic burden had also been measured in terms of the likelihood of a household paying any out-of-pocket costs for care, the prevalence of catastrophic health expenditure – i.e. out-of-pocket costs that were greater than 40% of the maximum amount that a household could pay – and the prevalence of cost-related delays in seeking care. None of the studies had evaluated the effectiveness of an intervention in reducing economic hardship.

Six of the studies had also investigated the effectiveness of an intervention on clinical and health-system outcomes, health-service use, adherence to pharmaceuticals, direct costs to private health insurers or the indirect costs to patients and household caregivers in terms of the time spent seeking health care.

There was a high or unclear risk of bias in the randomized and non-randomized controlled trials and controlled before-and-after studies (Fig. 2; available from: http://www.who.int/bulletin/volumes/93/2/14-139287). In these studies, inadequate allocation-sequence generation and concealment could have resulted in an overestimate of the effects of an intervention on the household economic burden – particularly since absolute out-of-pocket expenditure was often the main outcome and such expenditure was self-reported in three studies.31–33 Attrition bias due to incomplete reporting of outcome data – which may also lead to overestimates of an intervention – was potentially an issue in three studies.31–33 There was also a high risk of reporting bias in two of the studies.33,34

The data we reviewed from interrupted time series studies (3/9) had a generally low risk of bias (Fig. 3; available from: http://www.who.int/bulletin/volumes/93/2/14-139287). However, in such studies, there is some risk that the intervention effect may not have occurred independently of other changes occurring over time and that the outcome observed may have been influenced by confounding factors. These two issues may have resulted in an overestimate of the effect of the intervention. Attrition bias may also be an issue in these studies since there is unclear bias introduced by the incomplete reporting of outcome data.

The outcomes of the interventions investigated in all of our included studies are summarized in Table 3.

Two studies conducted in the USA evaluated the effectiveness of reducing or eliminating co-payments and found statistically significant reductions in out-of-pocket costs for cardiovascular pharmaceuticals and medical services.31,32 Another three studies conducted in the USA evaluated the effectiveness of parity in service coverage for mental health problems and substance use disorders.29,30,34 In these three studies, statistically significant reductions in out-of-pocket expenditure were reported for the whole study population,34 among children with high expenditure30 and in specific disease groups.34 For example, the reported mean annual reductions in out-of-pocket costs per patient were 148, United States dollars (US$) for bipolar disease, US$ 100 for major depression and US$ 68 for adjustment disorder.30 A sixth study in the USA found a statistically significant association between the expansion of health-insurance coverage and the proportion of people who had moderate out-of-pocket costs of US$ 1–2000 per person.32

In rural China, the implementation of a voluntary community-based insurance programme that offered higher reimbursement for outpatient services for a poor population was not found to reduce the prevalence of catastrophic health expenditure significantly.35

In Finland, the web-based delivery of information to patients was not associated with any change in out-of-pocket expenditure.36 In the USA, an intervention that targeted information at caregivers was found to increase the care-associated spending of the caregivers and had no significant effect on total

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| Study | Country | Study design (sample size) | Study objective | Study population | Intervention vs control | Outcomes measured |
|-------|---------|---------------------------|----------------|-----------------|------------------------|------------------|
| Jing et al. (2013) | China | CBA \((n = 2998)\) | To evaluate the impact of the New Cooperative Medical Scheme's reimbursement policies for chronic disease | Rural households in which one or more members have self-reported chronic disease | Higher reimbursement for essential drugs – e.g. 80% for diabetes and hypertension medications – and outpatient care – e.g. 25% or 40% – for specified chronic diseases vs usual care | Catastrophic health expenditure |
| Heikkinen et al. (2011) | Finland | NRCT \((n = 147)\) | To evaluate cost of care between two different modes of delivering patient education | Ambulatory orthopaedic surgery patients | Website containing biophysical, social and financial information plus email contact with nurse vs face-to-face education | Out-of-pocket costs |
| Barry et al. (2013) | USA | CBA \((n = 1 907 218)\) | To evaluate the impact of FEHBP parity policy on out-of-pocket costs | Individuals aged ≤ 21 years with MH/SUD | Parity of benefits for MH/SUD services vs usual care | Share of total costs spent on MH/SUD services and mean out-of-pocket costs for MH/SUD |
| Busch et al. (2013) | USA | CBA \((n = 29 615)\) | To evaluate the impact of FEHBP parity policy on spending and intensity of service use | Enrollees of FEHBP with bipolar disorder, major depression or adjustment disorder | Parity of benefits for MH/SUD services vs usual care | Out-of-pocket costs and health-service utilization |
| Choudhry et al. (2011) | USA | RCT \((n = 5855)\) | To evaluate the effect of providing full prescription drug coverage | Individuals with a principal or secondary diagnosis of acute myocardial infarction | Full prescription drug coverage vs usual coverage | Medication adherence and health-care spending, including out-of-pocket costs |
| Choudhry et al. (2012) | USA | ITS \((n = 52 631)\) | To evaluate the impact of reductions in drug co-payments | Individuals with diabetes or vascular disease | Co-payment elimination for patients with diabetes and reduction for patients on clopidogrel vs usual coverage | Out-of-pocket costs, medication use and health-service utilization |
| Davidoff et al. (2005) | USA | ITS \((n = 3413)\) | To evaluate the effects of the expansion of the SCHIP | Children with chronic health conditions | Expansion of eligibility for SCHIP vs usual care | Out-of-pocket spending and health-service use |
| Goldman et al. (2006) | USA | ITS \((n = 320 000)\) | To evaluate the impact of parity in insurance benefits | Enrollees of the FEHBP accessing MH/SUD services | Parity of benefits for MH/SUD services vs usual care | Rate of MH/SUD utilization, out-of-pocket costs and total spending |
| Van Houtven et al. (2013) | USA | RCT \((n = 187)\) | To evaluate the effect of a multicomponent intervention for caregivers of older adults | Caregivers of patients with Alzheimer or Parkinson diseases | Multicomponent training over 24 weeks for caregivers via the ASSIST programme vs social phone contacts while on waiting list | Out-of-pocket costs |

