Economic evaluation in global perspective: A bibliometric analysis of the recent literature

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HEALTH ECONOMICS & SYSTEMS ANALYSIS GROUP WORKING PAPER

Version 1.1 (August 2015)

Please note: This draft paper is intended for review and comments only. It is not intended for citation, quotation, or other use in any form.

Funding: This work was supported by the Economic and Social Research Council [grant number ES/J5000021/1].

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1. Abstract

We present a bibliometric analysis of recently published full economic evaluations of health interventions and reflect critically on the implications of our findings for this growing field. We created a database drawing on 14 health, economic, and/or general literature databases for articles published between 1 January 2012 and 1 May 2014 and identified 2,844 economic evaluations meeting our criteria. We present findings regarding the sensitivity, specificity, and added value of searches in the different databases. We examine the distribution of publications between countries, regions, and health areas studied and compare the relative volume of research with disease burden. We analyze authors' country and institutional affiliations, journals and journal type, language, and type of economic evaluation conducted. More than 1,200 economic evaluations were published annually, of which 4% addressed low-income countries, 4% lower-middle-income countries, 14% upper-middle-income countries, and 83% high-income countries. Across country income levels, 53%, 54%, 86%, and 100% of articles, respectively, included an author based in a country within the income level studied. Biomedical journals published 74% of economic evaluations. The volume of research across health areas correlates more closely with disease burden in high-income than in low- and middle-income countries. Our findings provide an empirical basis for further study on methods, research prioritization, and capacity development in health economic evaluation.

Key words: Bibliometrics, Economic evaluation, Cost-Effectiveness Analysis, Low- and middle-income countries, High-income countries

JEL codes: I10 (Health, General)**;** D610 (Allocative Efficiency; Cost-Benefit Analysis), I120 (Health Production)

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Abbreviations

CBA	Cost-benefit analysis
CEA	Cost-effectiveness analysis
CUA	Cost-utility analysis
DALY	Disability-adjusted life-year
GBD	Global burden of disease
HEED	Health Economic Evaluations Database (of Wiley publishing)
HICs	High-income countries
HIV	Human immunodeficiency virus
HIV/AIDS	Human immune deficiency virus / Acquired immune deficiency syndrome
ICD-10	International Classification of Disease, version 10
L&MICs	Low- and middle-income countries
LICs	Low-income countries
MICs	Middle-income countries
NHS EED	National Health Service Economic Evaluation Database (of the Center for Reviews and Dissemination, York University)
QALY	Quality-adjusted life-year
STDs	Sexually transmitted diseases

2. Introduction

"Bibliometrics" is the quantitative analysis of written communication in forms such as journal articles and books.(Pritchard, 1969) Bibliometric analyses can examine a body of knowledge far larger than that which can be assessed and synthesized in a systematic review and so allow reflection on the past, present, and future of entire fields of research. Wagstaff and Culyer's 2012 bibliometric analysis of the field of health economics, which updated and extended prior work by Rubin and Chang (2003), set out to undertake such an analysis of the entirety of health economics. Their ambitious work examined publications across 42 years (1969-2010) and generated much discussed rankings of the leading authors, institutions, and topics of health economics research over time. By restricting their analyses to journals indexed in Econlit, however, they captured very little of the literature in health economic evaluation, an important, and growing area of health economics.

This article presents a bibliometric analysis of recently published, full health economic evaluations (Drummond et al., 2005) and reflects critically on the implications of our findings. We stratify our analyses by the income group classification (World Bank, 2015) of the countries studied to allow comparisons across income groups. This stratification ensures that findings regarding low- and middle-income countries (L&MICs) receive due attention, given their far greater burden of disease, more constrained resources, and lesser focus in the methodological literature to date, as well as the fact that they are home to 84% of the world's population (World Health Organization., 2014). In light of the growing interest in global health and priority setting, this contribution to the evidence base is also timely.

A previous bibliometric analysis of cost-effectiveness analyses (CEAs) was limited to studies reporting outcomes as cost per quality-adjusted life-year (QALY) up to 2006 (Greenberg et al., 2010). As QALYs were only used in a total of 23 L&MIC CEAs up to 2006 (Harker and Guinness, 2015), this restriction biased Greenberg and others' findings towards studies undertaken in HICs and omitted nearly half of full economic evaluations (as we will show). Much has also changed since 2006, with a rapid expansion in the literature, including in L&MICs.

By 1984, just a handful of economic evaluations of health interventions had been conducted in L&MICs (Mills and Thomas, 1984) and even in 2000, Walker and Fox-Rushby (2000) were still able to review critically the 107 economic evaluations of interventions to address communicable diseases in L&MICs published between 1984 and 1997. In the past decade, however, the body of work has expanded such that it has been possible for reviews to focus on specific disease areas for example, non-communicable diseases (Mulligan et al., 2006); road traffic injuries (Waters et al., 2004); malaria (Goodman and Mills, 1999, White et al., 2011); various aspects of HIV/AIDS (Creese et al., 2002, Galarraga et al., 2009, Walensky et al., 2010, Johri and Ako-Arrey, 2011) and tuberculosis (Fitzpatrick and Floyd, 2012, Chavan et al., 2011); vaccination for Haemophilus influenzae type b (Griffiths and Miners, 2009), seasonal (Ott et al., 2013) and pandemic influenza (Perez Velasco et al., 2012); human papilloma virus (Natunen et al., 2013, Fesenfeld et al., 2013); cardiovascular diseases (Suhrcke et al., 2012); surgery (Chao et al., 2014); and strategies to improve the demand and supply of maternal and neonatal care (Mangham-Jefferies et al., 2014). Reviews of economic evaluations in L&MICs have also narrowed their focus by geography, for example, to Meso-America (Valencia-Mendoza et al., 2011), Latin America and the Caribbean (Augustovski et al., 2009), Thailand (Teerawattananon et al., 2007), Nigeria (Gavaza et al., 2010), Tanzania (Mori and Robberstad, 2012) and Ghana (Odame, 2013). In adopting a more constrained perspective, these reviews have allowed important insights into the economic evidence for specific disease areas or

geographies, but have not provided a wider perspective on the overall economic evaluation literature in L&MICs, nor been able to compare this literature with the far larger body of economic evaluations in high-income countries (HICs).

In the following sections, we describe the methods for generating and analysing our data, present our results, and reflect on the state of the field and the implications of our findings for research priority setting and capacity development.

3. Methods

We began by developing a comprehensive database of peer-reviewed research articles reporting a primary, full economic evaluation. Following Drummond et al, we defined "full economic evaluation" as studies which evaluate the efficiency of alternative interventions or courses of action by combining data on the costs and effects on human health of the alternatives in CEA, cost-utility analysis (CUA), or cost-benefit analysis (CBA). (Drummond et al., 2008) Further, we aimed to restrict our database to articles which went beyond simple reporting of some cost and effect data, rather including only articles which either (i) produced a summary measure of efficiency, such as a ratio (e.g. incremental cost-effectiveness ratio), probability (e.g. that an intervention is cost-effective given a defined threshold), difference (e.g. incremental net benefit), and/or graph, such as a cost-effectiveness plane or cost-effectiveness acceptability curve as recommended in ISPOR guidelines (Ramsey et al., 2005), or (ii) which demonstrated strict dominance (i.e. that one intervention is both more costly and less effective than the other). We defined "primary research" to include the production of a novel estimate (i.e. to include modelling studies) and to exclude reviews which only cite previously published estimates. Our analysis was restricted to articles published from 1 January 2012 to the date of our searches, 3 May 2014, comprising a period of 28 months.

In the following sections we describe the process of constructing the database and our analytical methods.

3.1. Data

Search strategies

Appendix 1 illustrates our search strategy in a flow diagram adapted from the PRISMA guidelines for systematic reviews.(Liberati et al., 2009) We identified 17 potential databases for our search by consulting recent systematic reviews of economic evaluations and a health sciences librarian to identify databases which seemed, prima facie, to be potentially useful or used by researchers.

Based on preliminary searches in all databases and a review of their content and functionality, we selected 14 databases for our final search: two health economics databases (the National Health Service Economic Evaluations Database (NHS EED) and the Health Economic Evaluations Database (HEED)), one economics database (EconLit), one general literature database (Scopus), two broad databases (the Science Citation Index Extended (SCI) and the Social Science Citation Index (SSCI), which were searched simultaneously), and eight health sciences databases (Embase, Medline including in-process, Latin American Health Sciences Literature (LILACS), Global Health, PsycInfo, Scielo, Biosis, and Cinahl). We excluded Google Scholar because Google prevents bulk downloading of citations; Pubmed because we

were able to obtain the same set of articles (Medline, Medline-in-process, and Pubmed-not-Medline) in our search of the Ovid SP interface, which is more user-friendly; and the Tufts Cost-Effectiveness Analysis Registry because its coverage was limited to articles published in English which report outcomes as QALYs and it charges substantial access fees.

Search strategies were optimized individually for each database, taking into account the scope of each database and the features of its user interface. Careful checks were performed to ensure that the initial search was as sensitive as possible, and that any restrictions increased specificity without compromising sensitivity. Each time we considered an additional restriction to increase the specificity of the search, such as excluding all articles with the word "protocol" in the title, we first reviewed the first one hundred excluded records, and revised the search strategy if any excluded records were found to meet our inclusion criteria. Full details of the final search strategy employed in each database are provided in **Appendix 2** and further discussion of the reasons for not using controlled vocabulary indexing terms (e.g. MeSH terms) is available in **Appendix 3.**

Merging and screening

Search results were exported to Excel. We identified duplicate records to produce a set of unique records linked to the bibliographic data in all of the databases in which they were found. By comparing multiple databases and carefully reviewing data, we corrected many of the errors within the bibliographic data. Titles and, if necessary, abstracts and in some cases full text, were screened by one author (CP) to determine whether they met our inclusion criteria. Although only English-language search terms were used, no language restrictions were applied. Keyword searches of all text fields were used to facilitate identification of articles for exclusion (using terms such as "review" and "protocol") and inclusion (using terms such as "dominant" and "cost-utility").

We excluded articles which described themselves as CEA, CUA, or CBA but did not meet our inclusion criteria. For example, self-proclaimed "cost-benefit analyses" which only compared the costs of interventions with cost savings resulting from reduced subsequent health care use were excluded as they did not measure health benefits. Cost-minimization analyses were similarly excluded (Dakin and Wordsworth, 2013), as were the many articles declaring an intervention "cost-effective" which did not analyze both costs and effects.

3.2. Analyses

All analyses are disaggregated by country income group and were conducted in Microsoft Excel.

Databases

For each of the 14 databases, we provide estimates of the sensitivity (% of the total number of unique economic evaluations identified), specificity (% of search results for each database classified as economic evaluations), and added value (% unique economic evaluations identified by given database and not also identified by another database identifying a greater % of economic evaluations) of our search.

Geographic areas studied

Key term searches were developed to classify articles by country (or countries) studied, which were then mapped onto World Bank income groups and regions (World Bank, 2015).[1] All potentially ambiguous names (including Congo, Korea, India, China, Niger, Japan, England, and Guinea) were reviewed, as were all articles not classified by any search term or classified as analysing multiple income groups. Articles which described themselves as studying a region or set of countries (such as "malaria endemic countries" (WHO Global Malaria Programme., 2014)) were classified according to all the countries within that region. A single article could be classified as belonging to multiple income levels or regions.

Health areas

We developed a classification of 25 health areas so as to allow comparability with the Global Burden of Disease (GBD) estimates (World Health Organization., 2014), to be implementable with an electronic key term search, and to permit meaningful analysis. In **Appendix 4**, we show how our 25 health areas map onto the GBD and onto the World Health Organization's international classification of disease, version 10 (ICD-10) (World Health Organization., 2011). A set of up to 49 search terms was developed for each of our health areas through an iterative process.

As with countries studied, a single article could be classified as belonging to multiple health areas. For example, we counted economic evaluations of interventions for gestational diabetes as both "maternal and newborn health" and "diabetes", and interventions to address HIV and tuberculosis co-infection (Pawlowski et al., 2012) as addressing each disease. While this could be considered double-counting, we argue that interventions addressing multiple areas do not contribute any less to each area than those interventions addressing only one disease. Further information is available in **Appendix 5**.

We then compared the distribution of health areas studied in economic evaluations to the GBD. Comparisons are presented graphically with scatter plots comparing the volume of economic evaluations and burden of disease by a) ranking and b) proportion of total, disaggregated by income group and in total, which allows us both to assess the correlation and to identify health areas which are outliers meriting deeper exploration.

Languages and journals

Journal names were classified as: 1) biomedical, 2) health economics, services, policy, and/or social sciences, or 3) other. (**Appendix 6**) The proportion of health economic evaluations published in each journal type were analyzed overall and by income group, as were the top ten journals, and the concentration of economic evaluations.

The language of the full text was also analyzed. Where the full text was available in English and another language, the article was categorized as English to permit analysis of what would be missed if only English-language publications were considered. As there were many errors in the language data in the bibliographic databases, these data were also compared with the journal title and country studied, and in some cases the full text or journal website examined, to arrive at a final language classification.

[1] Macao, Hong Kong, and Taiwan, which are all classified as high-income countries by the World Bank, were analysed separately from the mainland of the People's Republic of China, an upper-middle-income country.

Types of economic evaluation

Finally, we also used key term searches to disaggregate studies by self-reported type: CBA, CUA, and other CEAs. We further disaggregated cost-utility studies between those employing disability-adjusted life-years (DALYs) and those employing QALYs. Search terms are listed in **Appendix 7**.

Institutional and geographic affiliations of authors

We analyzed data on the institutional affiliation of all authors to develop a comprehensive picture of the institutions and countries contributing to health economic evaluations.

We identified the top ten institutions within each income group by volume of economic evaluations produced. As in previous work (Wagstaff and Culyer, 2012, Rubin and Chang, 2003), schools, colleges and institutes were aggregated with the university to which they belonged, with the exception of the highly federal Universities of London, California, Texas, and other similar university systems, whose constituent members were analyzed separately.

We considered a number of possible approaches for analysing articles with more than one institutional affiliation, including assigning a fractional value (and even weighted fractional values reflecting author order) to each institution based on the number of authors or institutions represented on a given article (Aksnes et al., 2012, Hagen, 2013, Retzer and Jurasinski, 2009). However, we rejected such approaches because the use of zero-sum metrics establishes a perverse incentive against collaboration between institutions and against the crediting of collaborators. We therefore assigned one point per institution per article, regardless of the number of institutions or authors on a given article. This has the disadvantage of weighting the analysis towards articles from multiple institutions, as these articles are counted multiple times in the analyses of institutional and country affiliations. More information on how we classified health areas and institutional affiliations is available in **Appendix 5.**

4. Results

4.1. Search results

In total, our searches of the 14 databases identified 47,407 records (**Appendix 1**). After duplicate removal, 15,057 unique records remained. 12,213 articles were removed in screening, leaving a total of 2,844 unique, full economic evaluations in the database.

4.2. Databases

Our search of Scopus identified the largest number of economic evaluations (n=2409), 85% of our total, followed by NHS EED, which identified 80% of the articles we identified (**Appendix 8**). Together, these two databases identified 96% of articles, and adding the Medline search increased this to 98%. With each additional database, the incremental gains were diminishingly small, and one database, Lilacs, failed to identify any additional articles beyond those identified by other databases. Econlit identified just 42 economic evaluations, 1% of the total. If we exclude NHS EED from consideration as it ceased to update records from March 2015 and exclude Wiley HEED as it ceased to be available from the end of 2014, our searches of a combination of Scopus, Medline, and Global Health would identify 91% of the economic evaluations, but a remaining 7% of economic evaluations in our database were only identified by NHS EED

and Wiley HEED not by our searches of other databases (**Appendix 9**). If we restrict the analysis to articles studying L&MICs and exclude NHS EED and Wiley HEED, our searches of Scopus, Medline, and Global Health would together identify 93% of economic evaluations in L&MIC settings, while 4% were only identified in NHS EED and Wiley HEED (**Appendix 10**).

4.3. Subjects studied

Geographic areas studied

At least one country, region, and income group studied was identified for all economic evaluations identified. Of these, 2,350 (83%) studied high-income countries, 391 (14%) upper-middle-income countries, 121 (4%) lower-middle-income countries, and 104 (4%) low-income countries. These sum to more than 100% because 63 (2%) articles reported studies set in multiple countries in more than one of the four income groups. As expected, most articles reported findings from Europe & Central Asia (1243, 44%) and/or North America (960, 34%), while relatively fewer articles reported findings from East Asia & Pacific, including Australia (405, 14%), Sub-Saharan Africa (158, 6%), Latin America and the Caribbean (129, 5%), South Asia (56, 2%), or the Middle East and North Africa (62, 2%). These figures include the 102 (4%) articles which analyzed countries in more than one region (**Table 1**).

Table 2 presents the individual countries most frequently studied. The United States was the subject of 813 studies, followed by the United Kingdom (n=478) and six further countries which were each studied in at least 100 articles: the Netherlands (n=183), Canada (n=162), Spain (n=136), China (n=116), Germany (n=109), and Australia (n=100). While China, South Africa (n=71), and Brazil (n=56) were studied in a relatively large number of articles, only ten upper-MICs were studied in at least 20 articles each. Led by Uganda (n=49), India (n=41), Kenya (n=41), and Zambia (n=39), all of the top 20 LIC & lower-MICs were studied in more than 20 economic evaluations, in part because 61 of the 184 articles (33%) studying at least one LIC or lower-MIC examined more than one country and 33 LIC & lower-MIC articles (18%) studied more than ten countries. In upper-MICs and HICs, only 14% (n=54) and 7% (n=169) of studies, respectively, examined more than one country and 8% (n=32) and 1% (n=27) examined more than 10 countries.

Health areas studied and the global burden of disease

At least one health area was assigned to 2,829 (99.5%) articles. The mean number of health areas per article was 1.4 and the maximum 7, reflecting a tendency towards evaluations addressing and often at the intersection of multiple health areas, as well as the construction of our health areas by which "lung cancer", for example, would be categorized as both "cancer" and "respiratory". In LICs, three health areas dominate: HIV/AIDS (30% of classified LIC articles), neonatal and maternal conditions (16%), and malaria (15%) (**Table 3**). In lower-MICs, HIV/AIDS again dominates (23%), but the remaining health areas are more evenly distributed; malaria comes second (11%), and is followed by other infectious diseases (8%) and mental health (8%); half of the latter focused on HIV treatment and prevention amongst injection drug users. In upper-MICs, HIV/AIDS (12%) falls to second place, while cancer and other neoplasms (19%) occupies the top spot with cardiovascular (11%) and respiratory diseases (10%) in third and fourth. As HICs are studied in 83% of economic evaluations, the disease areas addressed in economic evaluations in HICs drive the distribution of all economic evaluations conducted worldwide, with cardiovascular diseases (19% in HICs), cancer and other neoplasms (18%), mental health (10%), and musculoskeletal diseases (10%), the leading areas of study in HICs and overall (**Table 3**).

The distribution of articles across health areas corresponds substantially but by no means perfectly with the global disease burden. The degree of correlation varies by income level, but also depends on whether rankings or proportions are compared. By either metric, the health areas studied in HICs correlate surprisingly well with disease burden and substantially better than economic evaluations in LICs, lower-MICs, and upper-MICs, which feature more numerous and extreme outliers (**Figure 1**). As L&MICs account for 89% of the burden of disease and ill health, burden of disease correlates substantially less well with the health areas studied in economic evaluations globally than in HICs.

Some health areas accounted for a substantially higher proportion of economic evaluations conducted than burden of disease. HIV/AIDS is studied in a greater proportion of economic evaluations at every income level than its share of the disease burden, however, the gap is much smaller in HICs than in LICs and lower-MICs, where it is an extreme outlier. Other such "winners" across all income levels include "other infectious diseases"; genitourinary diseases, contraception, and fertility; and, STDs (other than HIV).

There are also some "losers": disease areas which are the subject of a lesser share of economic evaluations than disease burden. Interventions to address wounds and injuries and, to a somewhat lesser extent, neurological conditions, appear to be substantially under-researched at every income level.

4.4. Journals and languages

Economic evaluations were published in a total of 967 different journals, which averaged 1.3 economic evaluations each per year (**Appendix 11**). 559 journals published only one economic evaluation each in the entire 28-month period we analysed and 165 journals published only two. Just as the number of economic evaluations decreases down the income levels, so too does the number of journals in which they are published, from 802 journals publishing HIC articles to just 44 publishing LIC articles. The proportion of articles published in the top 20 journals for each income group increases steeply down the income groups: 29% of articles studying HICs are published in the top 20 journals publishing HIC evaluations, while 77% of articles studying LICs are published in the top 20 journals publishing LIC evaluations.

Overall, 74% of articles were published in biomedical rather than health economics, systems, and policy journals (22%) or other journal types (5%) (**Figure 2**). In HICs, however, 6 of the top 10 journals were health economics, systems, or policy journals, compared with only 3 of the top 10 journals publishing articles about LIC & lower-MICs (**Table 4**). The top outlet for economic evaluations across all income levels was *PLoS ONE*, an open-access journal publishing "primary research from any scientific discipline", which ranked first both for LIC & lower-MICs and for upper-MICs and third for HICs. *Vaccine*, which ranked fourth overall (n=66), ranked fifth for HICs (n=44) and second for both LIC & lower-MICs (n=13) and for upper-MICs (n=17). Yet overall, journals tended towards segregation by income group; 6 of the top 10 journals publishing economic evaluations about HICs did not publish a single LIC & lower-MIC study and two of the remaining published only one each.

All articles addressing LICs and lower-MICs were published in English, while 4% of HIC articles (n=89) were published in other languages, as was a striking 22% (n=87) of all articles addressing upper-MICs. In upper-MICs, Chinese was the leading non-English language (n=48, 12%), followed by Spanish, (23, 6%), and Portuguese (n=13, 3%), Turkish (n=2, 1%), and Farsi (n=1, 0%), while in HICs, Spanish was the language of full-text for 46 articles (2%), followed by German (n=13, 1%), and ten other languages.

4.5. Types of economic evaluation

Although the term is widely (mis)used in the literature, genuine cost-benefit analyses are very rare; we excluded many articles from our database which described themselves as CBAs of health interventions but did not value health or welfare outcomes. Of the 147 (5%) articles in our database which described themselves as CBAs, some do not in fact place a monetary value on health outcomes and should probably be described as CEAs or CUAs, however, for consistency and feasibility, our analysis of evaluation type is based on key term searches, and therefore reflect the authors' classification (**Appendix 7**). Cost-utility analyses accounted for at least half of economic evaluations across all income levels, ranging from 50% (n=52) in LICs to 62% (n=1448) in HICs. The proportion of CUAs employing DALYs decreases from 87% (n=45) in LICs to 2% (n=35) in HICs, while the proportion employing QALYs increases from 13% (n=7) in LICs to 35% (n=23) in lower-MICs, 68% (n=123) in upper-MICs, and 96% (n=1385) in HICs. A very small proportion of studies described themselves as CUAs but did not contain any search terms for DALYs or QALYs. (**Figure 3, Appendix 12**)

4.6. Authors' geographic and institutional affiliations

Author affiliation data were obtained for all articles. At least one author was affiliated with an institution in the United States or the United Kingdom on 1,145 (40%) and 619 (22%) of articles, respectively (**Table 5**). The Netherlands came in third place, as the country affiliation of at least one author of 9% of articles (n=267). With 116 articles, China-based authors contributed to 4% of all articles, making it the ninth largest contributor to economic evaluations, while Brazil (51, 2%) and South Africa (49, 2%) also ranked within the top 20 country affiliations of authors. With 22 articles (1%), India was the highest ranked lower-MIC and ranked 29th overall, just ahead of Hong Kong and Singapore, while Uganda was the largest contributor to economic evaluations amongst LICs with 20 articles (1%) and ranked 32nd overall just ahead of New Zealand. In general, the lists of leading country affiliations of authors within each income group strongly resemble the leading countries studied, however, the disparity between the top few countries and others are even more extreme; for example, while 813 articles studied the United States and 49 studied Uganda, United States-based authors contributed to 1,145 articles, whereas Uganda-based authors only contributed to 20. There were 30 articles set in Uganda which did not include any Uganda-based authors; of these, 25 were studies set in at least 15 countries each, but 5 articles focused on 3 or fewer countries.

On 91% of articles, at least one author was based in a high-income country. (**Table 6**) All but 5 of the 2350 articles studying HICs included at least one author based in a HIC and most articles studying upper-MICs included at least one upper-MIC-based author (n=338, 86%). By contrast, only 53% and 54% of articles studying LICs and lower-MICs, respectively, included any author based in an institution in the respective income group. Authors based in upper-MICs contributed to a relatively small proportion of articles analyzing LICs (n=16, 15%) or lower-MICs (n=15, 12%), and in nearly half of these articles, upper-MICs were also studied. Authors based in HIC institutions contributed to 94% (n=98) of articles analyzing LICs and 82% (n=99) analyzing lower-MICs, compared with fewer than half of evaluations in upper-MICs (n=175, 45%). Of the 65 articles studying LIC & lower-MIC which did not include an author from those income levels, 44 articles included at least one author based in the United States (68%). At least one author listed a major pharmaceutical company amongst the institutional affiliations on 9% of articles (n=246) overall, varying from 9% (n=221) of articles studying HICs, to 12% (n=46) studying an upper-MIC, 7% (n=8) studying a lower-MIC and 4% (n=4) studying a LIC. The leading institutions in LICs, lower-MICs,

and HICs contributing to economic evaluations were Anglophone, with the exceptions only of the Netherlands (where English is widely spoken) and Vietnam; this is in contrast to the leading upper-MICs, including China, Brazil, Thailand, Colombia, and Mexico, with South Africa as the only country in which English is an official language.

Harvard University, including its affiliated hospitals, was by some distance the institution contributing to the largest number of economic evaluations (n=152). The top institutions producing economic evaluations in LIC & lower-MICs are notable for their low individual and collective output, as well as for including many ministries of health or (semi-)autonomous research institutes (**Table 7**). The leading LIC or lower-MIC institution, Makerere University, was listed amongst the author affiliations of 14 economic evaluations over the 2.3 years we studied. The World Health Organization was listed amongst the author affiliations on 25 articles, while the World Bank and United Nations' Children's Fund contributed to only 4 economic evaluations each.

5. Discussion

Our analysis provides an evidence base from which to discuss the current state of the economic evaluation field and has generated many questions which warrant further investigation. Some of these issues are examined in other papers. For example, Griffiths and colleagues compare the methods used in economic evaluations in countries of differing income groups in a representative sample of articles from the database we created (2015) and Harker and Guinness examine the growing use of QALYs in L&MICs (Harker and Guinness, 2015). Other articles examine issues around capacity to produce and to use economic evaluations in Central and Eastern Europe (Kalo et al., 2015) and in a number of countries in Asia and Latin America (Tantivess et al., 2015). Our analysis also offers insights to strengthen the process of prioritising, conducting, publishing, and developing capacity for economic evaluation research. Here, we discuss the state of the field and the implications of our findings for research priority setting and capacity development.

5.1. The state of health economic evaluation

We identified a large volume of economic evaluations – 2,844 over 28 months – including 1,273 in 2013 alone. The principal economics database, EconLit, contains 5,483 publications with "Health" JEL codes for 2012 and 2013, but captured just 1% of economic evaluations published in those years. A large majority of economic evaluations were published in biomedical journals and even many of the journals we categorized as "health economics, services, and policy" are not indexed in EconLit. Adding the 2,413 economic evaluations we identified for 2012 and 2013 to the EconLit "health" records would increase the volume of "health economics" research by 44%. Further, these publications still do not include the many other health economic analyses of, for example, equity, demand, markets, and incentives, which are published in journals outside the economics literature as defined by the EconLit database.

Despite important analytical differences and the lack of overlap between the body of literature addressed in our analysis and Wagstaff and Culyer's analysis of health economics within the EconLit database, our findings share some commonalities. Both our analyses identified Harvard as the leading institution and the United States as by far the most prolific contributor to health economic (evaluation) research, followed by the United Kingdom, and then the Netherlands, Canada, and Australia. China and South

Africa also rank highly in both our analyses. Nonetheless, our findings also differ in important ways. As expected, our lists of leading journals share very little in common, as economic evaluations are predominantly published in biomedical journals, which are not indexed in EconLit. Some contributors, such as the World Bank and Taiwan, which ranked very highly in Wagstaff and Culyer's analysis, contribute far less to economic evaluations, while institutions with a stronger focus on health (rather than only economics) tend to rank more highly in our analysis. There are also substantial differences with respect to our estimates of the volume of research. Whereas Wagstaff and Culyer find that "economic evaluation . . .[shows] no clear trend", our analysis has highlighted the substantial size of the applied health economic evaluation literature relative to the "health economics" literature within EconLit, and indicates that with just 1% of the applied economic evaluation literature, the EconLit database is unlikely to provide a representative indication of trends over time in the size or relative importance of health economic evaluation.

As previously highlighted (Wagstaff and Culyer, 2012), identifying health economic literature in the biomedical databases was not straightforward. We found the use of economic vocabulary and article classifications in biomedical journals and databases to be so poor and inconsistent as to render simultaneously sensitive and specific searching impossible (**Appendix 3**). The NHS EED database, while incomplete, was by far the most sensitive and specific source of economic evaluations, which makes the decision to cease to update it from March 2015 particularly lamentable. The ongoing work to add DALY-based cost-utility analyses to the existing QALY-based Tufts Economic Evaluation Registry is a welcome development, however, it will still omit half of economic evaluations conducted in L&MICs and currently charges for access.

Our findings paint a picture of a research community that is simultaneously highly concentrated in a few countries and institutions and highly fragmented. A very small number of journals publish economic evaluations from both high- and low-income settings and a large proportion of articles appear in journals which only very rarely publish economic evaluations. The fact that so many biomedical journals now publish economic evaluations (if only rarely) is a positive sign of the acceptance and integration of economic evaluation within health research. It is also perhaps unsurprising, as economic evaluations are usually oriented towards health sector decision makers. This fragmentation may, however, also explain some of the problems of quality highlighted elsewhere (Griffiths et al., 2015), as biomedical journal editors may not only lack specialist knowledge of economic evaluation methods, but also lack familiarity with pools of suitably qualified reviewers. In this way, the small number of journals publishing economic evaluations about L&MICs may present an opportunity to engage with the editors of these journals to help improve standards where necessary, whereas the vast array of authors, institutions, and journals associated with economic evaluations set in HICs presents a somewhat different challenge. In any case, the lack of scholarly dialogue between those focusing on countries of differing income levels seems likely to be detrimental to all.

We hope that recognition of the size, importance, and fundamental interdisciplinarity of health economic evaluation will lead to an evolution in research culture within the field, and also, on a practical level, to improvements in existing databases or creation of a new one that will better reflect and serve the needs of health economics researchers. Of course, authors themselves, reviewers, and editors could already do far more to facilitate the efficient identification of health economic evaluations. For example, an initial step could include ensuring that all articles include the study design in their title, as is already required by

Plos Medicine, and that those that are not economic evaluations avoid economic terminology, such as "cost-effective" in their titles, abstracts, and keywords.

5.2. Research priority setting

Our findings also raise a number of questions about the health and geographic areas that are and are not prioritized for health economic evaluation. Burden of disease is not and should not be the sole determinant of the volume of economic evaluation research. It seems difficult to argue, however, that the differences between the number of economic evaluations conducted across low-, middle-, and high-income countries is equitable or efficient. High-income countries account for 15.8% of the world's population, 10.9% of the global burden of disease (World Health Organization., 2014), and 82.6% of all economic evaluations conducted, while low-income countries account for 11.7% of the world's population, 19.3% of the global burden of disease, and 3.7% of economic evaluations. There are 139 different L&MICs (World Bank, 2015), which have very diverse epidemiological and economic characteristics, and also, in many cases, weak(er) health systems with substantial and diverse constraints on the supply and demand for health care; this diversity likely contributes to greater heterogeneity in the cost-effectiveness of interventions and necessitates more, not less, research.(Vassall et al., 2015) Further, the opportunity cost of incorrect priority setting decisions may be substantially higher in low-income settings than in high-income settings.

One of our most surprising findings is how well the health areas studied in HICs correlate with the burden of disease in those settings. In L&MICs, however, the picture is much more mixed, with many more economic evaluations conducted about health areas accounting for lower proportions of the burden of disease. There are several reasons why such discrepancies may not be inequitable or inefficient. First, the GBD estimates themselves are highly contested (Nord, 2013, Byass et al., 2013); intended to reflect only a very narrow definition of health consequences, the newest disability weights used in the GBD estimates exclude wider individual or social welfare consequences (Salomon et al., 2012). In the case of HIV/AIDS, for example, the many and varied stakeholders could therefore conclude that it is right that HIV should be studied more than health areas accounting for a larger burden of disease because of its wider social and economic consequences, or because its health consequences are only lower than other diseases because of ongoing and expensive control efforts. Second, some health areas may have a low value of additional information relative to the costs of generating the information, especially if extensive research has already been conducted in that area. Third, so little may be understood about some health problems at a clinical level that economic evaluation of interventions may be premature. Fourth, economic evaluations may be conducted not to consider adding another more effective and more costly intervention, but rather to consider divestment from costly interventions, and therefore economic evaluations in health areas that contribute very little to the disease burden may be warranted. Finally, as economic evaluations are conceptualized around a (package of) interventions, which may not map neatly onto specific conditions, categorization of economic evaluations by health areas also has some conceptual limitations which could weaken their correlation with disease burden; we found this to be particularly true for surgical procedures, pain management and palliative care, and health systems and intersectoral interventions.

On the other hand, the four health areas accounting for the largest burden of disease in LICs are: 1) Neonatal and maternal conditions, 2) Respiratory diseases, 3) Wounds and injuries, and 4) Diarrhoeal diseases. While further biomedical advances, such as a point-of-care test for bacterial infections would

help (Zumla et al., 2014), the bulk of the impact of all four of these health areas needs to be addressed through health systems, multi-sectoral, and/or social interventions such as prompt access to high-quality health facilities (Kerber et al., 2007), road safety measures (World Health Organization., 2013), and improved water and sanitation (Bartram et al., 2005). Such solutions offer little potential for pharmaceutical company profits and instead require complex interventions. Recent systematic reviews of economic evaluations of cardiovascular disease interventions in L&MICs similarly found that evaluations of pharmacological interventions dominated and a greater focus on evaluation of non-clinical strategies was needed.(Shroufi et al., 2013, Suhrcke et al., 2012) Financing such evaluations is unlikely to appeal to private for-profit companies, and so domestic and international research funders, as well as researchers themselves, should concentrate on producing research in these areas, and thereby correct this market failure.

5.3. Capacity development

Several of our findings have important implications for thinking about how to increase capacity to produce and to use high-quality and policy-relevant health economic evaluations. Large upper-MICs, especially China but also South Africa, Brazil, and Iran, produce substantial numbers of economic evaluations and far more than many smaller HICs. This is in some ways unsurprising, as the costs of research are independent of the size of a country's population or economy and so the relative costs of research are lower in large economies. Capacity development is important for all countries, but particularly challenging for L&MICs and for small HICs as well (Kalo et al., 2015). A large gap between the numbers of economic evaluations conducted and what is needed for priority setting persists in all but a few countries (Geroy, 2012, Odame, 2013, Mori and Robberstad, 2012).

Our analysis has identified some clear institutional leaders in low- and middle-income countries, but also highlighted that many countries produce few, if any, economic evaluations. We propose the development of strong regional or sub-regional networks which bring together existing capacity in health economic evaluation and build on centres of strength in health intervention research, even where substantial economic evaluation capacity may not yet exist. A multi-stakeholder report on how to strengthen health economics more generally in Africa highlighted the importance of international networks as well as local institutional support (McIntyre et al., 2008). In addition to training and ongoing technical support, a well-funded regional network could also offer scope for deeper collaboration in producing multi-country evaluations and assessing transferability of findings across the region. Such a regional approach could be more efficient in generating economic evidence and assessing its relevance to a wider range of settings more systematically.

The leading contributors to economic evaluations from low- and lower-middle-income countries tend to be research institutions, often within or associated with Ministries of Health, rather than universities. Such embeddedness should be an advantage in ensuring that research both reflects and informs a country's health priorities. It also means, however, that there may be no pre-existing link between those who conduct health economic evaluation research and those who teach and train undergraduate and postgraduate students in these countries. This marked difference from high- and even upper-MICs may require new approaches to capacity development, rather than replication of strategies that have achieved successes in upper-MICs and HICs.

At the same time, further work is needed to generate demand for economic evaluation through the institutionalization of priority setting at the national level (Odame, 2013, Mori and Robberstad, 2012,

Wiseman et al., 2015), as well as continuing to strengthen the role of economic evaluation in international policy making at the World Health Organization, whose policy recommendations play a particularly large role in low- and lower-middle-income countries (World Health Organization., 2012).