ASSIST: Assistance, Support, and Self-health Initiated through Skill Training; CBA: controlled before-and-after study; FEHBP: Federal Employees Health Benefits Program; ITS: interrupted time series; MH/SUD: mental health and substance use disorders; NRCT: nonrandomized controlled trial; RCT: randomized controlled trial; SCHIP: State Children's Health Insurance Program; USA: United States of America.
out-of-pocket expenditure on health for the patients.  

Outcomes other than out-of-pocket expenditure were assessed in several studies (Table 4; available from: http://www.who.int/bulletin/volumes/93/2/14-139287). Two insurance interventions were adequately powered to measure their effect on clinical and health-service outcomes. One study found significant reductions in the rates of total major vascular events or revascularization. None of the other seven studies we included in our systematic review appeared to show a significant impact on the clinical or health-service outcomes assessed – probably because they were underpowered to assess the effect.

**Discussion**

To the authors’ knowledge this is the only systematic review to synthesize published evidence on the effectiveness of interventions that address the diverse ways that illness and injury adversely affect household economics. In the reviewed studies, the economic burden of illness at household level was measured predominantly in terms of out-of-pocket costs. The interventions that were found to be most effective at mitigating the burden of illness were implemented in the context of existing health-insurance schemes and involved reducing or eliminating co-payments for disease-specific treatments. Offering parity in the benefits for specific illnesses also significantly reduced out-of-pocket costs.

However, any reductions in out-of-pocket expenditure should be interpreted in the context of total spending – by the individual and the household – for the management of an illness or injury. One study reported that, although the 21% reduction in out-of-pocket expenditure found in their study was statistically significant, the absolute annual reduction – of US$ 100–148 per patient – was unlikely to confer protection from catastrophic expenditure. Total household expenditure on health-related care – including the costs of transport, home assistance, medical equipment and accommodation – can be much greater than the direct out-of-pocket costs of medicines and surgery. Moreover, such indirect costs of care are seldom covered by health-insurance schemes, particularly in low-income settings. Few of our included studies incorporated other categories of out-of-pocket expenditure beyond the direct costs of medical care. Interventions that solely reduce co-payments for specific aspects of care will only be effective if the care that is covered represents the main economic burden of the illness or injury at household level. Furthermore, many households may have more than one member with illness or injury. Therefore, interventions will need to move beyond targeting disease-specific aspects of treatment and, instead, take a holistic view of the multiple and diverse ways that illness and injury affect household economic circumstances.

Of the nine studies we reviewed, seven involved changes to – or extensions of – an existing package of health-insurance benefits, with the sole aim of shifting the costs of care to the insurer and minimizing the costs to the patient. Only one of these health-insurance studies was conducted in a low- or middle-income country. Although most of the health-insurance interventions were associated with statistically significant effects within the study period, such interventions will not be put into widespread practice unless they can be shown to be economically viable. To the authors’ knowledge, only one of the health-insurance studies was accompanied by a published cost–effectiveness investigation of the type needed to inform priority setting and resource planning for any sustainable intervention. In low- and middle-income countries, the financial sustainability of such measures is critical. If the post-2015 development goals relating to poverty reduction are to be achieved, good evidence is needed to inform the development of stronger and more financially sustainable health systems in these settings.