Finally, nearly half of economic evaluations studying LICs and lower-MICs do not include any authors from L&MIC institutions. Some of these were desk-based modelling studies, however, many involved data collection in L&MICs. Some may have included authors from L&MICs affiliated with a HIC institution, for example, as doctoral students, however, such cases cannot explain the full magnitude of the discrepancy. It is unclear whether this discrepancy reflects a lack of opportunities for participation from fellow researchers or funders, lack of skills or incentives, or some combination of these and other factors, but the results are clearly inequitable.(Chu et al., 2014) The situation also suggests a failure to recognize the wider potential of research capacity development to improve health in L&MICs and the more immediate impact that real partnership with L&MIC researchers and policy makers can have in ensuring that the research is policy-relevant and informs policy decisions. Both funders and researchers in all countries must examine and address these inequities.

We hope that the findings of this analysis will be useful for those conducting (systematic) reviews of the economic evaluation literature and that they will encourage and provide an empirical grounding for debate on the current state and future directions for this growing field.

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7. Tables & figures

Table 1 Number of economic evaluations by income group and region of study

	Income group(s) of countries studied						
Region(s) studied	Low	Lower-middle	Upper-middle	High	Multiple*	Total	% of total
East Asia & Pacific	22	43	165	229	25	405	14%
Europe & Central Asia	11	16	44	1210	20	1243	44%
Latin America & Caribbean	13	18	116	16	19	129	5%
Middle East & North Africa	14	20	43	27	20	62	2%
North America	1	1	1	960	1	960	34%
South Asia	27	49	20	15	25	56	2%
Sub-Saharan Africa	92	64	78	22	46	158	6%
Multiple*	27	35	31	85	38	102	4%
Total	104	121	391	2350	63	2844	100%
% of total	4%	4%	14%	83%	2%	100%	

*Articles studying at least two countries of differing income levels or regions are categorized as “Multiple”.

Table 2 Top 20 countries most frequently studied in economic evaluations by income group

	High income			Upper-middle-income			Low and lower-middle-income		
Rank	**Country**	**N**	**%**	**Country**	**N**		**Country**	**N**	
1	United States	813	35%	China	116	30%	Uganda	49	27%
2	United Kingdom	478	20%	South Africa	71	18%	India*	41	22%
3	Netherlands	183	8%	Brazil	56	14%	Kenya*	41	22%
4	Canada	162	7%	Thailand	36	9%	Zambia	39	21%
5	Spain	136	6%	Iran	31	8%	Malawi	35	19%
6	Germany	109	5%	Colombia*	28	7%	Nigeria*	34	18%
7	Australia	100	4%	Mexico*	28	7%	Tanzania*	34	18%
8	Italy	98	4%	Turkey	24	6%	Zimbabwe	33	18%
9	Sweden	74	3%	Botswana*	23	6%	Congo, Dem. Rep.	30	16%
10	France	57	2%	Namibia*	23	6%	Ethiopia	29	16%
11	Japan	45	2%	Angola	18	5%	Lesotho*	28	15%
12	Belgium	42	2%	Gabon	17	4%	Mozambique*	28	15%
13	Denmark	33	2%	Mauritius*	14	4%	Rwanda*	28	15%
14	Korea, Rep.*	31	1%	Peru*	14	4%	Vietnam*	28	15%
15	Norway*	31	1%	Seychelles*	14	4%	Ghana	27	15%
16	Greece	29	1%	Bulgaria	13	3%	Central African Republic	26	14%
17	Ireland	27	1%	Argentina*	12	3%	Burundi*	25	14%
18	Switzerland*	24	1%	Hungary*	12	3%	Cameroon*	25	14%
19	Finland*	24	1%	Maldives	11	3%	Eritrea*	25	14%
20	Taiwan	23	1%	Serbia	10	3%	Burkina Faso	24	13%
High-income countries		2350	100%	**Upper-middle-income countries**	391	100%	**Low- and lower-middle-income countries**	184	100%

*Equal ranking with country above and/or below.

Table 3 Number of economic evaluations by health area and income group

A single economic evaluation may address more than one health area in countries of more than one income group. The totals exclude the 15 articles (0.5%) in our data set which could not be classified by health area.

	Income group studied				
Health area	**Low**	**Lower-middle**	**Upper-middle**	**High**	**World**
Cancer and other neoplasms	7	8	73	416	492
Cardiovascular diseases	3	7	44	448	490
Mental health, cognition, and developmental and behavioural disorders (including self-harm and substance disorders)	1	10	21	243	268
Musculoskeletal diseases (including back pain)	2	3	18	240	262
Respiratory diseases	6	8	39	188	228
Genitourinary diseases, contraception & fertility	4	4	18	180	203
Other infectious diseases (including encephalitis, hepatitis, other parasitic and vector-borne diseases, and nematode infections)	6	10	38	111	159
Digestive disorders	3	3	21	127	152
Neonatal and maternal conditions	17	7	23	102	142
HIV/AIDS	31	27	46	61	136
Diabetes	1	3	22	102	125
Malnutrition (including obesity and exercise)	6	4	9	98	113
Wounds and injuries (including violence)	4	7	13	91	109
Endocrine, blood, and immune disorders (not diabetes or HIV)	0	1	12	86	99
Neurological conditions	1	3	16	81	98
Skin and oral conditions	0	3	5	67	75
Sense organ diseases	2	3	11	56	68
Tuberculosis	8	9	28	34	62
Sexually transmitted diseases (not HIV)	2	1	10	39	49
Diarrhoeal diseases	6	7	9	29	46
Communicable childhood diseases	2	5	9	24	40
Malaria	16	13	8	1	24
Congenital anomalies	0	1	2	20	23
Anaemia	0	1	1	9	11
Meningitis	2	2	3	3	9
TOTAL	104	120	390	2,337	2,829

Table 4 Journals publishing the greatest number of economic evaluations by income group of countries studied

	Low and lower-middle			Upper-middle			High income			All		
Rank	Journal	Type	N	Journal	Type	N	Journal	Type	N	Journal	Type	N
1	PLoS One	Other	30	PLoS One	Other	31	Journal of Medical Economics	HEPS	100	PLoS One	Other	121
2	Vaccine	BM	13	Vaccine	Other	17	Health Technology Assessment	HEPS	82	Journal of Medical Economics	HEPS	101
3	Malaria Journal	BM	9	Value in Health Regional Issues	BM	11	PLoS One	Other	70	Health Technology Assessment	HEPS	82
4	Journal of Acquired Immune Deficiency Syndromes	BM	8	Value in Health	HEPS	8	Value in Health	HEPS	54	Vaccine	BM	66
5	Health Policy and Planning	HEPS	8	BMJ	HEPS	7	Vaccine	BM	44	Value in Health	HEPS	63
6	BMJ	BM	6	AIDS	BM	7	ClinicoEconomics and Outcomes Research	HEPS	36	ClinicoEconomics and Outcomes Research	HEPS	37
7	Value in Health Regional Issues	HEPS	6	Cadernos de Saude Publica	BM	7	European Journal of Health Economics	HEPS	35	European Journal of Health Economics	HEPS	36
8	Cost Effectiveness and Resource Allocation	HEPS	5	BMC Public Health	BM	6	PharmacoEconomics	HEPS	33	PharmacoEconomics	HEPS	34
9	PLOS MEDICINE	BM	5	BMC Health Services Research	BM	6	Clinical Therapeutics	BM	28	Clinical Therapeutics	BM	32
10	AIDS	BM	4	PLoS Medicine	HEPS	5	BMJ Open	BM	26	Value in Health Regional Issues	HEPS	28
11	PloS Neglected Tropical Diseases	BM	4	International Journal of Tuberculosis and Lung Disease	BM	5	Applied Health Economics and Health Policy	HEPS	26	BMJ Open	BM	26
12	BMC Public Health	BM	3	Journal of the Medical Association of Thailand	BM	5	International Journal of Technology Assessment in Health Care	HEPS	22	Applied Health Economics and Health Policy	HEPS	26
13	International Journal of Tuberculosis and Lung Disease	BM	3	Malaria Journal	BM	4	Cancer	BM	21	International Journal of Technology Assessment in Health Care	HEPS	25
14	World journal of surgery	BM	3	Journal of Acquired Immune Deficiency Syndromes	BM	4	BMJ	BM	19	BMC Health Services Research	HEPS	23
15	Bulletin of the World Health Organization	HEPS	3	Cost Effectiveness and Resource Allocation	BM	4	BMC Health Services Research	HEPS	17	Cancer	BM	21
16	Tropical Medicine and International Health	BM	3	Clinical Therapeutics	HEPS	4	American Journal of Managed Care	BM	16	BMJ	BM	20
17	Clinical Infectious Diseases	BM	2	BMC infectious diseases	BM	4	Osteoporosis International	BM	14	BMC Public Health	BM	20
18	Lancet	BM	2	Revista Panamericana de Salud Publica	BM	4	Gynecologic Oncology	BM	14	Cost Effectiveness and Resource Allocation	HEPS	20
19	Biosystems	BM	2	Modern Preventive Medicine	BM	4	BMC Public Health	BM	13	American Journal of Managed Care	BM	16
20	Journal of Pediatrics	BM	2	Biomedica	BM	4	Cost Effectiveness and Resource Allocation	HEPS	13	AIDS	BM	16
	Lancet Global Health	BM	2	Chinese Journal of New Drugs	BM	4	BJU International	BM	13			
	Proceedings of the National Academy of Sciences of the USA	BM	2	Zhonghua liu xing bing xue za zhi	BM	4	Heart	BM	13			
	Journal of the Pakistan Medical Association	BM	2									
	Disasters	Other	2									

BM: Biomedical; HEPS: Health economics, policy, and services; OTH: Other.

Table 5 Most frequent countries of institutional affiliation of authors

The table ranks countries of institutional affiliations of authors by the number of economic evaluations including at least one author affiliated with that country. All countries affiliated with at least one author of at least one economic evaluation are listed. *Equal ranking with country above and/or below.

	High-income		Upper-middle-income		Low- and lower-middle-income	
Rank	Country	N	Country	N	Country	N
1	United States	1145	China	116	India	22
2	United Kingdom	619	Brazil	51	Uganda	20
3	Netherlands	267	South Africa	49	Kenya	13
4	Canada	238	Thailand	37	Vietnam	11
5	Australia	191	Colombia	32	Ghana*	9
6	Germany	151	Mexico	26	Zambia*	9
7	Spain	147	Iran	25	Nigeria	8
8	Switzerland	104	Turkey	18	Indonesia*	5
9	France	103	Argentina	14	Burkina Faso*	5
10	Italy	99	Malaysia	12	Bangladesh*	4
11	Sweden	98	Peru	9	Pakistan*	4
12	Belgium	78	Bulgaria*	7	Tanzania*	4
13	Japan	53	Serbia*	7	Philippines*	4
14	Denmark	45	Hungary	5	Egypt*	4
15	Ireland	39	Venezuela	3	Ethiopia*	2
16	Norway	32	Romania*	2	Malawi*	2
17	Taiwan	28	Lebanon*	2	Congo, Dem. Rep.*	2
18	Finland	27	Costa Rica*	2	Benin*	2
19	Korea, Rep.*	25	Jordan*	2	Myanmar*	2
20	Austria*	25	Tunisia*	2	Zimbabwe*	2
21	Greece	23	Iraq*	1	Cameroon*	2
22	Hong Kong	21	Botswana*	1	Senegal*	2
23	Singapore	21	Cuba*	1	Sri Lanka*	1
24	New Zealand*	19	Kazakhstan*	1	Cambodia*	1
25	Poland*	19	Panama*	1	Niger*	1
26	Portugal	15	Jamaica*	1	Afghanistan*	1
27	Israel	12	Dominican Republic*	1	Nepal*	1
28	Russia	9			Rwanda*	1
29	Chile	8			Sierra Leone*	1
30	Czech Republic	7			Somalia*	1
31	Slovenia*	5			Syria*	1
32	Qatar*	5			Bolivia*	1
33	Croatia*	2			Guyana*	1
34	Saudi Arabia*	2			Uzbekistan*	1
35	Estonia*	2			West Bank and Gaza*	1
36	Iceland*, Liechtenstein*, Lithuania*, Macao*, Malta*, Puerto Rico*, Trinidad and Tobago*	1				

Table 6 Income group studied vs. Income group of author affiliations

Row percentages are presented and reflect the proportion of articles addressing a given income level which include authors affiliated with institutions based in a country of the given income level. As all institutional affiliations of all authors of a given article are analyzed, and a single article may examine countries in more than one income group, column totals and row totals may be less than the sum of the given column or row.

	Income group of authors' country affiliation(s)									
Income group of countries studied	Low		Lower-middle		Upper-middle		High		Total	
Low	55	(53%)	7	(7%)	16	(15%)	98	(94%)	104	(100%)
Lower-middle	8	(7%)	65	(54%)	15	(12%)	99	(82%)	121	(100%)
Upper-middle	11	(3%)	11	(3%)	338	(86%)	175	(45%)	391	(100%)
High	4	(0%)	12	(1%)	51	(2%)	2345	(100%)	2350	(100%)
Total	59	(2%)	80	(3%)	394	(14%)	2601	(91%)	2844	(100%)

Table 7 Most frequent institutional affiliation of authors

The table ranks institutional affiliations of authors by the number of economic evaluations including at least one author affiliated with that institution. The top ten institutions located in each income level are listed. To the extent possible, institutions' totals include their affiliated hospitals, centres, and groups even if the parent institution was not specifically cited in the affiliation data. *Equal ranking with country above and/or below.

Income group of authors' institutions									
	High			Upper-middle			Low and lower-middle		
Rank	**Institution**	**Country**	**N**	**Institution**	**Country**	**N**	**Institution**	**Country**	**N**
1	Harvard University	United States	152	University of Cape Town	South Africa	19	Makerere University	Uganda	14
2	Johns Hopkins University	United States	74	Tehran University of Medical Sciences	Iran	17	Kenya Medical Research Institute	Kenya	9
3	London School of Hygiene & Tropical Medicine	United Kingdom	70	Shanghai Jiao Tong University*	China	15	Ministry of Health	Vietnam	6
4	University of Toronto	Canada	65	Universidade de Sao Paulo*	Brazil	15	All India Institute of Medical Sciences*	India	5
5	University of Amsterdam	Netherlands	62	University of the Witwatersrand*	South Africa	15	Hanoi Medical University*	Vietnam	5
6	University College London	United Kingdom	61	Chinese Center for Disease Control and Prevention*	China	11	Ghana Health Service*	Ghana	4
7	University of York	United Kingdom	57	Mahidol University*	Thailand	11	Ministry of Health*	Zambia	4
8	Pfizer, inc.	Multinational private company	51	Instituto Mexicano del Seguro Social*	Mexico	10	University of Nigeria*	Nigeria	4
9	Centers for Disease Control and Prevention*	United States	46	Universidad Nacional de Colombia*	Colombia	10	Centre Muraz*	Burkina Faso	3
10	Duke University*	United States	46	Health Intervention and Technology Assessment Program	Thailand	8	Family Health* International	Vietnam	3
							INDEPTH Network*	Ghana	3
							Kenya Government Medical Research Center*	Kenya	3
							Mbarara University of Science and Technology*	Uganda	3
							Ministry of Health*	Kenya	3
							Universitas Padjadjaran*	Indonesia	3
							University of Ghana*	Ghana	3
							YR Gaitonde Centre for AIDS Research and Education*	India	3

Figure 1 Economic evaluations vs. burden of disease by income group

Results are presented in two ways: the lefthand column compares the ranking of the 25 health areas by the volume of economic evaluations and by burden of disease, while the righthand column compares the proportion of the total number of economic evaluations examining each health area with the proportion of the total burden of disease accounted for by each health area. MNH: Maternal and newborn health, STDs: Sexually transmitted diseases (excluding HIV), CVD: Cardiovascular disease, TB: Tuberculosis, Child: Communicable childhood illnesses.

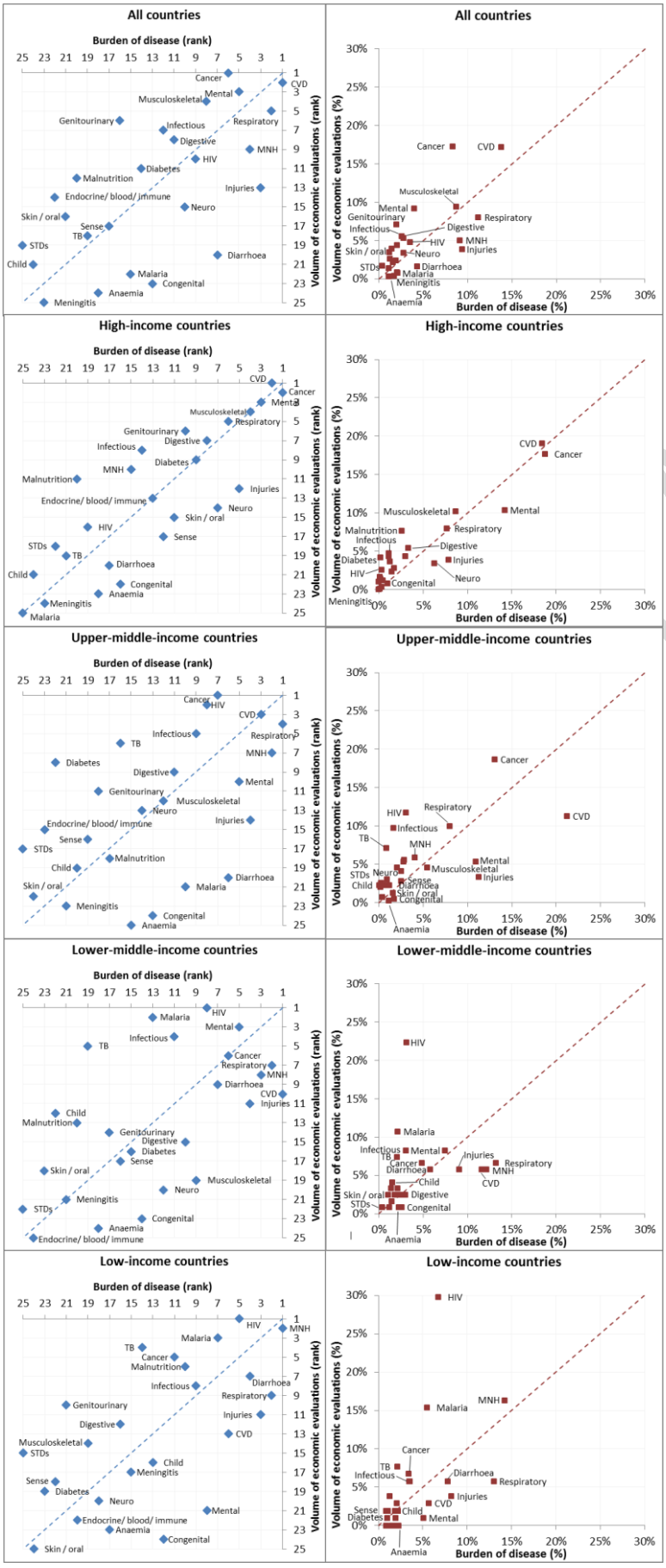


Figure 2 Proportion of economic evaluations by journal type and income group

The classification of journals by type is provided in **Appendix 6**. Articles are disaggregated by the income group(s) of the country or countries studied.