There is a general scarcity of evaluations of innovative interventions to address the economic burden of illness and injury. Such interventions have the potential to supplement existing health-
## Table 3. Effects of interventions on measures of household economic burden

| Type of measure and study | Source of data | Measure | Relative difference (95% CI) | P | Reference period (months) | Out-of-pocket cost for control group, mean (SD) | Standardized mean difference (95% CI) |
|---------------------------|----------------|---------|-------------------------------|---|--------------------------|--------------------------------|-------------------------------------|
| **Out-of-pocket costs**    |                |         |                               |   |                         |                                            |                                     |
| Choudhry et al. (2011)     | Insurance claims | Relative ratio of costs per patient | Prescription drugs: 0.70 (0.65 to 0.75) | < 0.001 | 12 | 1164 (1313) | −0.30 (−0.35 to −0.25) |
|                           |                |         | Non-drug: 0.82 (0.72 to 0.94) | 0.005 | 12 | 618 (1480) | −0.11 (−0.17 to −0.06) |
|                           |                |         | All: 0.74 (0.68 to 0.80) | < 0.001 | 12 | 1781 (2263) | −0.26 (−0.31 to −0.20) |
|                           |                |         | Cardiovascular-specific, prescription drugs: 0.49 (0.46 to 0.53) | < 0.001 | 12 | 665 (721) | −0.58 (−0.64 to −0.53) |
|                           |                |         | Cardiovascular-specific, non-drug: 0.91 (0.82 to 1.00) | 0.05 | 12 | 235 (349) | −0.10 (−0.15 to −0.04) |
|                           |                |         | Cardiovascular-specific, total: 0.60 (0.56 to 0.64) | 0.001 | 12 | 900 (888) | −0.50 (−0.55 to −0.45) |
| Choudhry et al. (2012)     | Insurance claims | Relative ratio of costs per patient | Statin, medication and insurance co-payments: 0.05 (NR) | NR | 1 | NR | – |
|                           |                |         | Statin, medical: 0.90 (0.83 to 0.98) | NR | 1 | NR | – |
|                           |                |         | Statin, pharmacy: 0.65 (0.62 to 0.68) | NR | 1 | NR | – |
|                           |                |         | Statin, total: 0.79 (0.75 to 0.83) | NR | 1 | NR | – |
|                           |                |         | Clopidogrel, medication and insurance co-payments: 0.61 (NR) | NR | 1 | 1443 (13.38) | −0.43 (−0.50 to −0.35) |
|                           |                |         | Clopidogrel, medical: 0.76 (0.61 to 0.94) | NR | 1 | NR | – |
|                           |                |         | Clopidogrel, pharmacy: 0.72 (0.67 to 0.76) | NR | 1 | NR | – |
|                           |                |         | Clopidogrel, total: 0.74 (0.66 to 0.82) | NR | 1 | NR | – |
| Davidoff et al. (2005)     | Self-report    | Change in percentage of patients paying | At least US$ 2000: −1.3 (−8.94 to 6.34) | 0.05 | 12 | NR | – |
|                           |                |         | US$ 50–1999: −4.0 (−14.39 to 6.39) | > 0.05 | 12 | NR | – |
|                           |                |         | US$ 1–499: 3.2 (−7.19 to 13.59) | > 0.05 | 12 | NR | – |
|                           |                |         | Nothing: 2.2 (−2.31 to 6.71) | > 0.05 | 12 | NR | – |
| Goldman et al. (2006)      | Insurance claims | Difference in change in mean costs per patient of MH/SUD services, US$ | National PPO: 4.48 (0.91 to 8.06) | ≤ 0.05 | 24 | NR | – |
|                           |                |         | Mid-Atlantic PPO 1: −15.43 (−26.14 to −4.73) | ≤ 0.05 | 24 | NR | – |
|                           |                |         | Mid-Atlantic PPO 2: −13.82 (−23.96 to −3.67) | ≤ 0.05 | 24 | NR | – |
|                           |                |         | Northeastern PPO 1: −8.78 (−21.14 to 3.57) | > 0.05 | 24 | NR | – |
|                           |                |         | Northeastern PPO 2: −48.12 (−66.85 to −29.39) | ≤ 0.05 | 24 | NR | – |
|                           |                |         | Western PPO: −49.80 (−61.17 to −38.43) | ≤ 0.05 | 24 | NR | – |
|                           |                |         | Southern PPO: −87.06 (−99.73 to −74.38) | ≤ 0.05 | 24 | NR | – |
| Barry et al. (2013)        | Insurance claims | Difference in change in mean costs per patient of MH/SUD services, US$ | −178 (−257 to −97) | ≤ 0.05 | 12 | NR | – |

(continues . . .)
| Type of measure and study | Source of data | Measure | Relative difference (95% CI) | P | Reference period (months) | Out-of-pocket cost for control group, mean (SD) | Standardized mean difference (95% CI) |
|---------------------------|----------------|---------|-----------------------------|---|---------------------------|-----------------------------------------------|-------------------------------------|
| Busch et al. (2013)⁶      | Insurance claims | Difference in mean costs per patient, US$ | Bipolar disorder: −148 (−217 to −85) | NR | 12 | NR | −0.02 (−0.35 to 0.32) |
|                           |                |         | Major depression: −100 (−123 to −77) | NR | 12 | NR | − |
|                           |                |         | Adjustment disorder: −68 (−84 to −54) | NR | 12 | NR | − |
| Heikkinen et al. (2011)⁷  | Self-report    | Relative ratio of costs per patient | Total: 0.98 (NR) | NR | NR | 240 (264) | −0.02 (−0.35 to 0.32) |
|                           |                |         | Hospital: 1.04 (NR) | NR | NR | 124 (134) | 0.04 (−0.30 to 0.37) |
|                           |                |         | Laboratory tests and X-ray examinations: 0.45 (NR) | NR | NR | 216 (242) | −0.64 (−1.29 to 0.01) |
|                           |                |         | Medication: 1.16 (NR) | NR | NR | 26.2 (19.29) | 0.17 (−0.20 to 0.53) |
|                           |                |         | Physician fees: 0.95 (NR) | NR | NR | 51.39 (64.24) | −0.05 (−0.58 to 0.48) |
|                           |                |         | Travel: 1.17 (NR) | NR | NR | 18.73 (24.79) | 0.11 (−0.36 to 0.57) |
|                           |                |         | Equipment: 1.10 (NR) | NR | NR | 11.63 (803) | 0.14 (−0.41 to 0.69) |
|                           |                |         | Medical certificate: 0.83 (NR) | NR | NR | 802 (9.09) | −0.15 (−0.64 to 0.34) |
|                           |                |         | Escort: 4.44 (NR) | NR | NR | 788 (9.19) | 0.94 (−0.45 to 2.32) |
|                           |                |         | Utility bills: 1.71 (NR) | NR | NR | 249 (1.70) | 0.82 (−0.10 to 1.73) |
|                           |                |         | Parking: 1.27 (NR) | NR | NR | 1.49 (1.85) | 0.23 (−0.39 to 0.86) |
|                           |                |         | Additional: 0.29 (NR) | NR | NR | 120 (144) | −0.68 (−2.42 to 1.06) |
| Van Houtven et al. (2013)⁵ | Self-report    | Logged costs per patient, US$ | Caregiver: −543.32 (−1438.31 to 35.17)⁸ | NR | 1 | NR | − |
|                           |                |         | Care-recipient: 192.25 (−361.86 to 746.36)⁹ | NR | 1 | NR | − |
|                           |                |         | Total: 57.42 (−461.39 to 576.23)⁵ | NR | 1 | NR | − |
| Jing et al. (2013)¹¹      | Self-report    | Difference in proportion of households, % | 0.53 (NR) | > 0.05 | 12 | −2.10 (5.75) | NR |
| Housesholds with catastrophic health expenditure | | | | | | | |
| Davidoff et al. (2005)¹⁰  | Self-report    | Change in percentage of patients who delayed seeking care due to cost | −1.7 (−6.6 to 3.2) | NR | 12 | NR | − |
| Probability of out-of-pocket costs | | | | | | | |

(continues . . )
## Reducing the economic burden of illness and injury

- **Probability that**

  

| Reference | Period (months) | Out-of-pocket cost for control group, mean (SD) | Standardized mean difference (95% CI) | Relative difference (95% CI) |
|-----------|----------------|-----------------------------------------------|-------------------------------------|---------------------------|
| NR        | NR             | NR                                            | NR                                  | NR                        |
| NR        | NR             | NR                                            | NR                                  | NR                        |
| NR        | NR             | NR                                            | NR                                  | NR                        |

- **P**

  - **Relative difference (95% CI)**

  - **Standardized mean difference (95% CI)**

  - **Non**

  - **Consistently involved in the improvement of health outcomes**

  - **Outcome-based or, to a lesser extent, involve repeated patient education.**

  - **These economic outcomes have been variable quality and rarely randomized controlled trials.**

  - **Inconsistencies in the measurement and reporting of outcomes such as out-of-pocket costs and catastrophic health expenditures.**

- **Conclusion**

  Health-insurance programmes that reduce or eliminate co-payments for defined illness-specific treatments can effectively provide some financial protection, by reducing out-of-pocket expenditure. However, little is known about the cost-effectiveness of such programmes and about other forms of intervention that may provide relief from adverse economic outcomes to households. Given the multiple and diverse ways that illness and injury can affect the economic circumstances of households, this review highlights the need for method development in this field – above and beyond the limited focus on out-of-pocket expenditure. Additionally, especially in low- and middle-income countries, there is wide scope for research on the effectiveness of innovative non-insurance interventions that could provide low-cost and better-targeted support.