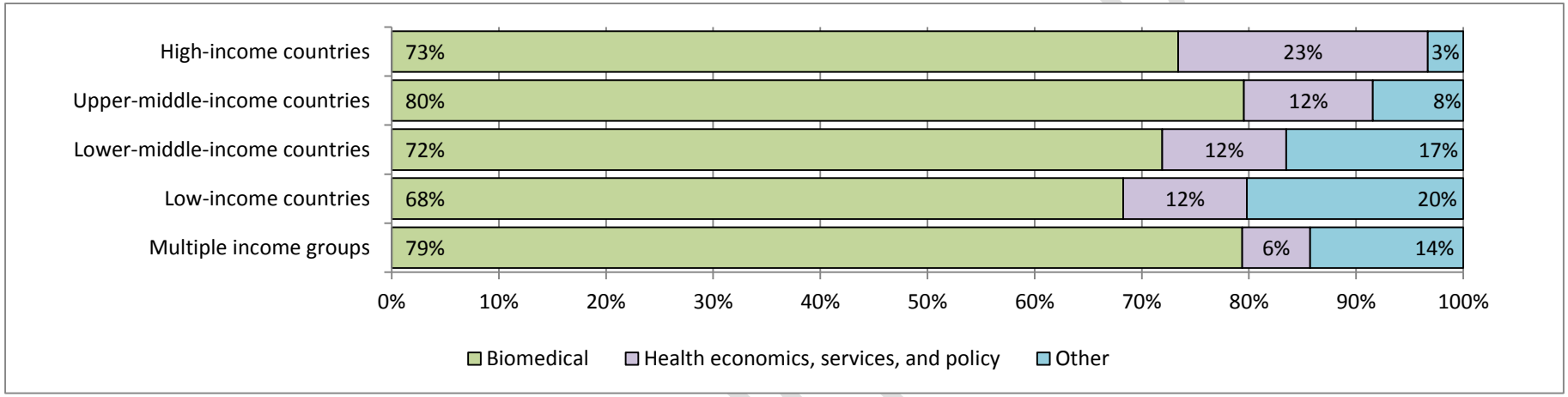
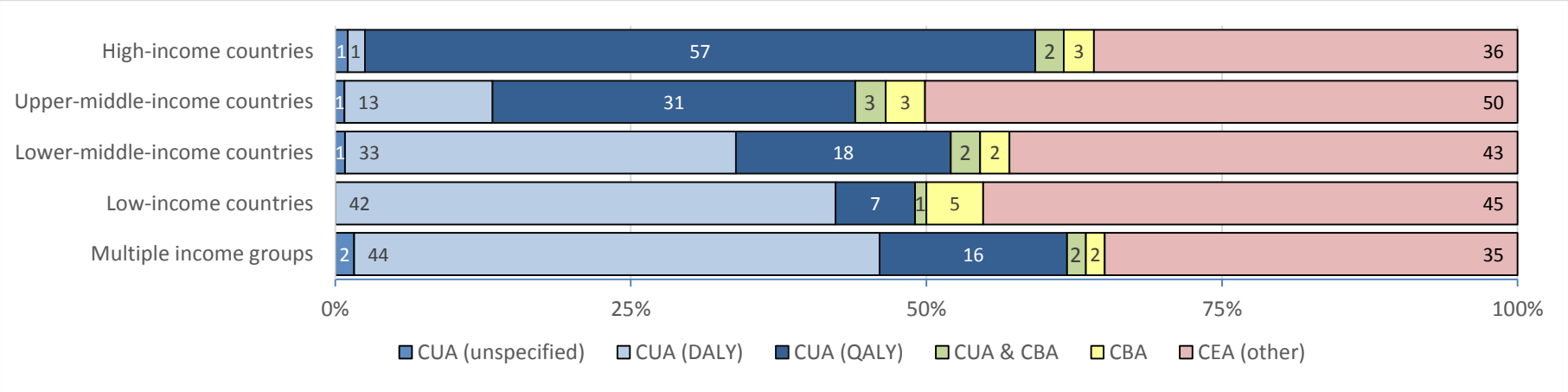


Figure 3 Proportion of economic evaluations by analytical type and income group studied

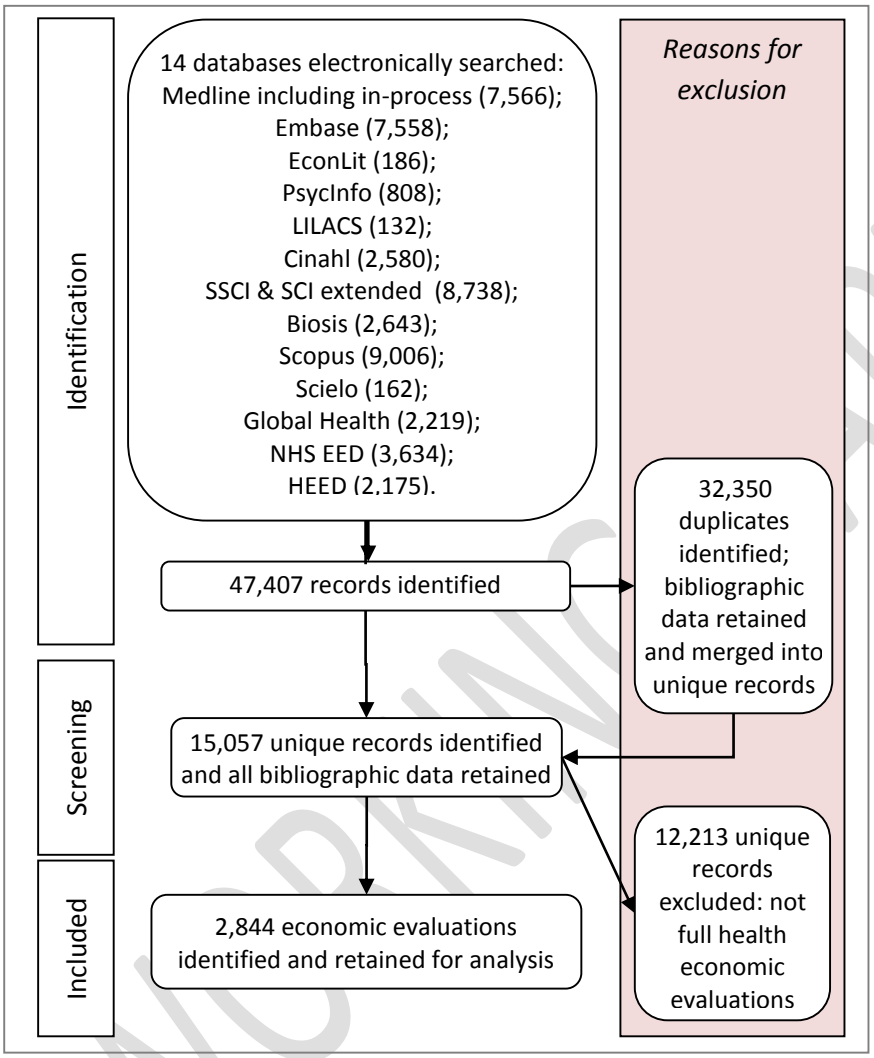
In this figure, "cost-effectiveness analyses" refers to articles meeting our definition of a full economic evaluation but not containing any keywords to define it more specifically as a cost-utility or cost-benefit analysis. Articles can be classified as both cost-utility and cost-benefit analyses if they contain keywords for both. CBA: Cost-benefit analysis, CEA: Cost-effectiveness analysis, CUA: Cost-utility analysis, DALY: disability-adjusted life year, QALY: quality-adjusted life-year. Articles are disaggregated by the income group(s) of the country or countries studied.



8. Appendices: Supplementary information on methods and results

Appendix 1 Flow diagram of the data development process

The figure is adapted from the flow diagram recommended in the PRISMA statement on systematic reviews (Liberati et al., 2009). The "eligibility" stage recommended by PRISMA is not used here as articles were not reviewed for quality; decisions to include records were based primarily on the record's source, title, and abstract; the full text was only screened where the title was unclear and the abstract was not available in any of the downloaded data.



Appendix 2 Searches in bibliographic databases

Database (Interface)	Search
National Health Service Economic Evaluation Database (Centre for Reviews and Dissemination) ***Note: this database is still available, however, updating ceased in March 2015***	NHS EED: tick box (DARE: blank, HTA: blank) Publication year: 2012 to 2014 Export: "Full record" → produces a single RIS document with consecutively numbered records
Health Economic Evaluations `Database (Wiley) ***Note: this database ceased to be available from the end of 2014.***	**Search 1: Identifies studies already reviewed and categorized by HEED** Search type (from purple button on left): Compound Search Use pull-down menus to select: | Journal Date | >= 2012 | AND | |Type of Econ eval | 'EFFECTIVENESS' Or 'UTILITY' Or 'BENEFIT' | AND | | Type of Article | 'APPLIED' | **Search 2: Identifies additional studies not yet reviewed and categorized by HEED** Search type (from purple button on left): Expert Search 1. EE= 'EFFECTIVENESS' Or 'UTILITY' Or 'BENEFIT' AND TE= 'APPLIED' AND JD>= 2012 2. TI='Cost-effective*' OR 'Cost-Utility' OR 'Cost-benefit' OR 'Cost effective*' OR 'Cost Utility' OR 'Cost benefit' OR 'economic evaluation' AND (JD>= 2012) 3. AB='Cost-effectiveness' OR 'Cost-Utility' OR 'Cost-benefit' OR 'Cost effectiveness' OR 'Cost Utility' OR 'Cost benefit' OR 'economic evaluation' AND (JD>= 2012) 4. KW='Cost-effectiveness' OR 'Cost-Utility' OR 'Cost-benefit' OR 'Cost effectiveness' OR 'Cost Utility' OR 'Cost benefit' OR 'economic evaluation' AND (JD>= 2012) 5. AB='cost per death averted' or 'cost per death avoided' or 'cost per case averted' or 'cost per case avoided' or 'cost per infection' or 'cost per life' or 'cost per disability-adjusted' or 'cost per quality-adjusted' or 'cost per qaly' or 'cost per daly' 6. CS = LINE 1 OR LINE 2 OR LINE 3 OR LINE 5

LILACS (Bireme/WHO/ PAHO)	cost-effective or "cost effective" or cost-effectiveness or "cost effectiveness" or cost-utility or "cost utility" or cost-benefit or "cost benefit" or "economic evaluation" or "cost per death" or "cost per case" or "cost per infection" or "cost per life" or "cost per disability adjusted" or "cost per quality adjusted" or "cost per disability-adjusted" or "cost per quality-adjusted" or "cost per qaly" or "cost per daly" [Words] and 2012 or 2013 or 2014 [Country, year publication] and not study and protocol [Title words]
ADOLEC (Bireme/WHO/PAHO)	cost-effective or "cost effective" or cost-effectiveness or "cost effectiveness" or cost-utility or "cost utility" or cost-benefit or "cost benefit" or "economic evaluation" or "cost per death" or "cost per case" or "cost per infection" or "cost per life" or "cost per disability adjusted" or "cost per quality adjusted" or "cost per disability-adjusted" or "cost per quality-adjusted" or "cost per qaly" or "cost per daly" [Words] and 2012 or 2013 or 2014 [Country, year publication] and not study and protocol [Title words]
Medline (including in-process) (Ovid SP)	1. ("2012" or "2013" or "2014").yr. 2. (cost-effectiveness or cost-utility or cost-benefit or "economic evaluation").ti,ab,kw. 3. cost-effective.ti. 4. ("cost-per-death-av*" or "cost-per-case-av*" or "cost-per-infection" or "cost-per-life" or "cost-per-disability-adjusted-life-year" or "cost-per-quality-adjusted-life-year" or "cost-per-qaly" or "cost-per-daly").ti,ab,kw. 5. 2 or 3 or 4 6. 1 and 5 7. limit 6 to (autobiography or bibliography or biography or case reports or classical article or comment or congresses or consensus development conference or consensus development conference, nih or editorial or festschrift or guideline or historical article or in vitro or interactive tutorial or interview or lectures or letter or news or newspaper article or patient education handout or practice guideline or published erratum or technical report or twin study or video-audio media or webcasts) 8. 6 not 7 9. limit 8 to animals 10. limit 9 to human 11. 9 not 10 12. 8 not 11 13. study protocol.ti. 14. 12 not 13
Embase (Ovid SP)	1. ("2012" or "2013" or "2014").yr. 2. (cost-effectiveness or cost-utility or cost-benefit or "economic evaluation").ti,ab,kw. 3. cost-effective.ti. 4. ("cost-per-death-av*" or "cost-per-case-av*" or "cost-per-infection" or "cost-per-life" or "cost-per-disability-adjusted-life-year" or "cost-per-quality-adjusted-life-year" or "cost-per-qaly" or "cost-per-daly").ti,ab,kw.

	5. 2 or 3 or 4 6. 1 and 5 7. limit 6 to (book or book series or conference abstract or conference paper or conference proceeding or "conference review" or editorial or erratum or letter or note or report) 8. 6 not 7 9. limit 8 to (animals or animal studies) 10. limit 9 to humans 11. 9 not 10 12. 8 not 11 13. study protocol.ti. 14. 12 not 13
EconLit (Ovid SP)	1. ("2012" or "2013" or "2014").yr. 2. health.af. 3. (cost-effective* or cost-utility or cost-benefit or "economic evaluation").af. 4. ("cost-per-death-av*" or "cost-per-case-av*" or "cost-per-infection" or "cost-per-life" or "cost-per-disability-adjusted-life-year" or "cost-per-quality-adjusted-life-year" or "cost-per-qaly" or "cost-per-daly").af. 5. 3 or 4 6. 1 and 2 and 5 7. study protocol.ti. 8. limit 6 to (books or book reviews or collective volume articles or dissertations) 9. 6 not 8 10. limit 9 to working papers 11. 9 not 10
PsycInfo(Ovid SP)	1. ("2012" or "2013" or "2014").yr. 2. (cost-effectiveness or cost-utility or cost-benefit or "economic evaluation").mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures] 3. cost-effective.ti. 4. ("cost-per-death-av*" or "cost-per-case-av*" or "cost-per-infection" or "cost-per-life" or "cost-per-disability-adjusted-life-year" or "cost-per-quality-adjusted-life-year" or "cost-per-qaly" or "cost-per-daly").ti,ab,kw. 5. 2 or 3 or 4 6. 1 and 5 7. limit 6 to ("0200 book" or "0240 authored book" or "0280 edited book" or "0300 encyclopedia" or "0400 dissertation abstract" or "column/opinion" or "comment/reply" or dissertation or editorial or encyclopedia entry or "erratum/correction" or letter or obituary) 8. 6 not 7 9. limit 8 to animal 10. limit 9 to human 11. 9 not 10 12. 8 not 11 13. study protocol.ti.

	14. 12 not 13
Global Health (Ovid SP)	1. ("2012" or "2013" or "2014").yr. 2. (cost-effectiveness or cost-utility or cost-benefit or "economic evaluation").af. 3. cost-effective.ti. 4. ("cost-per-death-av*" or "cost-per-case-av*" or "cost-per-infection" or "cost-per-life" or "cost-per-disability-adjusted-life-year" or "cost-per-quality-adjusted-life-year" or "cost-per-qaly" or "cost-per-daly").af. 5. 2 or 3 or 4 6. 1 and 5 7. limit 6 to (annual report or annual report section or book or book chapter or bulletin or conference or conference proceedings or conference paper or correspondence or editorial or patent or thesis) 8. 6 not 7 9. study protocol.ti. 10. 8 not 9
Scopus (Scopus)	**MAIN SEARCH:** ((((TITLE("cost-effective*" OR "cost-utility" OR "cost-benefit" OR "economic evaluation") AND SUBJAREA(mult OR agri OR bioc OR immu OR neur OR phar OR mult OR medi OR nurs OR vete OR dent OR heal OR mult OR arts OR busi OR deci OR econ OR psyc OR soci) AND PUBYEAR > 2011) OR (TITLE("cost per death" OR "cost per case" OR "cost per infection" OR "cost per life" OR "cost per disability-adjusted" OR "cost per quality-adjusted" OR "cost per qaly" OR "cost per daly") AND SUBJAREA(mult OR agri OR bioc OR immu OR neur OR phar OR mult OR medi OR nurs OR vete OR dent OR heal OR mult OR arts OR busi OR deci OR econ OR psyc OR soci) AND PUBYEAR > 2011) OR (ABS("cost-effectiveness" OR "cost-utility" OR "cost-benefit" OR "economic evaluation") AND SUBJAREA(mult OR agri OR bioc OR immu OR neur OR phar OR mult OR medi OR nurs OR vete OR dent OR heal OR mult OR arts OR busi OR deci OR econ OR psyc OR soci) AND PUBYEAR > 2011) OR (ABS("cost per death" OR "cost per case" OR "cost per infection" OR "cost per life" OR "cost per disability-adjusted" OR "cost per quality-adjusted" OR "cost per qaly" OR "cost per daly") AND SUBJAREA(mult OR agri OR bioc OR immu OR neur OR phar OR mult OR medi OR nurs OR vete OR dent OR heal OR mult OR arts OR busi OR deci OR econ OR psyc OR soci) AND PUBYEAR > 2011) OR (AUTHKEY("cost-effectiveness" OR "cost-utility" OR "cost-benefit" OR "economic evaluation") AND SUBJAREA(mult OR agri OR bioc OR immu OR neur OR phar OR mult OR medi OR nurs OR vete OR dent OR heal OR mult OR arts OR busi OR deci OR econ OR psyc OR soci) AND PUBYEAR > 2011)) AND (SUBJAREA(mult OR immu OR neur OR phar OR mult OR medi OR nurs OR dent OR heal OR deci OR econ OR psyc))) AND NOT (TITLE("study protocol"))) AND NOT (DOCTYPE(bk OR ch OR bz OR cp OR cr OR ed OR er OR le OR no OR pr OR rp OR sh)) **BREAKING UP THE SEARCH:** **BY YEAR: 2014 – 1,216** **BY YEAR: 2013 – 4,039** **Broke this one up further – by "cost-effectiveness" in title, abstract, and keywords (3,148) and not (891)** **BY YEAR: 2012 – 3,751**
Social Science Citation Index &	# 1 4,006,203 PY=(2012 or 2013 or 2014)

Science Citation Index extended (Web of Science)	# 2 5,706 TI=("cost-effective*" or "cost-benefit" or "cost-utility" or "economic evaluation" or "cost per death" or "cost per case" or "cost per infection" or "cost per life" or "cost per disability-adjusted" or "cost per quality-adjusted" or "cost per qaly" or "cost per daly") # 3 13,274 TS=("cost-effectiveness" or "cost-benefit" or "cost-utility" or "economic evaluation" or "cost per death" or "cost per case" or "cost per infection" or "cost per life" or "cost per disability-adjusted" or "cost per quality-adjusted" or "cost per qaly" or "cost per daly") # 4 1,091 TITLE: ("study protocol") # 5 14,237 #3 OR #2 # 6 14,237 #5 AND #1 # 7 14,054 #6 not #4 # 8 2,900 (#7) AND DOCUMENT TYPES: (Abstract of Published Item OR Art Exhibit Review OR Bibliography OR Biographical-Item OR Book OR Book Chapter OR Book Review OR Chronology OR Correction OR Correction, Addition OR Dance Performance Review OR Database Review OR Discussion OR Editorial Material OR Excerpt OR Fiction, Creative Prose OR Film Review OR Hardware Review OR Item About an Individual OR Letter OR Meeting Abstract OR Meeting Summary OR Music Performance Review OR Music Score OR Music Score Review OR News Item OR Note OR Poetry OR Proceedings Paper OR Record Review OR Reprint OR Script OR Software Review OR TV Review, Radio Review OR TV Review, Radio Review, Video OR Theater Review) # 9 11,154 #7 NOT #8 # 10 8,738 #9 AND WC=(PATHOLOGY OR BEHAVIORAL SCIENCES OR MEDICAL LABORATORY TECHNOLOGY OR BIOLOGY OR SOCIAL SCIENCES INTERDISCIPLINARY OR SOCIAL WORK OR HEALTH CARE SCIENCES SERVICES OR VIROLOGY OR MEDICINE GENERAL INTERNAL OR HEALTH POLICY SERVICES OR PUBLIC ENVIRONMENTAL OCCUPATIONAL HEALTH SCI OR PUBLIC ENVIRONMENTAL OCCUPATIONAL HEALTH OR MICROBIOLOGY OR PHARMACOLOGY PHARMACY OR RHEUMATOLOGY OR SOCIAL SCIENCES BM OR ECONOMICS OR NEUROSCIENCES OR PARASITOLOGY OR SURGERY OR ONCOLOGY OR REHABILITATION OR DENTISTRY ORAL SURGERY MEDICINE OR OPERATIONS RESEARCH MANAGEMENT SCIENCE OR FOOD SCIENCE TECHNOLOGY OR PUBLIC ENVIRONMENTAL OCCUPATIONAL HEALTH SSCI OR CARDIAC CARDIOVASCULAR SYSTEMS OR CRITICAL CARE MEDICINE OR INFECTIOUS DISEASES OR NURSING OR IMMUNOLOGY OR OPHTHALMOLOGY OR ANESTHESIOLOGY OR CLINICAL NEUROLOGY OR EMERGENCY MEDICINE OR MULTIDISCIPLINARY SCIENCES OR NUTRITION DIETETICS OR TOXICOLOGY OR MEDICINE RESEARCH EXPERIMENTAL OR SUBSTANCE ABUSE OR PSYCHIATRY OR DERMATOLOGY OR GASTROENTEROLOGY HEPATOLOGY OR GENETICS HEREDITY OR TRANSPLANTATION OR OBSTETRICS GYNECOLOGY OR TROPICAL MEDICINE OR MEDICAL INFORMATICS OR GERIATRICS GERONTOLOGY OR OTORHINOLARYNGOLOGY OR PERIPHERAL VASCULAR DISEASE OR ORTHOPEDICS OR MANAGEMENT OR PEDIATRICS OR UROLOGY NEPHROLOGY OR PSYCHIATRY SCI OR RESPIRATORY SYSTEM OR ENDOCRINOLOGY METABOLISM OR RADIOLOGY NUCLEAR MEDICINE MEDICAL IMAGING OR PRIMARY HEALTH CARE OR ENGINEERING ENVIRONMENTAL OR HEMATOLOGY) Indexes=SCI-EXPANDED, SSCI Timespan=2012-2014
Scielo (Web of Science)	# 1 79,842 PY=(2012 or 2013 or 2014) # 2 98 TI= ("cost-effective*" or "cost-benefit" or "cost-utility" or "economic evaluation" or "cost per death" or "cost per case" or "cost per infection" or "cost per life" or "cost per disability-adjusted" or "cost per quality-adjusted" or "cost per qaly" or "cost per daly")

	# 3 221 TS=("cost-effectiveness" or "cost-benefit" or "cost-utility" or "economic evaluation" or "cost per death" or "cost per case" or "cost per infection" or "cost per life" or "cost per disability-adjusted" or "cost per quality-adjusted" or "cost per qaly" or "cost per daly") # 4 227 #2 or #3 # 5 2 TI=("study protocol") # 6 227 #4 not #5 # 7 175 #6 AND SU=(PUBLIC ENVIRONMENTAL OCCUPATIONAL HEALTH OR LEGAL MEDICINE OR GENERAL INTERNAL MEDICINE OR PEDIATRICS OR CARDIOVASCULAR SYSTEM CARDIOLOGY OR DENTISTRY ORAL SURGERY MEDICINE OR ANESTHESIOLOGY OR DERMATOLOGY OR PHARMACOLOGY PHARMACY OR ENDOCRINOLOGY METABOLISM OR GASTROENTEROLOGY HEPATOLOGY OR ENVIRONMENTAL SCIENCES ECOLOGY OR HEALTH CARE SCIENCES SERVICES OR NURSING OR MEDICAL LABORATORY TECHNOLOGY OR NEUROSCIENCES NEUROLOGY OR OPERATIONS RESEARCH MANAGEMENT SCIENCE OR OTORHINOLARYNGOLOGY OR OBSTETRICS GYNECOLOGY OR OPHTHALMOLOGY OR PSYCHIATRY OR PATHOLOGY OR RESPIRATORY SYSTEM OR RADIOLOGY NUCLEAR MEDICINE MEDICAL IMAGING OR TROPICAL MEDICINE OR SURGERY OR RHEUMATOLOGY OR UROLOGY NEPHROLOGY OR BIOTECHNOLOGY APPLIED MICROBIOLOGY OR INFECTIOUS DISEASES OR EConomics) # 8 13 (#7) AND DOCUMENT TYPES: (Announcement OR Article-Commentary OR Case-Report OR Editorial OR Letter OR Rapid-Communication) # 9 162 #7 not #8
Biosis (Web of Science)	# 1 1,608,659 PY=(2012 or 2013 or 2014) # 2 1,741 TI= ("cost-effective*" or "cost-benefit" or "cost-utility" or "economic evaluation" or "cost per death" or "cost per case" or "cost per infection" or "cost per life" or "cost per disability-adjusted" or "cost per quality-adjusted" or "cost per qaly" or "cost per daly") # 3 3,846 TS=("cost-effectiveness" or "cost-benefit" or "cost-utility" or "economic evaluation" or "cost per death" or "cost per case" or "cost per infection" or "cost per life" or "cost per disability-adjusted" or "cost per quality-adjusted" or "cost per qaly" or "cost per daly") # 4 4,109 #2 or #3 # 5 4,109 #1 and #4 # 6 35 TI= ("study protocol") # 7 4,104 #5 not #6 # 8 777 (#7) AND DOCUMENT TYPES: (Annual Report OR Article Thesis Dissertation OR Book OR Book Chapter OR Book Review OR Company Profile OR Index OR Letter OR Main Cite OR Meeting OR Meeting Paper OR Obituary OR Patent OR Reprint OR Software OR Technical Report OR Thesis Dissertation) # 9 3,327 #7 NOT #8 # 10 123 (#9) AND LITERATURE TYPE: (Annual Report OR Bibliography OR Biography OR Catalog OR Checklist OR Correction OR Dictionary OR Editorial OR Errata OR Identification Guide OR Manual OR Meeting Abstract OR Meeting Address OR Meeting Paper OR Meeting Poster OR Meeting Report OR Meeting Slide OR Meeting Summary OR Nomenclator OR Nomenclature OR Obituary OR Protocol OR Retraction OR Software Review OR Standard OR Taxonomic Key OR Taxonomic Review) # 11 3,204 #9 not #10

	# 12 2,643 #11 AND SU=(TOXICOLOGY OR RADIOLOGY NUCLEAR MEDICINE MEDICAL IMAGING OR REPRODUCTIVE BIOLOGY OR HEMATOLOGY OR ANESTHESIOLOGY OR DEVELOPMENTAL BIOLOGY OR INFECTIOUS DISEASES OR ORTHOPEDICS OR PUBLIC ENVIRONMENTAL OCCUPATIONAL HEALTH OR BEHAVIORAL SCIENCES OR EVOLUTIONARY BIOLOGY OR IMMUNOLOGY OR REHABILITATION OR ONCOLOGY OR NURSING OR PHYSIOLOGY OR CARDIOVASCULAR SYSTEM CARDIOLOGY OR NUTRITION DIETETICS OR DENTISTRY ORAL SURGERY MEDICINE OR NEUROSCIENCES NEUROLOGY OR ALLERGY OR SURGERY OR OPHTHALMOLOGY OR GENETICS HEREDITY OR OBSTETRICS GYNECOLOGY OR GASTROENTEROLOGY HEPATOLOGY OR DERMATOLOGY OR GENERAL INTERNAL MEDICINE OR PARASITOLOGY OR HEALTH CARE SCIENCES SERVICES OR PSYCHIATRY OR PEDIATRICS OR GERIATRICS GERONTOLOGY OR ENDOCRINOLOGY METABOLISM OR RHEUMATOLOGY OR UROLOGY NEPHROLOGY OR RESPIRATORY SYSTEM OR OTORHINOLARYNGOLOGY)
Cinahl (EBSCO)	S1. TI ("cost-effective*" or "cost-benefit" or "cost-utility" or "economic evaluation" or "cost per death" or "cost per case" or "cost per infection" or "cost per life" or "cost per disability-adjusted" or "cost per quality-adjusted" or "cost per qaly" or "cost per daly") S2. AB ("cost-effectiveness" or "cost-benefit" or "cost-utility" or "economic evaluation" or "cost per death" or "cost per case" or "cost per infection" or "cost per life" or "cost per disability-adjusted" or "cost per quality-adjusted" or "cost per qaly" or "cost per daly") S3. S1 OR S2 S4. TI ("study protocol") S5. S3 NOT S4 S6. S5 and PT (Algorithm OR Anecdote OR Bibliography OR Biography OR Book OR Book Chapter OR Book Review OR Brief Item OR Care Plan OR Cartoon OR Case Study OR CEU OR Classification Term OR Code of Ethics OR Commentary OR Computer Program OR Consumer/Patient Teaching Materials OR Critical Path OR Directories OR Doctoral Dissertation OR Editorial OR Evidence-Based Care Sheet OR Exam Questions OR Forms OR Games OR Glossary OR Historical Material OR Interview OR Legal Case OR Letter OR Masters Thesis OR Nurse Practice Acts OR Obituary OR Pamphlet OR Pamphlet Chapter OR Periodical OR Poetry OR Practice Acts OR Proceedings OR Quick Lesson OR Research Instrument Validation OR Response OR Standards OR Statistics OR Teaching Materials OR Tracings OR Trade Publication OR Website) S7. S5 NOT S6

Appendix 3 A note on database indexing terms

In developing our search strategy, we explored the use of controlled vocabulary indexing terms, if available, in each of the databases; unlike author-defined keywords, these terms are generally applied to publications by professional indexers from a pre-defined set. While this standardization should offer advantages, one drawback is the delays in their application; while many of the databases offer basic citation data as supplied by the journal first, indexing takes more time and so searches based exclusively on indexing terms will exclude the most recent literature, to which index terms have not yet been applied.

In Medline and Embase, indexing terms are known as medical subject headings (MeSH) and Emtree (which is not an acronym), respectively; both are organized hierarchically. While the only MeSH term relevant to our search is "cost-benefit analysis", Emtree appears much more detailed and appropriate, as it distinguishes "cost effectiveness analysis", "cost utility analysis", and "cost benefit analysis" from "cost control", "cost minimization analysis", and "cost of illness" within the broader indexing term "economic evaluation." When we compared the results of our searches in the title, abstract, and author-defined keywords for the key terms we identified above with the results of searches using MeSH terms (in Medline) and Emtree terms (in Embase), we found that the controlled vocabulary terms were both less specific and less sensitive. Our search terms identified many relevant articles missed by the MeSH and Emtree indexers. By contrast, the controlled vocabulary terms greatly increased the number of search results, but a review of the first hundred records identified by the MeSH term and, separately, by each of the three Emtree terms (i.e. 400 records in total) after excluding records identified by our search terms identified only one additional article meeting our inclusion criteria (identified by the Emtree term "cost-effectiveness analysis"). We used this article to develop an additional set of search terms (based on "cost per x") and concluded that the MeSH and Emtree BM indexing terms were not useful for our final searches, as they identified a vast number of articles, many of which contained no cost or other economic data or analysis , while omitting many relevant publications .

Another database applying its own indexing is HEED . On the "compound search" page, HEED offers "type of econ eval" as a search category, as well as a "type of article". While the associated picklist does not make this obvious, HEED in fact categorizes economic evaluations as "cost effectiveness analysis", "cost utility analysis", "cost benefit analysis", "cost analysis", "cost of illness", "cost benefit analysis", and "cost consequences analysis"; it allows a single record to be classified as multiple types of economic evaluation, allows the user to specify only "applied study" as the "type of article", and reports that its indexers are professional health economists. After examining this classification, we found that the terms for CEA, CUA, and CBA were highly specific and useful when combined with "applied study" as type of study , however, many publications in the HEED database were not classified at all, making the search relatively insensitive even within the HEED database. In HEED, we therefore implemented two separate searches: 1) using the HEED classification of the type of economic evaluation, and 2) using our search terms in the title, abstract, and author-defined keywords, and excluding records containing the specified categories, such that any records identified by this search would be additional to records identified by the use of HEED's indexing.

The EconLit database uses the Journal of Economic Literature (JEL) classification system, however, unlike the indexing systems previously described, JEL codes are applied by the authors themselves.

They break down the wider health economics field into 6 specified sub-fields, none of which mention in their descriptions or examples either applied or methodological work in economic evaluation; "general" and "other" health economics categories are also provided. On reviewing a selection of health economic evaluations in the EconLit database identified by title and abstract searches, we found that while some authors combine the codes "D61: Allocative Efficiency; Cost-benefit analysis" (within the microeconomics heading) and "I12: Health Production" (within the health economics heading), other authors did not use these codes at all, choosing instead a wide variety of other codes within the health, microeconomics, and "miscellaneous" headings in particular, as well as others. Rather than using the JEL codes, we therefore decided to take a more sensitive approach in EconLit, and instead searched for "health" in all fields, which would capture the word "health" in JEL codes, but also in journal title, keywords, article title, or abstract; we combined this with keyword searches for our definition of economic evaluation.

Appendix 4 Mapping of 25 disease areas onto the Global Burden of Disease (GBD), International Classification of Disease (ICD-10), and search terms used

Health areas developed for this analysis are listed in alphabetical order in the lefthand column. We mapped each component of the Global Burden of Disease (World Health Organization., 2014) onto one health area. The mapping of the ICD-10 codes (World Health Organization., 2011) onto GBD codes is taken from the GBD appendices. Both GBD and ICD-10 definitions were used to inform the development of search terms for each health areas, which were applied as necessary to the titles, abstracts, and/or keywords in the final database of economic evaluations. Underscores ("_") have been used here to show single spaces and question marks ("?") reflect a single wildcard character. GBD: Global Burden of Disease. ICD-10: International Classification of Disease, version 10.