- **Acknowledgements**

  BME is also affiliated with the Menzies Centre for Health Policy, University of Sydney, Australia. MLH, SJ and TLL have affiliations with the University of Sydney, Australia.

- **Funding:** This work was supported by the National Health and Medical Research Council of Australia and the Ian Potter Foundation.

- **Competing interests:** None declared.
Efficacité des interventions visant à réduire la charge économique des maladies et des blessures sur les ménages: une revue systématique

Objectif: Déterminer la nature, la portée et l’efficacité des interventions visant à réduire la charge économique des maladies et des blessures sur les ménages.

Méthodes: Nous avons systématiquement passé en revue les rapports publiés avant le 31 janvier 2014, que nous avons trouvés dans les bases de données CENTRAL, CINAHL, Econlit, Embase, MEDLINE, PreMEDLINE et PsycINFO. Nous avons extrait les données à partir d’essais contrôlés prospectifs et évalué le risque de biais. Nous avons fait la synthèse des données de manière narrative.

Résultats: Parmi les 4330 études examinées, 9 d’entre elles ont satisfait nos critères d’inclusion. Nous avons évalué les changements dans les programmes d’assurance maladie existants et 2 avaient évalué les différents modes de diffusion des informations. Les seules interventions qui réduisaient significativement les dépenses restaient à la charge des patients qui éliminaient ou diminuaient substantiellement la participation aux frais pour une population de patients donnée. Toutefois, les réductions ne représentaient que des changements marginaux dans l’ensemble des dépenses des patients. Nous n’avons trouvé aucune autre étude qui n’ait pas été efficace dans le traitement de l’effet de l’impact économique sur les ménages – comme les dépenses cataclysmiques de santé – dans les populations de malades étudiées.

Conclusion: En général, les interventions visant à réduire la charge économique et complexe des maladies et des blessures sur les ménages semblent n’avoir que peu d’effet sur l’économie des ménages. Nous n’avons trouvé qu’un petit nombre d’études pertinentes qui utilisées des modèles d’étude rigoureux et qui ont été menées sur des populations de patients définies. Les études ont été limitées dans la gamme des interventions testées et elles n’ont évalué qu’une gamme restreinte de résultats économiques sur les ménages. Il est nécessaire de développer des méthodes pour améliorer la quantification des conséquences économiques des maladies et des blessures sur les ménages et pour faciliter le développement d’interventions innovantes afin de compléter les stratégies reposant sur l’assurance maladie.
Резюме

Эффективность мер по снижению экономического бремени болезней и травм для домохозяйств: систематический обзор

Цель Определить характер, масштабы и эффективность мер по снижению экономического бремени болезней и травм для домохозяйств.

Методы Проводился систематический обзор отчетов, опубликованных по состоянию на 31 января 2014 года в базах данных CENTRAL, CINAHL, Econlit, Embase, MEDLINE, PREMEDLINE y PsycINFO. Были извлечены данные из проспективных контролируемых исследований и определен риск системной ошибки. Для собранных данных была проведена описательная классификация. Результаты Девять из 4330 рассмотренных исследований соответствовали критериям включения в обзор — в семи из них оценивались изменения в существующих программах медицинского страхования, а в двух исследованиях выявлялись различные способы доставки информации. Единственными выявленными мероприятиями, которые приводили к существенному снижению собственных расходов домохозяйств на лечение, были те, которые устраивали или значитель но сокращали собственные доплаты для определенного контингента больных. Тем не менее, это снижение собственных доплат составляло лишь незначительную долю в общем объеме расходов пациентов. Не были найдены исследования, которые бы эффективно устраивали экономические воздействия на домохозяйства — такие как катастрофические расходы на здравоохранение — в исследованных группах заболеваний.

Вывод В целом, выявленные меры, направленные на снижение сложного экономического бремени болезней и травм для домохозяйств, оказывали незначительное влияние на экономику этих домохозяйств. Были обнаружены всего несколько соответствующих исследований, использующих тщательно разработанные схемы, которые были проведены в определенных группах пациентов. Эти исследования касались ограниченного диапазона мероприятий и оценивали ли узкий диапазон воздействий на экономику домохозяйств. Существует потребность в разработке методов измерения экономических последствий болезней и травм для домохозяйств, как и в содействии разработке инновационных мероприятий в дополнение к стратегиям, основанным на медицинском страховании.