Health area	GBD	ICD-10	Search terms used to identify economic evaluations in this area
Anaemia	58: Iron-deficiency anaemia	D50, D64.9	Anaemia, Anemia, Anemic, Anaemic, Iron?deficien, _iron_, iron?supplement,
Cancer and other neoplasms	61: Malignant neoplasms, 79: Other neoplasms	C00-C97, D00-D48	Adenocarcinoma, Adenoma, Cancer, carcinoma, chemoradiotherapy, Chemotherapy, Glioblastoma, glioma, Neoplasm, Radiation_therapy, Radiotherapy, Melanoma, Lymphoma, myeloma, neoplastic, Leukaemia, microcalcification, neoplasia, myelodysplas, leukemia, metastatic, sarcoma, paclitaxel, Hematopoietic_Stem_Cell, autologous_stem_cell, cervical_screen, pap_smear, lynch_syndrome, tumour, tumor, breast_reconstruction, metastasis,
Cardiovascular diseases	110: Cardiovascular diseases	I00-I99	Angina, Angioplasty, Anticoagulants, aorta, aortic, Arrhythmia, Arrhythmic, arterial, artery, Atrial_Fibrillation, blood_pressure, blood_vessel, cardiac, cardio, carotid, Chest, cholesterol, Coronary, Deep_Vein_Thrombosis, embolism, heart, hypertensi, myocarditis, endocarditis, Myocardial, pulmonary, stroke, aneurysm, circulatory, warfarin, rheumatic, varicose_vein, venous*ulcer, vascular_disease,
Communicable childhood diseases	12: Childhood-cluster diseases	A33-A37, B05	chickenpox, Pertussis, Whooping_cough, Diphtheria, Measles, Tetanus, chicken_pox, rubella, immunization,
Congenital anomalies	140: Congenital anomalies	Q00-Q99	chromosom, cleft_lip, Dwarfism, cystic_fibrosis, Neural_tube_defect, Cleft_lip, Congenital, cleft_palate, Down_Syndrome, Down's_Syndrome, Down's_Syndrome, disabilities, disabled_children, neural_tube, congenital, Tetralogy_of_Fallot, spina_bifida, trisomy, polydactyl, teratogenic,
Diabetes	80: Diabetes mellitus	E10-E14	Diabetes, glucose, diabetic, hyperglycemi,
Diarrhoeal diseases	11: Diarrhoeal diseases	A00, A01, A03, A04, A06-A09	diarrhea, diarrhoea, rotavirus, cholera, typhoid, shigell, amoebiasis, amoeba, rotaviral, enteritis, norwalk, adenovir, escherichia_coli, campylobacter, clostridium_difficile, dysentery, giardia, cryptosporid, norovirus,
Digestive diseases	121: Digestive diseases	K20-K92	celiac, cholera, coeliac, crohn, Digestive, gallbladder, gallstones, gall?stones, gastric, gastro, helicobacter, ileostomy, colitis, constipation, Appendectomy,

Health area	GBD	ICD-10	Search terms used to identify economic evaluations in this area
			appendicitis, hernia_, bowel_, Intestinal_Polyps, Peptic_ulcer, diverticulitis, Cholecystolithiasis, pancreatitis, Cholecystitis, liver_, biliary, duodenal, vomit, ileus, hepatic, inguinal_hernia,
Endocrine, blood, and immune disorders (not diabetes or HIV)	81: Endocrine, blood, immune disorders	D55-D64 (minus D64.9), D65-D89, E03-E07, E15-E34, E65-E88	graves_disease, Hormones, hyperthyroidism, hypothyroidism, Goiter, Endocrin, Haemophilia, Adrenal, Allerg, Anaphylaxis, hemophilia, thyroid, hematological, neutropenia, Ischaemi, Ischemi, tonsil, thalassaemia, thalassemia, Thrombocytopenia, Fabry_disease, lysosomal, sickle_cell,
Genitourinary diseases, family planning & fertility	126: Genitourinary diseases	N00-N64, N75-N76, N80-N98	Gynecolog, Gynaecolog, contraception, contraceptive, embryo, fertility, fertilization, prostat, urologic, urinary, urethral_, genito, Kidney, Urolithiasis, nephrolog, Infertility, infertile, Nephrostomy, dialysis, pyelography, ovulation, urodynamic, ureter, hypogonadism, menstrual, nephropathy, microalbuminur, nephritis, bladder, varicocele,
HIV/AIDS	10: HIV/AIDS	B20-B24	Acquired_Immune_Deficiency_Syndrome, CD4, HAART, retroviral, hiv?aids, _hiv_, Human_Immunodeficiency_Virus, cd4_,
Malaria	22: Malaria	B50-B54, P37.3, P37.4	bed?net, malaria, bednet, artemesenin,
Malnutrition (including obesity and exercise)	54: Nutritional deficiencies (*except 58: Iron-deficiency anaemia*)	E00-E02, E40-E46, E50-E64, D51-D53	bariatric, Body_Mass_Index, Body_Weight, nutrition, Iodine, Vitamin_A, obesity, obese, physical_activity, exercise, pedometer, vegetable, dietary, biofortif, weight_management,
Maternal and neonatal conditions	42: Maternal conditions, 49: Neonatal conditions	O00-O99, P00-P96 excl P37.3, P37.4	low?birth?weight, Preterm, Birth, Neonat, Newborn, New-born, Amniocentesis, Birth, caesarean, cesarean, fetal, folic_acid, gestational, preeclampsia, eclampsia, pregnancy, prenatal, abortion, endometrial, obstetric, premature_infant, prematurity, vaginal_deliver,
Meningitis	17: Meningitis	A39, G00, G03	mening,
Mental health, cognition, and developmental and behavioural disorders (including self-harm and addictions)	82: Mental and behavioural disorders, 161: Self-harm	F04-F99, X41-X42, X45, X60-X84, Y870	ADHD, Agoraphobi, Antidepressant, Antidepressive, Anxiety, autism, Autistic, Schizophreni, Bipolar, _cognition, cognitive, Dementia, depression, substance_use_disorder, opiate_substitution, Eating_Disorder, _Emotions, mental_health, heroin, psychosis, psychotic, Unipolar, cocaine, addiction, Alcohol_use, Drug_use, developmental_disorder, behavioural_disorder, intellectual, behavio?r_disorder, clinically_isolated_syndrome, mentally_ill, Somatoform, depressive_disorder, Alcohol, Drug_Abuse, Drug_Addiction, Narcotic_Control, smoking, substance_abuse, Psychotherapy, mental_illness, Mental_Disorder, suicide, smoker, methadone, methadone, delirium, Nicotine, attention?deficit?hyperactivity?disorder, fear_of, behavior_disorder, cannabis,
Musculoskeletal diseases	134: Musculoskeletal diseases	M00-M99	ankle, Bone, Carpal_Tunnel, Cartilage, elbow, fracture, Joint, knee, Ligament, arthritis, Lumbar, Diskectomy, discectomy, musculoskeletal,

Health area	GBD	ICD-10	Search terms used to identify economic evaluations in this area
(including back and neck pain)			Physical_Therapy_, osteoporo, fibromyalgia, Spinal, foot, shoulder, orthopedic, hip_replacement, lupus, Gout, low?back_pain,
Neurological conditions (including headache and sleep disorders)	94: Neurological conditions	F01-F03, G06 -G98	cerebral, nervous_system, neurological, Epilepsy, Alzheimer, Parkinson, Epileptic, Multiple_sclerosis, Migraine, headache, sleep, Myasthenia_gravis, thymectomy, neurosurgery, neuropath, chronic_fatigue_syndrome, neuralgia,
Other infectious diseases (including encephalitis, hep A, B, C, and other parasitic and vector-borne diseases, and nematode infections)	18: Encephalitis, 19: Acute hepatitis B, 20: Acute hepatitis C, 21: Parasitic and vector diseases (*except 22: Malaria*), 33: Intestinal nematode infections, 37: Other infectious diseases	A83-A86, B94.1, G04, B16-B19 (minus B17.1, B18.2), B17.1, B18.2, A30, A71, A82, A90-A91, B55-B57, B65, B73, B74.0-B74.2, B76-B77, B79, A02, A05, A20-A28, A31, A32, A38, A40-A49, A65-A70, A74-A79, A80-A81, A87-A89, A92-A99, B00-B04, B06-B15, B25-B49, B58-B60, B64, B66-B72, B74.3-B74.9, B75,B78, B80-B89, B91-B99 (minus B94.1)	Encephaliti, Dengue, lyme_, deworming, hepatitis, hep_b, hep_c, Trypanosomiasis, Chagas, Schistosom, Leishmania, Lymphatic_filariasis, Onchocerciasis, Leprosy, leprous, Trachoma, Rabies, Ascariasis, Trichuriasis, Hookworm, hep_a, rubella, herpes_zoster, clostridium, Staphylococc, Bacteremia, hospital-acquired_infection, septic_shock, sepsis, Staphylococc, scabies, systemic_Candida_infection, cytomegalovirus, infection_control, hcv, Creutzfeldt?Jakob, _invasive_Candid, Helminth, roundworm, antimicrobial,
Respiratory diseases	38: Respiratory infections, 117: Respiratory diseases	J00-J22, H65-H68,P23, U04, J30-J98	Respiratory, Pulmonary, Lung, Bronchial, Trachea, Bronchitis, Airway, Asthma, H1N1, Influenza, bird_flu, avian_flu, interstit, Pleural_effusion, sore_throat, pneumonia, Respiration, pneumococcal, Haemophilus, breathing, pharyngitis, pneumonia,
Sense organ diseases	102: Sense organ diseases	H00-H61, H69-H93	Blindness, Cataract, cochlear, deafness, eye_, Glaucoma, hearing, Macular, rhino, Nasolacrimal, Refractive_error, vision_loss, hearing_loss, canaloplasty, Trabeculectomy, retina, Ophthalmolog, keratoplasty, otitis_media,
Skin and oral conditions	133: Skin diseases, 147: Oral conditions	L00-L98, K00-K14	debridement, Dental, Dentistry, Denture, gingival, Edentulism, Periodontal, peritonsillar, Dentition, Orthodontics, Dermatitis, Dermatolog, Eczema, skin_disease, tinea, psoriasis, dermatophytic, plantar_wart, skin?graft, soft_tissue, foam_dressing, pressure_ulcer,
Sexually Transmitted Infections (not HIV)	4: STDs excluding HIV	A50-A64, N70-N73	chlamydia, condoms, Gonorrhea, Papillomavirus, Syphilis, Gonorrhoea, Trichomoniasis, Sexually_Transmitted, hpv,
Tuberculosis	3: Tuberculosis	A15-A19, B90	antitubercular, BCG, TB, tuberculos, bacille_Calmette-Guerin,

Health area	GBD	ICD-10	Search terms used to identify economic evaluations in this area
Wounds and injuries	151: Injuries (*except 161: Self-harm*)	V01-X59, Y871-Y89,	Injury, Injuries, Accident, Burn, violence, Poisoning, Drown, child_abuse, domestic_abuse, Domestic_Violence, trauma, fall_prevention, falls_prevention, venom, antidote, whiplash, _radon_, road_safety,

Appendix 5 Supplementary information on article classification

Health areas

We developed a classification of 25 health areas so as to allow comparability with the Global Burden of Disease (GBD) estimates (World Health Organization., 2014), to be implementable with an electronic key term search, and to permit meaningful analysis. The GBD uses four hierarchical levels to classify disease. At its highest level, it classifies diseases as "Communicable, maternal, perinatal and nutritional conditions", "Non-communicable diseases" or "Injuries", while at its lowest levels, it breaks these down into 154 more specific conditions. We did not maintain the GBD's highest level classification because in some cases, it was not implementable (e.g. key term searches could not distinguish between communicable and non-communicable causes of respiratory diseases) and in other cases, we felt the distinction did not map coherently onto preventive and curative interventions (e.g. we separated "intentional injuries: self harm" from other injury categories and placed it in a single category with mental health issues).

A set of up to 49 search terms was developed for each of our health areas through an iterative process. We began by reviewing the names of sub-categories in the GBD and the categories and descriptions provided in the ICD-10 (World Health Organization., 2011) to develop an initial set of search terms. We then reviewed the titles and keywords of unclassified records in our database, and continued adding search terms until all records in our database which could be classified were classified according to at least one health area. Throughout the process, we reviewed samples of records within each health area, and reviewed in-depth the records identified by search terms we considered potentially ambiguous, before finalizing our search terms and disease classification.

Institutional and geographic affiliations of authors

We analyzed data on the institutional affiliation of all authors to develop a comprehensive picture of the institutions and countries contributing to health economic evaluations. We began by transferring the institutional affiliation data from wide to long form and implementing the country keyword searches previously developed. As affiliation data frequently did not name a country, unclassified affiliations were then iteratively reviewed and search terms for city names and non-geographic institution names (e.g. Harvard, Yale) were identified and linked to countries, taking care to avoid misclassifying search terms such as "York", which could refer to the city (York) or county (Yorkshire) in the United Kingdom, to York University in Canada, or to the city or state of New York in the United States. In this way, nearly all articles for which affiliation data were available were classified as being produced by researchers in one or more specified countries. This data was further cross-checked against the data on countries studied and inconsistencies reviewed. The original articles were sought to resolve inconsistencies and to obtain institutional affiliation data for any articles remaining without data. Articles were then classified by the income group of the country or countries of the author affiliations and the countries producing the greatest volume of economic evaluations were ranked within each income group.

We further identified the top ten institutions within each income group by volume of economic evaluations produced. The affiliation data for top-ranked countries within each income group were carefully reviewed to develop sets of specific key terms for institutions. As in previous work (Wagstaff and Culyer, 2012, Rubin and Chang, 2003), schools, colleges and institutes were

aggregated with the university to which they belonged, with the exception of the highly federal Universities of London, California, Texas, and other similar university systems, whose constituent members were analyzed separately. To the extent possible, hospitals and institutes were associated with their parent institution, even when that institution was not explicitly named. Even though they are independently owned and managed, Harvard's 16 affiliated hospitals were aggregated with Harvard. Once an initial set of ten institutions were identified for each income group, only affiliations from countries which had produced more than the tenth-ranked institution for that income group were reviewed to identify institutions which could have produced more economic evaluations than the currently tenth-ranked institution. For example, the tenth-ranked UMIC institution, the *Instituto Mexicano del Seguro Social*, produced 7 economic evaluations, and so only affiliations from UMICs which had produced at least 7 economic evaluations were reviewed to identify individual institutions which could have produced at least this number. The searches for city names were then used to facilitate the identification of institutions.

In addition, search terms were developed for international and inter-governmental organizations, such as United Nations agencies and the World Bank, and for multi-national pharmaceutical companies, regardless of the country, if any, with which they were associated in their affiliation data. These were then aggregated into two groups, "international organizations" and "pharmaceutical industry", to permit consideration of their relative influence.

This process allowed a comprehensive assessment of the total volume of articles produced by each country and by income group, as well as a comprehensive assessment of top institutions, taking into account the many and unpredictable variations in their listing. Less thorough approaches would be likely to bias rankings towards institutions such as Yale, with its unique name which also appears in the name of all its constituent schools and hospital, and away from institutions with a wider variety of permutations, abbreviations and possibly ambiguous versions of its name, such as the University of York (Univ York, U York, but not York University), with Hull-York Hospital (Hull-York Hosp), which were not always listed with the university name in the affiliation data.

We considered a number of possible approaches for analysing articles with more than one institutional affiliation. Both Wagstaff and Culyer (2012) and Rubin and Chang (2003) were constrained by the EconLit database, which only provides data on the first three or four authors, whereas we obtained institutional affiliation data for all authors. We considered assigning a fractional value (and even weighted fractional values reflecting author order) to each institution based on the number of different authors or institutions represented on a given article (Aksnes et al., 2012, Hagen, 2013, Retzer and Jurasinski, 2009). However, we rejected such approaches for two reasons: first, we believe that the use of zero-sum metrics establishes a perverse incentive against collaboration between institutions and against the crediting of collaborators. We therefore assigned one point per institution per article, regardless of the number of institutions or authors on a given article. This has the disadvantage of weighting the analysis towards articles from multiple institutions, as these articles are counted multiple times.

Appendix 6 Classification of journal types

The following is a comprehensive list of how we classified journals publishing at least one economic evaluation meeting our criteria.

Health economics, policy, and services journals	
Administration and Policy in Mental Health and Mental Health Services Research	International Journal of Technology Assessment in Health Care
AIDS and behavior	Israel Journal of Health Policy Research
Alter	Journal d'Economie Medicale
American Health and Drug Benefits	Journal of Benefit-Cost Analysis
Applied Health Economics and Health Policy	Journal of health economics
Behaviour research and therapy	JOURNAL OF HEALTH SERVICES RESEARCH and POLICY
BMC HEALTH SERVICES RESEARCH	Journal of Medical Economics
BMC Medical Informatics and Decision Making	Journal of Mental Health Policy and Economics
British Journal of Health Care Management	Journal of Nursing Management
Bulletin of the World Health Organization	JOURNAL OF NUTRITION EDUCATION AND BEHAVIOR
Cancer Management and Research	Journal of Pain and Symptom Management
CHILDREN AND YOUTH SERVICES REVIEW	Journal of Pharmaceutical Health Services Research
ClinicoEconomics and Outcomes Research	Journal of Public Health Management and Practice
Cost Effectiveness and Resource Allocation	Medical Decision Making
Decision Sciences	Mediterranean Journal of Social Sciences
Epilepsy and Behavior	Ontario Health Technology Assessment Series
European Journal of Health Economics	Open Pharmacoeconomics and Health Economics Journal
European Review of Agricultural Economics	PharmacoEconomics
Expert review of pharmacoeconomics and outcomes research	PharmacoEconomics - Italian Research Articles
Gesundheitsokonomie und Qualitatsmanagement	Pharmacoeconomics - Spanish Research Articles
GMS health technology assessment	Population Health Management
Health Affairs	Psychological Services
Health Economics	Research in Social and Administrative Pharmacy
Health Economics Review	Revista medica del Instituto Mexicano del Seguro Social
Health Policy	Social Psychiatry and Psychiatric Epidemiology
Health Policy and Planning	South African Journal of Economic and Management Sciences
Health Policy and Technology	Substance abuse treatment, prevention, and policy
Health Services Research	Therapeutics and Clinical Risk Management
Health Technology Assessment	Value in Health
Healthcare Policy	Value in Health Regional Issues
International Journal of Behavioral Nutrition and Physical Activity	Vascular Health and Risk Management
International Journal of Drug Policy	
Biomedical journals	
[Rinsho ketsueki] The Japanese journal of clinical hematology	Iowa Orthopaedic Journal
Academic Emergency Medicine	Iranian journal of neurology
Academic Pediatrics	Iranian Journal of Pediatrics
Acta Chirurgiae Orthopaedicae et Traumatologiae Cechoslovaca	Iranian Journal of Pharmaceutical Research
Acta Chirurgica Belgica	Iranian Journal of Radiology
Acta clinica Belgica	Iranian Red Crescent Medical Journal
Acta gastroenterologica Latinoamericana	Irish Journal of Medical Science
Acta Medica Indonesiana	ISRN Gastroenterology
Acta neurochirurgica	ISRN Obstetrics and Gynecology
Acta Neurologica Scandinavica	Italian Journal of Public Health
	JACC: Heart Failure
	JAMA

Acta Neuropsychiatrica	JAMA Ophthalmology
Acta Obstetricia et Gynecologica Scandinavica	JAMA Pediatrics
Acta Oncologica	Japanese Journal of Ophthalmology
Acta Ophthalmologica	Japanese Pharmacology and Therapeutics
Acta Oto-Laryngologica	Joint Commission Journal on Quality and Patient Safety
Acta Psychiatrica Scandinavica	Joint, Bone, Spine
Acta Radiologica	Jornal Portugues de Gastrenterologia
Actas dermo-sifiliograficas	Journal de Mycologie Medicale
Actas Urologicas Espanolas	Journal for Healthcare Quality
Acupuncture in Medicine	Journal of Acquired Immune Deficiency Syndromes
Addiction	Journal of Adolescent Health
Advances in Clinical and Experimental Medicine	Journal of Advanced Nursing
Advances in Skin and Wound Care	Journal of affective disorders
Advances in Therapy	Journal of Aging Research
Aesthetic Surgery Journal	Journal of Allergy and Clinical Immunology
African health sciences	Journal of Alternative and Complementary Medicine
African Journal of AIDS Research	Journal of Antivirals and Antiretrovirals
African Journal of Urology	Journal of Anxiety Disorders
Age and Ageing	Journal of Arthroplasty
AIDS	Journal of Arthropod-Borne Diseases
AIDS Care	Journal of Asthma
Alcohol and Alcoholism	Journal of bone and joint surgery
Alcoholism Clinical and Experimental Research	Journal of Bone and Mineral Research
Alimentary Pharmacology and Therapeutics	Journal of Brain Science
Allergologie	Journal of Bronchology and Interventional Pulmonology
Alzheimer's and Dementia	Journal of Burn Care and Research
American heart journal	Journal of Cancer
American Journal of Cardiology	Journal of Cancer Epidemiology
American Journal of Cardiovascular Drugs	Journal of Cardiothoracic Surgery
American Journal of Clinical Dermatology	Journal of Cardiovascular Computed Tomography
American Journal of Clinical Oncology	Journal of Cardiovascular Electrophysiology
American Journal of Emergency Medicine	Journal of Cardiovascular Magnetic Resonance
American Journal of Gastroenterology	Journal of Cardiovascular Medicine
American Journal of Geriatric Psychiatry	Journal of Cardiovascular Nursing
American Journal of Health-System Pharmacy	Journal of Cataract and Refractive Surgery
AMERICAN JOURNAL OF HYPERTENSION	Journal of Child and Adolescent Substance Abuse
American Journal of Industrial Medicine	Journal of Child and Family Studies
American Journal of Infection Control	Journal of Children's Orthopaedics
American Journal of Kidney Diseases	Journal of Clinical Apheresis
American Journal of Managed Care	Journal of Clinical Endocrinology and Metabolism
American Journal of Medical Genetics Part A	Journal of clinical gastroenterology
American Journal of Medicine	Journal of Clinical Hypertension
American Journal of Neuroradiology	Journal of clinical lipidology
American Journal of Obstetrics and Gynecology	JOURNAL OF CLINICAL MICROBIOLOGY
American journal of ophthalmology	Journal of clinical nursing
American Journal of Perinatology	Journal of Clinical Oncology
American Journal of Pharmacy Benefits	Journal of Clinical Periodontology
American Journal of Physical Medicine and Rehabilitation	Journal of Clinical Psychiatry
American Journal of Preventive Medicine	Journal of Clinical Sleep Medicine
American Journal of Public Health	Journal of Clinical Ultrasound
American Journal of Rhinology and Allergy	Journal of Clinical Virology
American Journal of Roentgenology	Journal of Cognitive and Behavioral Psychotherapies
American Journal of Speech-Language Pathology	Journal of community health
American journal of sports medicine	Journal of Comparative Effectiveness Research
American Journal of Surgery	JOURNAL OF CROHNS and COLITIS
AMERICAN JOURNAL OF THERAPEUTICS	

American Journal of Transplantation	Journal of Crohn's and Colitis
American Journal of Tropical Medicine and Hygiene	Journal of Cystic Fibrosis
Anesthesiology	Journal of Dental Research
Angiology	Journal of Dermatological Treatment
Annali di igiene : medicina preventiva e di comunita	Journal of Endourology
Annals of Allergy, Asthma and Immunology	Journal of Endovascular Therapy
Annals of cardiothoracic surgery	JOURNAL OF EPIDEMIOLOGY AND COMMUNITY HEALTH
Annals of Emergency Medicine	
Annals of General Psychiatry	Journal of evaluation in clinical practice
Annals of Hematology	Journal of Food and Drug Analysis
Annals of Internal Medicine	Journal of Food Protection
Annals of Nuclear Medicine	JOURNAL OF FOOT AND ANKLE RESEARCH
Annals of Oncology	JOURNAL OF GASTROENTEROLOGY AND HEPATOLOGY
Annals of Pharmacotherapy	
Annals of Plastic Surgery	Journal of Gastrointestinal Cancer
Annals of rehabilitation medicine	Journal of Gastrointestinal Surgery
Annals of Surgery	Journal of General Internal Medicine
Annals of Surgical Oncology	Journal of Global Health
Annals of the Rheumatic Diseases	Journal of gynecologic oncology
Annals of the Royal College of Surgeons of England	Journal of hand surgery
Annals of Thoracic Surgery	journal of headache and pain
Annals of Vascular Surgery	Journal of Hearing Science
Antimicrobial Agents and Chemotherapy	Journal of Heart and Lung Transplantation
Antiviral therapy	JOURNAL OF HEPATOLOGY
ANZ Journal of Surgery	Journal of Hospital Infection
Archives of Disease in Childhood	Journal of Hospital Medicine
Archives of Gynecology and Obstetrics	Journal of Hypertension
Archives of Internal Medicine	Journal of Infection
Archives of Iranian Medicine	Journal of Infectious Diseases
Archives of Medical Research	Journal of Interventional Cardiology
Archives of Medical Science	Journal of Korean Academy of Nursing Administration
Archives of Ophthalmology	Journal of Korean Medical Science
Archives of Pathology and Laboratory Medicine	Journal of long-term effects of medical implants
Archives of Pediatrics and Adolescent Medicine	Journal of Lower Genital Tract Disease
Archives of Surgery	Journal of Managed Care Medicine
ARCHIVOS DE BRONCONEUMOLOGIA	Journal of Managed Care Pharmacy
Archivos de Neurociencias	journal of maternal-fetal and neonatal medicine
Arquivos brasileiros de cardiologia	Journal of Medical Colleges of PLA
Arquivos Brasileiros de Oftalmologia	Journal of Medical Internet Research
Arquivos de Gastroenterologia	Journal of Mental Health
Arthritis Care and Research	Journal of microbiology, immunology, and infection = Wei mian yu gan ran za zhi
Arthroscopy	
ARYA Atherosclerosis	Journal of Nervous and Mental Disease
Asian Biomedicine	Journal of Neurology
Asian Pacific Journal of Cancer Prevention	Journal of Neurology Neurosurgery and Psychiatry
Asian Pacific Journal of Tropical Disease	Journal of Neuro-Ophthalmology
Asia-Pacific Journal of Clinical Oncology	Journal of neurosurgery
Asia-Pacific Journal of Public Health	Journal of neurosurgery. Spine
Atencion Farmaceutica	Journal of Neurosurgery: Spine
Atencion Primaria	JOURNAL OF NEUROSURGERY-SPINE
Australian and New Zealand Journal of Obstetrics and Gynaecology	Journal of Nuclear Medicine
	Journal of Nursing Scholarship
Australian and New Zealand journal of public health	Journal of Nutrition
Australian Health Review	JOURNAL OF OBSTETRICS AND GYNAECOLOGY
Australian Journal of Primary Health	Journal of Obstetrics and Gynaecology Canada
Autism	Journal of Occupational and Environmental Medicine
Biochemia medica	Journal of Occupational Rehabilitation

BioDrugs	Journal of Oncology Pharmacy Practice
Biologics in Therapy	Journal of Oncology Practice
Biology of Blood and Marrow Transplantation	Journal of Orthopaedic Research
BioMed research international	Journal of orthopaedic trauma
Biomedica	Journal of Otolaryngology - Head and Neck Surgery
BIOMEDICAL ENGINEERING-BIOMEDIZINISCHE TECHNIK	Journal of Pain and Palliative Care Pharmacotherapy
Biomedical Journal	Journal of pediatric ophthalmology and strabismus
Biosecurity and Bioterrorism	Journal of Pediatrics
BIOSYSTEMS	Journal of Perinatology
BIOTECHNOLOGY and BIOTECHNOLOGICAL EQUIPMENT	Journal of Periodontology
BJOG: An International Journal of Obstetrics and Gynaecology	Journal of Pharmacy Practice
BJU International	Journal of Plastic, Reconstructive and Aesthetic Surgery
Blood purification	Journal of Population Therapeutics and Clinical Pharmacology
BMC Anesthesiology	Journal of Practical Oncology
BMC Cancer	Journal of primary care and community health
BMC Cardiovascular Disorders	Journal of Psychiatric Research
BMC Clinical Pharmacology	Journal of Psychosomatic Research
BMC Complementary and Alternative Medicine	Journal of Public Health
BMC family practice	JOURNAL OF PUBLIC HEALTH DENTISTRY
BMC Gastroenterology	Journal of Radiation Research
BMC infectious diseases	Journal of Rehabilitation Medicine
BMC Medical Research Methodology	Journal of research in health sciences
BMC Medicine	Journal of Sexual Medicine
BMC Musculoskeletal Disorders	Journal of Shoulder and Elbow Surgery
BMC Neurology	Journal of Spinal Disorders and Techniques
BMC ophthalmology	Journal of Stroke and Cerebrovascular Diseases
BMC Pediatrics	Journal of Studies on Alcohol and Drugs
BMC pregnancy and childbirth	Journal of Substance Abuse Treatment
BMC Psychiatry	Journal of Surgical Oncology
BMC PUBLIC HEALTH	Journal of Surgical Research
BMC research notes	Journal of Telemedicine and Telecare
BMJ	Journal of the Academy of Nutrition and Dietetics
BMJ Open	Journal of the American Academy of Audiology
BMJ quality and safety	Journal of the American Academy of Dermatology
BMJ supportive and palliative care	Journal of the American College of Cardiology
Boletin Medico del Hospital Infantil de Mexico	Journal of the American College of Surgeons
Bone	JOURNAL OF THE AMERICAN GERIATRICS SOCIETY
bone and joint journal	Journal of the American Medical Directors Association
Brachytherapy	Journal of the American Medical Informatics Association
Brazilian Journal of Infectious Diseases	Journal of the American Pharmacists Association
Brazilian Journal of Pharmaceutical Sciences	Journal of the American Society of Nephrology
Breast Cancer Research and Treatment	Journal of the Balkan Union of Oncology
Breast Cancer: Targets and Therapy	Journal of the European Academy of Dermatology and Venereology
Breast Care	JOURNAL OF THE FORMOSAN MEDICAL ASSOCIATION
Breastfeeding Medicine	Journal of the International Association of Providers of AIDS Care
British Journal of Anaesthesia	Journal of the Medical Association of Thailand
British Journal of Cancer	Journal of the National Cancer Institute
British Journal of Dermatology	Journal of the National Comprehensive Cancer Network
British Journal of General Practice	Journal of the Neurological Sciences
British Journal of Haematology	Journal of the Pakistan Medical Association
British Journal of Ophthalmology	
British Journal of Psychiatry	
British Journal of Sports Medicine	
British Journal of Surgery	

Bulletin du Cancer	Journal of the Royal Society Interface
Cadernos de Saude Publica	Journal of the Royal Society of Medicine
CADTH technology overviews	Journal of Theoretical Biology
Canadian Journal of Cardiology	Journal of Thoracic and Cardiovascular Surgery
Canadian Journal of Infectious Diseases and Medical Microbiology	Journal of Thoracic Oncology
	Journal of Thrombosis and Haemostasis
Canadian Journal of Ophthalmology	Journal of thrombosis and thrombolysis
Canadian Journal of Surgery	Journal of Traditional Chinese Medicine
Canadian Journal of Urology	Journal of Trauma and Acute Care Surgery
Canadian Journal on Aging	Journal of Urban Health
Canadian Medical Association Journal	Journal of Urology
Canadian Urological Association Journal	Journal of vascular and interventional neurology
Cancer	Journal of Vascular and Interventional Radiology
Cancer Causes and Control	Journal of Vascular Nursing
Cancer Epidemiology Biomarkers and Prevention	Journal of Vascular Surgery
Cancer Epidemiology, Biomarkers and Prevention	JOURNAL OF VIRAL HEPATITIS
Cancer Prevention Research	Journal of Women's Health
Cardiogenetics	Journal of wound care
CardioVascular and Interventional Radiology	Kardiologia Polska
Cardiovascular Drugs and Therapy	KARDIOLOGIYA
Cardiovascular journal of Africa	Kidney and Blood Pressure Research
Cardiovascular Therapeutics	Klimik Dergisi
Caries Research	Klinische Monatsblatter fur Augenheilkunde
Catheterization and Cardiovascular Interventions	Klinische P+ndiatrie
Cerebrovascular Diseases	Knee Surgery, Sports Traumatology, Arthroscopy
Ceska Gynekologie	Korean Journal of Thoracic and Cardiovascular Surgery
Chest	
Child and Adolescent Psychiatry and Mental Health	La Radiologia medica
Childhood Obesity	Lancet
Chinese Journal of Cancer Prevention and Treatment	Lancet Global Health
Chinese Journal of Clinical Nutrition	Lancet Infectious Diseases
Chinese Journal of Clinical Oncology	Laryngoscope
Chinese Journal of Evidence-Based Medicine	Leukemia and Lymphoma
Chinese Journal of Lung Cancer	Lin chuang er bi yan hou tou jing wai ke za zhi = Journal of clinical otorhinolaryngology, head, and neck surgery
Chinese Journal of New Drugs	
Chinese Journal of Oncology	
Chinese Journal of Schistosomiasis Control	Liver Transplantation
Chinese Journal of Tissue Engineering Research	Lung Cancer
Chinese Pharmaceutical Journal	Malaria Journal
Chinese Preventive Medicine	Managed Care
Chongqing Medicine	Maternal and Child Health Care of China
Ciencia and saude coletiva	Mathematical Biosciences and Engineering
Ciencia y Enfermeria	Medical Care
Circulation	MEDICAL HYPOTHESES
Circulation: Cardiovascular Quality and Outcomes	MEDICAL JOURNAL OF AUSTRALIA
Circulation: Heart Failure	Medical Journal of Chinese People's Liberation Army
CIRCULATION-CARDIOVASCULAR QUALITY AND OUTCOMES	Medical Journal of Malaysia
	Medicina Preventiva
Cirugia Espanola	Medicine, Health Care and Philosophy
Cirugia y Cirujanos	Methodist DeBakey cardiovascular journal
Clinica e Investigacion en Ginecologia y Obstetricia	Midwifery
Clinical and Experimental Nephrology	Modern Preventive Medicine
Clinical and experimental obstetrics and gynecology	Molecular and Clinical Oncology
Clinical and Experimental Rheumatology	Molecular Diagnosis and Therapy
Clinical and translational allergy	MOVEMENT DISORDERS
Clinical Breast Cancer	Multiple Sclerosis
Clinical Cardiology	Mycoses

Clinical drug investigation	Nan fang yi ke da xue xue bao = Journal of Southern Medical University
Clinical Gastroenterology and Hepatology	National Medical Journal of China
Clinical Infectious Diseases	Nephrology Dialysis Transplantation
Clinical Journal of Pain	Netherlands Journal of Medicine
Clinical Journal of the American Society of Nephrology	Neurologia
Clinical Laboratory	Neurologia medico-chirurgica
Clinical Medicine Insights: Therapeutics	Neurologist
Clinical Microbiology and Infection	Neurology
Clinical Nephrology	Neuro-oncology
Clinical Neurology and Neurosurgery	Neurosurgery
Clinical Neurophysiology	Neurourology and Urodynamics
Clinical Nutrition	New Biotechnology
Clinical Oncology	NEW ENGLAND JOURNAL OF MEDICINE
Clinical orthopaedics and related research	Nicotine and Tobacco Research
Clinical Otolaryngology	North Carolina medical journal
Clinical pediatrics	Nutrition and Diabetes
Clinical Pharmacology and Therapeutics	OBESITY
Clinical Rehabilitation	Obesity Research and Clinical Practice
Clinical Research in Cardiology	Obesity surgery
CLINICAL RHEUMATOLOGY	Obstetrics and Gynecology
Clinical Therapeutics	Occupation and Health
Clinical Transplantation	Occupational Medicine
Clinical Trials	Ochsner journal
Clinics	Oncologist
CNS Drugs	Oncology
Cochrane Database of Systematic Reviews	Open Respiratory Medicine Journal
Cocuk Enfeksiyon Dergisi	Open Rheumatology Journal
Colorectal Disease	Ophthalmic Epidemiology
Community Dental Health	Ophthalmologica
Community Dentistry and Oral Epidemiology	Ophthalmology
Community Oncology	Oral Oncology
Contact Dermatitis	Orphanet journal of rare diseases
Contraception	Orthopedics
Crisis	Osteoarthritis and Cartilage
Critical Care Medicine	Osteoporosis International
Critical Pathways in Cardiology	Otolaryngology - Head and Neck Surgery
Current Alzheimer Research	Pacing and Clinical Electrophysiology
Current Medical Research and Opinion	Paediatric Anaesthesia
Current Oncology	Paediatrics and Child Health
Danish Medical Journal	PAEDIATRICS AND INTERNATIONAL CHILD HEALTH
DARU	Pain Medicine
Das Gesundheitswesen	Pain physician
Dementia and Geriatric Cognitive Disorders	Pain Practice
Dermatology	Pan African Medical Journal
Dermatology and therapy	PARASITES and VECTORS
Diabetes and Vascular Disease Research	Payesh Health Monitor
Diabetes care	PEDIATRIC ALLERGY AND IMMUNOLOGY
Diabetes Research and Clinical Practice	Pediatric Cardiology
Diabetes Technology and Therapeutics	Pediatric Drugs
Diabetes Therapy	PEDIATRIC EMERGENCY CARE
Diabetes, Obesity and Metabolism	Pediatric Infectious Disease Journal
Diabetic Medicine	Pediatric obesity
Digestive and Liver Disease	Pediatric Transplantation
Digestive diseases and sciences	Pediatrics
Digestive Surgery	Pediatrics International
Diseases of the Colon and Rectum	Perioperative Medicine
DMW Deutsche Medizinische Wochenschrift	