References
1. Xu K, Evans DB, Carrin G, Aguilar-Rivera AM, Musgrove P, Evans T. Protecting households from catastrophic health spending. Health Aff (Millwood). 2007 Jul-Aug;26(4):972–83. doi: http://dx.doi.org/10.1377/hlthaff.26.4.972 PMID: 17630440
2. Gilson L. The lessons of user fee experience in Africa. Health Policy Plan. 1997 Dec;12(4):273–85. doi: http://dx.doi.org/10.1093/oxfordjournals. heapol.a018882 PMID: 10176263
3. McIntyre D, Thiede M, Dahlgren G, Whitehead M. What are the economic consequences of households of illness and of paying for health care in low- and middle-income country contexts? Soc Sci Med. 2006 Feb;62(4):858–65. doi: http://dx.doi.org/10.1016/j.socscimed.2005.07.001 PMID: 16099574
4. Sauerborn R, Brau N, Neugraeg A, Borchert M, Hien M, Brender J, et al. The economic costs of illnesses for rural households in Burkina Faso. Trop Med Parasitol. 1995 Mar;46(1):54–60. PMID: 7631130
5. Himmelstein DU, Thorne D, Warren E, Woolhandler S. Medical bankruptcy in the United States, 2007: results of a national study. Am J Med. 2009 Aug;122(8):741–6. doi: http://dx.doi.org/10.1016/j.amjmed.2009.04.012 PMID: 19501347
6. Profiles of debtors. 2011. Canberra: Commonwealth of Australia; 2012. Available from: https://www.afsa.gov.au/resources/statistics/profiles-of-debtors-documents/profiles-of-debtors-2011 [cited 2014 Nov 2].
7. Schoenberg NE, Kim H, Edwards W, Fleming ST. Burden of common multiple-morbidity constellations on out-of-pocket medical expenditures among older adults. Gerontologist. 2007 Aug;47(4):423–37. doi: http://dx.doi.org/10.1093/geront/47.4.423 PMID: 17766664
8. Moreno-Serra R, Millett C, Smith PC. Towards improved measurement of financial protection in health. PLoS Med. 2011 Sep;8(9):e1001087. doi: http://dx.doi.org/10.1371/journal.pmed.1001087 PMID: 2190246
9. Ruger JP. An alternative framework for analyzing financial protection in health. PLoS Med. 2012;9(8):e1001294. doi: http://dx.doi.org/10.1371/journal.pmed.1001294 PMID: 22927799
10. Health systems: improving performance. Geneva: World Health Organization; 2000.
26. Quality assessment tool for quantitative studies method (updated 13 April, 2012).

24. Liang X, Guo H, Jin C, Peng X, Zhang X. The effect of new cooperative medical schemes on health outcomes and alleviating catastrophic health expenditure. Pediatr. 2013 Mar;131(3):e903–11. doi: http://dx.doi.org/10.1542/peds.2012-1491 PMID: 23420919

23. Barry CL, Yoon F, Barry CL, Azam V, Normand SL, Goldman HH, et al. The effects of mental health parity on spending and utilization for bipolar, major depression, and adjustment disorders. Am J Psychiatry. 2013 Feb 1;170(2):180–7. doi: http://dx.doi.org/10.1176/appi.ajp.2012.12030392 PMID: 23377639

22. Choudhry NK, Avorn J, Grynn RJ, Antman EM, Schneeweiss S, Toccano M, et al.; Post-Myocardial Infarction Free Rx Event and Economic Evaluation (MI FREE) Trial. Full coverage for preventive medications after myocardial infarction. N Engl J Med. 2011 Dec 1;365(22):2088–97. doi: http://dx.doi.org/10.1056/NEJMao110793 PMID: 22080794

21. Ofman JJ, Badamgarav E, Henning JM, Knight K, Gano AD Jr, Levan RK, et al. Does cataract surgery alleviate poverty? Evidence from a multi-centre case of health insurance in China. J Health Econ. 2008 Jul;27(4):990–1005. doi: http://dx.doi.org/10.1016/j.jhealeco.2008.02.002 PMID: 18342963

20. Goudge J, Russell S, Gilson L, Molyneux C, Hanson K. Household care payments in the Asia Pacific: validation of five survey measures of economic burden. Int J Equity Health. 2013;12(1):49. doi: http://dx.doi.org/10.1186/1475-9276-12-49 PMID: 23285225

19. Jan S, Essue BM, Leeder SR. Falling through the cracks: the hidden economic burden of chronic illness and disability on Australian households. Med J Aust. 2012 Jan 16;196(1):29–31. doi: http://dx.doi.org/10.5694/maj11.11105 PMID: 22562994

18. Jan S, Wiseman V. What have economists ever done for global health? Lancet. 2014 May 24;383(9931):1801. doi: http://dx.doi.org/10.1016/S0140-6736(14)60782-2 PMID: 24856019

17. Hung AC, Pinkney G, Dubay L. Effects of the State Children's Health Insurance Program Expansions on children with chronic health conditions. Pediatr. 2005 Jul;116(1):e34–42. doi: http://dx.doi.org/10.1542/peds.2004-2297 PMID: 15958662

16. Quality assessment tool for quantitative studies method (updated 13 April, 2012). Bull World Health Organ. 2015;93:102–112 doi: http://dx.doi.org/10.2471/BLT.14.139287

15. Heeley E, Anderson CS, Huang Y, Jan S, Li Y, Liu M, et al.; ChinaQUEST Investigators. Role of health insurance in averting economic hardship in families after acute stroke in China. Stroke. 2009 Jun;40(6):2149–56. doi: http://dx.doi.org/10.1161/STROKEAHA.108.540054 PMID: 19359646

14. Wagstaff A, Lindelow M. Can insurance increase financial risk? The curious case of health insurance in China. J Health Econ. 2008 Jul;27(4):990–1005. doi: http://dx.doi.org/10.1016/j.jhealeco.2008.02.002 PMID: 18342963

13. Jeffrey AE, Newacheck PW. Role of insurance for children with special health care needs: a synthesis of the evidence. Pediatrics. 2006 Jul;118(1):e22–36. doi: http://dx.doi.org/10.1542/peds.2005-2527 PMID: 16966391

12. Ekman B. Community-based health insurance in low-income countries: a systematic review of the evidence. Health Policy Plan. 2004 Sep;19(5):249–73. doi: http://dx.doi.org/10.1017/S026500750400220X PMID: 15634128

11. Agenda item 123. Global health and foreign policy. A/67/L.36. Sixty-seventh United Nations General Assembly, New York, 6 December 2012. United Nations. 2012.

10. Choudhry NK, Fischer MA, Avorn JL, Lee JL, Schneeweiss S, Solomon DH, et al. The impact of reducing cardiovascular medication copayments on health spending and resource utilization. J Am Coll Cardiol. 2012 Oct 30;60(18):1817–24. doi: http://dx.doi.org/10.1016/j.jacc.2012.06.050 PMID: 23040581

9. Barry CL, Chou J, Normand SL, Busch AB, Azam V, Goldman HH, et al. Parity and out-of-pocket spending for children with high mental health or substance abuse expenditures. Pediatrics. 2013 Mar;131(3):e903–11. doi: http://dx.doi.org/10.1542/peds.2012-1491 PMID: 23420919

8. Jan S, Wiseman V. What have economists ever done for global health? Lancet. 2014 May 24;383(9931):1801. doi: http://dx.doi.org/10.1016/S0140-6736(14)60782-2 PMID: 24856019

7. Hanratty B, Holland P, Jacoby A, Whitehead M. Financial stress and strain associated with terminal cancer – a review of the evidence. Palliat Med. 2012;26(8):663–672. doi: http://dx.doi.org/10.1177/0269206011427855

6. Choudhry NK, Avorn J, Grynn RJ, Antman EM, Schneeweiss S, Toccano M, et al.; Post-Myocardial Infarction Free Rx Event and Economic Evaluation (MI FREE) Trial. Full coverage for preventive medications after myocardial infarction. N Engl J Med. 2011 Dec 1;365(22):2088–97. doi: http://dx.doi.org/10.1056/NEJMoa110793 PMID: 22080794

5. Wagstaff A, van Doorslaer E. Catastrophe and impoverishment in paying for health care: with applications to Vietnam 1993–1998. Health Econ. 2003 Nov;12(1):921–34. doi: http://dx.doi.org/10.1002/hec.776 PMID: 14601155

4. Choudhry NK, Fischer MA, Avorn JL, Lee JL, Schneeweiss S, Solomon DH, et al. The impact of reducing cardiovascular medication copayments on health spending and resource utilization. J Am Coll Cardiol. 2012 Oct 30;60(18):1817–24. doi: http://dx.doi.org/10.1016/j.jacc.2012.06.050 PMID: 23040581

3. Wagstaff A, Lindelow M. Can insurance increase financial risk? The curious case of health insurance in China. J Health Econ. 2008 Jul;27(4):990–1005. doi: http://dx.doi.org/10.1016/j.jhealeco.2008.02.002 PMID: 18342963

2. Ofman JJ, Badamgarav E, Henning JM, Knight K, Gano AD Jr, Levan RK, et al. Does disease management improve clinical and economic outcomes in patients with chronic diseases? A systematic review. Am J Med. 2004 Aug;117(3):182–92. doi: http://dx.doi.org/10.1016/j.amjmed.2004.03.018 PMID: 15300966