Drug and Alcohol Dependence	Peritoneal Dialysis International
Drug Metabolism and Pharmacokinetics	Personalized Medicine
Drugs and Aging	Pharmacogenetics and Genomics
Ear and hearing	Pharmacogenomics
ecancermedicalscience	Pharmacotherapy
Eksperimental'naia i klinicheskaia gastroenterologiia = Experimental and clinical gastroenterology	Pharmazie
EMERGENCIAS	Physis: Revista de Saude Coletiva
Emergency Medicine Journal	Plastic and reconstructive surgery
Emerging Infectious Diseases	PLOS MEDICINE
Endoscopy	PloS Neglected Tropical Diseases
Enfermedades Infecciosas y Microbiologia Clinica	PM and R
Epidemiology and Infection	Polski Merkuriusz Lekarski
Epidemiology and Psychiatric Science	Postepy Dermatologii I Alergologii
Epilepsia	Postgraduate medicine
Epilepsy Research	Practical Pharmacy and Clinical Remedies
Europace	Prenatal Diagnosis
European Annals of Otorhinolaryngology, Head and Neck Diseases	Presse Medicale
European Child and Adolescent Psychiatry	Preventing chronic disease
European Heart Journal	PREVENTION SCIENCE
EUROPEAN HEART JOURNAL-CARDIOVASCULAR IMAGING	Preventive Medicine
European Journal of Cancer	Primary care diabetes
European Journal of Cardio-Thoracic Surgery	Primary Care Respiratory Journal
European Journal of Clinical Microbiology and Infectious Diseases	Proceedings of the National Academy of Sciences of the United States of America
European Journal of Clinical Nutrition	Progresos de Obstetricia y Ginecologia
European Journal of Gastroenterology and Hepatology	Progress in Modern Biomedicine
European Journal of Haematology	Progress in Neuro-Psychopharmacology and Biological Psychiatry
European Journal of Heart Failure	Prostate cancer and prostatic diseases
European Journal of Hospital Pharmacy: Science and Practice	Psychiatrische Praxis
European Journal of Human Genetics	Psychological Medicine
European Journal of Integrative Medicine	Psychologische Rundschau
European Journal of Neurology	Psycho-Oncology
European Journal of Nuclear Medicine and Molecular Imaging	Psychosomatics
EUROPEAN JOURNAL OF OBSTETRICS and GYNECOLOGY AND REPRODUCTIVE BIOLOGY	Psychotherapy Research
European Journal of Obstetrics Gynecology and Reproductive Biology	Public health nutrition
European Journal of Orthopaedic Surgery and Traumatology	QJM
European Journal of Paediatric Neurology	QUALITY OF LIFE RESEARCH
EUROPEAN JOURNAL OF PAIN	Radiol. bras
European Journal of Preventive Cardiology	Radiological Physics and Technology
European journal of public health	Radiology
European Journal of Radiology	Rational Pharmacotherapy in Cardiology
European Journal of Vascular and Endovascular Surgery	Rehabilitacion
European Neurology	Renal Failure
European Neuropsychopharmacology	Reproductive biomedicine online
European Radiology	Research in Autism Spectrum Disorders
European Respiratory Journal	Research Journal of Pharmacy and Technology
	Respiratory medicine
	Reumatologia
	Reumatologia Clinica
	Revista Brasileira de Cardiologia Invasiva
	Revista Brasileira de Cirurgia Cardiovascular
	Revista Clinica de Medicina de Familia
	Revista clinica espanola
	Revista Colombiana de Cardiologia
	Revista Colombiana de Obstetricia y Ginecologia
	REVISTA DA ASSOCIACAO MEDICA BRASILEIRA

European Review for Medical and Pharmacological Sciences	Revista de Associacao Medica Brasileira
European Spine Journal	Revista de enfermeria (Barcelona, Spain)
European Urology	Revista de la Sociedad Espanola del Dolor
Evaluation and Program Planning	Revista de Salud Publica
Evidence Based Medicine	Revista de Saude Publica
Experimental and Therapeutic Medicine	Revista espanola de anestesiologia y reanimacion
Expert Review of Anticancer Therapy	Revista Espanola de Cardiologia
Familial Cancer	Revista Espanola de Cirugia Ortopedica y Traumatologia
Farmacia Hospitalaria	Revista Espanola de Quimioterapia
Female pelvic medicine and reconstructive surgery	Revista Espanola de Salud Publica
Fertility and Sterility	Revista Mexicana de Neurociencia
Fisioterapia	Revista Panamericana de Salud Publica
Food and Nutrition Bulletin	Revista Portuguesa de Cardiologia
Foot and Ankle International	Revista Salud Publica (Bogota)
Foot and Ankle Surgery	Revue de Medecine Interne
Fortschritte auf dem Gebiete der Rontgenstrahlen und der Nuklearmedizin	Revue de Neuropsychologie, Neurosciences Cognitives et Cliniques
Forum of Clinical Oncology	Revue des maladies respiratoires
Frontiers in oncology	Revue du Rhumatisme (Edition Francaise)
Gastroenterologia y Hepatologia	Rheumatology
Gastroenterology	Rheumatology International
Gastrointestinal Endoscopy	Risk Analysis
Gazzetta Medica Italiana	RUSSIAN JOURNAL OF CARDIOLOGY
Genetics in Medicine	Salud Publica de Mexico
Gerodontology	Salud(i)Ciencia
Ginecologia y Obstetricia de Mexico	Sarcoma
GLOBAL HEALTH ACTION	Saudi Medical Journal
Global Journal of Health Science	Scandinavian Cardiovascular Journal
Global Public Health	SCANDINAVIAN JOURNAL OF INFECTIOUS DISEASES
Gut	SCANDINAVIAN JOURNAL OF PUBLIC HEALTH
Gut and Liver	Scandinavian Journal of Urology and Nephrology
Gynecologic Endocrinology	Scandinavian Journal of Work Environment and Health
Gynecologic Oncology	Schizophrenia Research
Haematologica	Semergen
Haemophilia	Seminars in Spine Surgery
Hawaii Journal of Medicine and Public Health	Sex Education
Health	Sexual Health
Health Outcomes Research in Medicine	Sexually transmitted diseases
Health promotion international	Sexually Transmitted Infections
Health Psychology	Singapore Medical Journal
Heart	Sleep
Heart Lung and Circulation	South African Journal of Obstetrics and Gynaecology
Heart Rhythm	South African Medical Journal
Hellenic Journal of Cardiology	Spine
Hematological Oncology	Spine Deformity
Hematology/ Oncology and Stem Cell Therapy	Spine Journal
Hepatitis Monthly	SpringerPlus
Hepato-Gastroenterology	STOCHASTIC ENVIRONMENTAL RESEARCH AND RISK ASSESSMENT
HEPATOLOGY	Stroke
Hepatology Research	Supportive Care in Cancer
Hinyokika kiyo. Acta urologica Japonica	Surgery
HIP International	Surgical Endoscopy
HIV Clinical Trials	Surgical Endoscopy and Other Interventional Techniques
HIV MEDICINE	
Hong Kong Medical Journal	
Hormone Research in Paediatrics	

Hospital Practice	Surgical Laparoscopy, Endoscopy and Percutaneous Techniques
HPB	Swiss Medical Weekly
Human Reproduction	Technology in Cancer Research and Treatment
Human Vaccines	Telemedicine and e-Health
Human Vaccines and Immunotherapeutics	Theoretical biology and medical modelling
Imaging in Medicine	Therapeutic Advances in Psychopharmacology
Indian Journal of Community Medicine	Thorax
Indian Journal of Dermatology	Thrombosis and Haemostasis
Indian Journal of Medical and Paediatric Oncology	Thrombosis Journal
Indian Journal of Pharmacology	Thrombosis Research
Indian journal of public health	Tijdschrift voor Geneeskunde
Infant, Child and Adolescent Nutrition	Tobacco Control
Infection	Toxicon
Infection Control and Hospital Epidemiology	Toxins
Infectious Diseases in Obstetrics and Gynecology	TRANSACTIONS OF THE ROYAL SOCIETY OF TROPICAL MEDICINE AND HYGIENE
Inflammatory Bowel Diseases	Transfusion
Influenza and other Respiratory Viruses	Transfusion and Apheresis Science
Injury	TRANSPLANT INTERNATIONAL
Injury Prevention	Transplantation
Insights into Imaging	Transplantation Proceedings
Intensive care medicine	Trials
Internal medicine journal	Tropical Medicine and International Health
International Brazilian Journal of Urology	Tumor
International Forum of Allergy and Rhinology	Turkderm Deri Hastaliklari ve Frengi Arsivi
International Health	TURKISH JOURNAL OF MEDICAL SCIENCES
International Journal for Quality in Health Care	Ultrasound in Obstetrics and Gynecology
International journal of Alzheimer's disease	University of Toronto Medical Journal
International Journal of Antimicrobial Agents	Vaccine
International Journal of Cancer	Vakcinologie
International Journal of Cardiology	Vascular and endovascular surgery
International journal of chronic obstructive pulmonary disease	Vector-Borne and Zoonotic Diseases
International journal of clinical pharmacy	Vestnik Dermatologii i Venerologii
International journal of clinical practice	Vojnosanitetski pregled. Military-medical and pharmaceutical review
International Journal of COPD	Voprosy Onkologii
International Journal of Dermatology	Vox sanguinis
International Journal of Drug Development and Research	Wiener Klinische Wochenschrift
International Journal of Eating Disorders	Wiener Medizinische Wochenschrift
International Journal of Environmental Research and Public Health	Work
International Journal of Geriatric Psychiatry	World Chinese Journal of Digestology
International Journal of Group Psychotherapy	World Journal of Emergency Surgery
International Journal of Gynecological Cancer	World Journal of Gastroenterology
International Journal of Gynecology and Obstetrics	World journal of surgery
International Journal of Health Care Quality Assurance	World Journal of Surgical Oncology
International journal of inflammation	World Neurosurgery
International Journal of Medical Engineering and Informatics	Wounds
International Journal of Nursing Studies	ZDRAVSTVENO VARSTVO
International Journal of Obesity	Zeitschrift fur Evidenz Fortbildung und Qualitat im Gesundheitswesen
International journal of pediatric otorhinolaryngology	Zeitschrift fur Gerontologie und Geriatrie
International Journal of Pharmaceutical Sciences Review and Research	Zhongguo Shiyong Neike Zazhi / Chinese Journal of Practical Internal Medicine
International Journal of Pharmacology	Zhongguo Xinyao yu Linchuang Zazhi
	Zhongguo Zhong xi yi jie he za zhi Zhongguo Zhongxiyi jiehe zazhi = Chinese journal of integrated

International Journal of Pharmacy and Pharmaceutical Sciences International Journal of Preventive Medicine International Journal of Radiation Oncology, Biology, Physics International Journal of Spine Surgery International Journal of Stroke International Journal of Tuberculosis and Lung Disease International Journal of Urology International Journal of Vascular Medicine International Orthopaedics INTERNATIONAL UROGYNECOLOGY JOURNAL International Wound Journal IOVS	traditional and Western medicine / Zhongguo Zhong xi yi jie he xue hui, Zhongguo Zhong yi yan jiu yuan zhu ban Zhongguo Zhong yao za zhi = Zhongguo zhongyao zazhi = China journal of Chinese materia medica Zhonghua lao dong wei sheng zhi ye bing za zhi = Zhonghua laodong weisheng zhiyebing zazhi = Chinese journal of industrial hygiene and occupational diseases Zhonghua liu xing bing xue za zhi = Zhonghua liuxingbingxue zazhi Zhonghua wei chang wai ke za zhi = Chinese journal of gastrointestinal surgery Zhonghua yu fang yi xue za zhi [Chinese journal of preventive medicine] Zhonghua zhong liu za zhi [Chinese journal of oncology]
Other	
American Water Works Association Journal Child Abuse and Neglect Disasters Environment International European Journal of Operational Research Journal of interpersonal violence	Journal of Water and Health MATHEMATICAL MODELLING OF NATURAL PHENOMENA PLoS One Traffic Injury Prevention

Appendix 7 Search terms to classify cost-utility and cost-benefit analyses

The following search terms were used to classify articles within our final database of full health economic evaluations according to study type. Searches were conducted in titles and abstracts. Search terms could classify an article as a cost-utility analysis, cost-benefit analysis, both, or neither. Articles in our database which did not contain search terms for cost-utility analyses or cost-benefit analyses were categorized as cost-effectiveness analyses. Question marks ("?") represent a single wildcard character or space.

Type of analysis	Search terms implemented in Excel database
Cost-utility analysis	Cost?utility [Additionally, all results of DALY and QALY searches also included]
CUA employing DALYs	DALY, Disability?adjusted?life?year
CUA employing QALYs	QALY, Quality?adjusted?life?year, EQ?5D, SF?36, SF?12, SF?6D
Cost-benefit analysis	Cost?benefit, benefit?cost, net?benefit, net?monetary?benefit

Appendix 8 Search findings by database – all articles and databases

All searches were conducted on 3 May 2014, except for the LILACS database, which was searched on 12 May 2014. The first database listed identified the largest number of economic evaluations. Remaining databases are listed in order of those which identified the most additional economic evaluations beyond those already identified by other databases higher on the list.

Database	**Number of records identified by search**	**Number of economic evaluations meeting inclusion criteria**	**Sensitivity** (% of total economic evaluations)	**Specificity** (% of search results classified as economic evaluations)	**Additional economic evaluations** *(Beyond those found in databases higher on this list)*	**Cumulative %**
Scopus	9006	2409	85%	27%	2409	85%
NHS EED	3634	2280	80%	63%	314	96%
Medline	7566	2254	79%	30%	65	98%
Global Health	2219	691	24%	31%	19	99%
Wiley HEED	2175	1707	60%	78%	13	99%
Web of Science	8738	1852	65%	21%	6	99%
Biosis	2643	834	29%	32%	5	100%
Embase	7558	2217	78%	29%	4	100%
Cinahl	2580	1097	39%	43%	4	100%
Scielo	162	53	2%	33%	3	100%
PsycInfo	808	183	6%	23%	1	100%
EconLit	186	42	1%	23%	1	100%
Lilacs	132	42	1%	32%	0	100%
TOTAL	47,407	2844				

Appendix 9 Search findings by database – excluding NHS EED and Wiley HEED

All searches were conducted on 3 May 2014, except for the LILACS database, which was searched on 12 May 2014. The first database listed identified the largest number of economic evaluations. Remaining databases are listed in order of those which identified the most additional economic evaluations beyond those already identified by other databases higher on the list. As NHS EED ceased to update records from March 2015 and Wiley HEED ceased to be available from the end of 2014, they have been placed at the bottom of the list to permit examination of available databases.

Database	**Number of records identified by search**	**Number of economic evaluations meeting inclusion criteria**	**Sensitivity** (% of total economic evaluations)	**Specificity** (% of search results classified as economic evaluations)	**Additional economic evaluations** *(Beyond those found in databases higher on this list)*	**Cumulative %**
Scopus	9006	2409	85%	27%	2409	85%
Medline	7566	2254	79%	30%	156	90%
Global Health	2219	691	24%	31%	35	91%
Web of Science	8738	1852	65%	21%	22	92%
Embase	7558	2217	78%	29%	14	93%
Biosis	2643	834	29%	32%	7	92%
Cinahl	2580	1097	39%	43%	5	93%
Scielo	162	53	2%	33%	3	93%
EconLit	186	42	1%	23%	1	93%
PsycInfo	808	183	6%	23%	1	93%
Lilacs	132	42	1%	32%	0	93%
(NHS EED)	*(3634)*	*(2280)*	*(80%)*	*(63%)*	*(183)*	*(100%)*
(Wiley HEED)	*(2175)*	*(1707)*	*(60%)*	*(78%)*	*(8)*	*(100%)*
TOTAL	41,598	2653				

Appendix 10 Search findings by database – only articles studying low- and middle-income countries, excluding NHS EED and Wiley HEED

All searches were conducted on 3 May 2014, except for the LILACS database, which was searched on 12 May 2014. The first database listed identified the largest number of economic evaluations. Remaining databases are listed in order of those which identified the most additional economic evaluations beyond those already identified by other databases higher on the list. L&MIC: Low- and middle-income country. As NHS EED ceased to update records from March 2015 and Wiley HEED ceased to be available from the end of 2014, they have been placed at the bottom of the list to permit examination of available databases.

Database	**Number of records identified by search**	**Number of L&MIC economic evaluations meeting inclusion criteria**	**Sensitivity** (% of total L&MIC economic evaluations)	**Specificity** (% of search results classified as L&MIC economic evaluations)	**Additional L&MIC economic evaluations** *(Beyond those found in databases higher on this list)*	**Cumulative %**
Scopus	9006	428	81%	5%	428	81%
Medline	7566	380	72%	5%	40	89%
Global Health	2219	287	54%	13%	23	93%
Biosis	2643	181	34%	7%	4	94%
Embase	7558	403	76%	5%	4	95%
Web of Science	8738	316	60%	4%	3	95%
Cinahl	2580	119	23%	5%	1	95%
Scielo	162	43	8%	27%	1	96%
Lilacs	132	39	7%	30%	0	96%
PsycInfo	808	21	4%	3%	0	96%
EconLit	186	6	1%	3%	0	96%
(NHS EED)	*(3634)*	*(378)*	*(72%)*	*(10%)*	*(21)*	*(100%)*
(Wiley HEED)	*(2175)*	*(294)*	*(56%)*	*(14%)*	*(2)*	*(100%)*
TOTAL	41,598	504				

Appendix 11 Journal concentration by income group of countries studied

	LICs	Lower-MICs	Upper-MICs	HICs	All
Total articles	104	121	391	2350	2844
Avg articles per journal	2.4	2.0	1.7	2.9	2.9
Total journals	44	61	226	802	967
% articles in top 10 journals	62%	52%	27%	22%	21%
Total articles in top 10 journals	64	63	105	509	600
% articles in top 20 journals	77%	66%	38%	29%	29%
Total articles in top 20 journals	80	80	147	684	813

Appendix 12 Number and proportion of economic evaluations by type and income group

In this table, "cost-effectiveness analyses" refers to articles meeting our definition of a full economic evaluation but not containing any keywords to define it more specifically as a cost-utility or cost-benefit analysis. Articles can be classified as both cost-utility and cost-benefit analyses if they contain keywords for both. DALY: disability-adjusted life year, QALY: quality-adjusted life-year.

	Income group studied											
	LICs		Lower-MICs		Upper-MICs		HICs		Multiple income groups		Total	
Type of analysis	N	%	N	%	N	%	N	%	N	%	N	%
Cost-utility analysis (only)	51	49%	63	52%	172	44%	1391	59%	39	61.9%	**1605**	56%
DALY	44	42%	40	33%	49	13%	34	1%	28	44.4%	**112**	4%
QALY	7	7%	22	18%	120	31%	1332	57%	10	15.9%	**1465**	52%
Cost-benefit analysis (only)	5	5%	3	2%	13	3%	60	3%	1	1.6%	**79**	3%
Cost-benefit & cost-utility analysis	1	1.0%	3	2.5%	10	2.6%	57	2.4%	1	1.6%	**68**	2%
Cost-effectiveness analysis	47	45%	52	43%	196	50%	842	36%	22	34.9%	**1092**	38%
Total	**104**	100%	**121**	100%	**391**	100%	**2350**	100%	**63**	100.0%	**2844**	100%
%	3.7%		4.3%		13.7%		82.6%		2.2%		100.0%	