1. Agenda item 123. Global health and foreign policy. A/67/L.36. Sixty-seventh United Nations General Assembly, New York, 6 December 2012. United Nations. 2012.
Fig. 2. **Risk of bias in the randomized and nonrandomized controlled trials and the controlled before-and-after studies on interventions to reduce the household economic burden of ill health**

| Domain                                | Yes (low risk) | No (high risk) | Unclear (unclear risk) | % of studies |
|---------------------------------------|----------------|----------------|------------------------|--------------|
| Adequate sequence generation          |                |                |                        |              |
| Allocation concealment                |                |                |                        |              |
| Blinding                              |                |                |                        |              |
| Incomplete outcome data addressed     |                |                |                        |              |
| Free of selective reporting           |                |                |                        |              |
| Free of other bias                    |                |                |                        |              |

Note: Each domain refers to an area of potential bias that could affect the validity of the six studies. For each domain, a study was categorized as high, low or unclear risk, using the criteria suggested for Effective Practice and Organisation of Care reviews. 28

Fig. 3. **Risk of bias in the interrupted time series studies on interventions to reduce the household economic burden of ill health**

| Domain                                | Yes (low risk) | No (high risk) | Unclear (unclear risk) | % of studies |
|---------------------------------------|----------------|----------------|------------------------|--------------|
| Intervention independent of other changes |                |                |                        |              |
| Shape of effect pre-specified         |                |                |                        |              |
| Unlikely to affect data collection    |                |                |                        |              |
| Blinding                              |                |                |                        |              |
| Incomplete outcome data addressed     |                |                |                        |              |
| Free of selective reporting           |                |                |                        |              |
| Free of other bias                    |                |                |                        |              |

Note: Each domain refers to an area of potential bias that could affect the validity of the three studies. For each domain, a study was categorized as high, low or unclear risk, using the criteria suggested for Effective Practice and Organisation of Care reviews. 29
### Other patient outcomes assessed in the included studies

| Patient outcome                                      | Choudhry et al. (2011)$^{11}$ | Choudhry et al. (2012)$^{12}$ | Davidoff et al. (2005)$^{13}$ | Goldman et al. (2006)$^{14}$ | Jing et al. (2013)$^{15}$ | Barry et al. (2013)$^{16}$ | Busch et al. (2013)$^{19}$ | Heikki-nen et al. (2011)$^{16}$ | Van Houtven et al. (2013)$^{20}$ |
|-----------------------------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| **Clinical**                                         |                               |                               |                               |                               |                               |                               |                               |                               |                               |
| Readmission for major vascular event or coronary revascularization | Yes                           | No                            | No                            | No                            | No               | No              | No              | No              | No              |
| Rate of total major vascular events or revascularization | Yes                           | Yes                           | No                            | No                            | No               | No              | No              | No              | No              |
| **Health-system feature**                            |                               |                               |                               |                               |                               |                               |                               |                               |                               |
| Private health-insurance coverage                    | No                            | No                            | Yes                           | No                            | No               | No              | No              | No              | No              |
| **Health-service use and access**                    |                               |                               |                               |                               |                               |                               |                               |                               |                               |
| Emergency presentations                              | No                            | Yes                           | No                            | Yes                           | No               | No              | No              | No              | No              |
| Hospital admissions                                  | No                            | Yes                           | No                            | Yes                           | No               | No              | Yes             | Yes             | No              |
| Physician visits                                     | No                            | Yes                           | No                            | Yes                           | No               | No              | Yes             | Yes             | No              |
| Other$^a$                                            | No                            | No                            | No                            | No                            | No               | No              | No              | Yes             | No              |
| Unmet needs$^b$                                      | No                            | No                            | No                            | No                            | Yes              | No              | No              | No              | No              |
| **Adherence**                                        |                               |                               |                               |                               |                               |                               |                               |                               |                               |
| Medication possession ratio$^c$                       | Yes                           | No                            | No                            | No                            | No               | No              | No              | No              | No              |
| Full adherence                                       | Yes                           | No                            | No                            | No                            | No               | No              | No              | No              | No              |
| Medication filling                                   | No                            | Yes                           | No                            | No                            | No               | No              | No              | No              | No              |
| **Direct and indirect costs**                        |                               |                               |                               |                               |                               |                               |                               |                               |                               |
| Costs to private health insurer                      | Yes                           | Yes                           | No                            | No                            | No               | No              | No              | No              | No              |
| Time costs$^d$                                       | No                            | No                            | No                            | No                            | No               | No              | Yes             | No              | No              |

$^a$ First aid, nurses and other health-care professionals.

$^b$ Medical, dental, prescription drugs and mental health services.

$^c$ The number of days a patient had a supply of each medication class available divided by the number of days the patient was eligible for that medication.

$^d$ Including work and free time spent attending laboratory tests, X-ray examinations and receiving patient-targeted education and time spent off work, on sick leave.