

*Is the indexing of economic methodology papers feasible? An investigation using NHS EED.*

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## **Abstract**

**Aim:** The aim of this project was to assess the feasibility and usefulness of indexing economics methodology papers within the context of an internet database.

**Methods:** A random sample of 180 methodology studies was selected from NHS EED and records containing bibliographic details and an author abstract (if available) were downloaded. The sample was split into 4 batches of 45 references, stratified by date of publication. Each batch was assigned to a reviewer who assessed records according to the proposed indexing system. Once assessed the batch was re-allocated to a second blinded reviewer. The index terms for each record were compared and the degree of agreement analysed. The analysis was also conducted on a sub-group of papers (138) which excluded potential misclassifications.

**Results:** Reviewer agreement at some level of indexing was 78.9% for the full sample (n=180) and 96.4% for the sub-sample (n=138). Full agreement across all indexing was rare. In addition the indexing scheme was too specific in some areas and too broad in others, with the result that indexing some concepts did not really help the searcher in terms of focusing down the number of records retrieved.

**Conclusions:** Appropriate indexing was hindered by narrow definitions of the more specific indexing terms lower down the hierarchy and inadequate information with which to index because of the lack of availability of some abstracts. A revised indexing system has since been devised which seeks to achieve better focus in problem areas. This will be evaluated prospectively.

## **Introduction**

The aim of the project was to investigate the feasibility and practical aspects of undertaking further indexing of NHS EED records classified as 'methodology papers', whilst generating debate and discussion on the usefulness of such indexing. A large number of economics methods papers are published each year and, as part of the NHS EED process, a high proportion of these papers are identified and classified as 'methodology papers', and subsequently have their bibliographic details loaded onto the database. As at 30<sup>th</sup> November 2007, there were 1,803 methodology records on the database (<http://www.york.ac.uk/inst/crd/crddatabases.htm>).

The Campbell & Cochrane Economics Methods Group (CCEMG) is an emerging international network of researchers, clinicians and other health care decision-makers with a shared interest in the interfaces between economic evaluation and systematic review methods. Part of the core functions of CCEMG's role, as a Methods Group within The Cochrane Collaboration, involves providing guidance, based on empirical evidence on methodological decisions feeding into the production of economics components of Cochrane Reviews. The Cochrane Collaboration promotes the idea that, as well as drawing on the expertise of CCEMG members, the maintenance of a bibliography of relevant methodology studies can facilitate such guidance<sup>1</sup>. However, the breadth and depth of the health economics methods literature makes it difficult to identify all studies relevant to a particular methodological issue, or area, within an unindexed bibliography of studies.

There are close organisational links between NHS EED and CCEMG, specifically NHS EED is published as part of The Cochrane Library and CCEMG has, since its inception, advocated that authors of Cochrane Reviews should undertake searches of the database in order to identify and use relevant studies that provide evidence on economics aspects of interventions. Several NHS EED staff and associates are also prominent members of CCEMG. In addition, given that identification and classification of papers as 'methodology papers' is already part of the NHS EED process, to avoid duplication of effort, and due to the potential added benefits to the users of the database, NHS EED appeared to be an appropriate vehicle with which to pilot the further indexing of economics methods papers.

## **Methods**

A three-tier indexing system was proposed, with the first level being simply record type (in other words, is the paper a methodology paper?) The second tier focused on study type and was broken down into two mutually exclusive indices, namely: papers focusing on a single methodology or methodological framework, and papers focusing on a review of alternative or competing methodologies. This second tier was conceived as an attempt to convey to the end user the study design underpinning each methodology paper.

The third tier of the indexing system comprised 23 possible indices, which were not considered to be mutually exclusive. The indices were based primarily on the CCEMG Registration Document <sup>2</sup>, which sets out the scope of the Methods Group to include representation of skills, and development and testing of methods, across a range of economics methods issues judged relevant to the conduct of Cochrane and Campbell Reviews and the subsequent use of their results.

Indexing, in this instance, was based on either the title alone or the title and author's abstract (if available) and was undertaken retrospectively using an existing sample of NHS EED records of methodology papers. This is the practice of classification in NHS EED. The NHS EED process was followed as far as possible due to the use of NHS EED records in evaluating the indexing system. The aim of the database is to identify full economic evaluations and to produce a critical structured abstract of the full paper<sup>3</sup>. Therefore, full hard copies of methodology papers are not always obtained, as they are often not needed in order to make a classification of 'methods paper', and would be prohibitively costly. This is an important factor in this instance, as further indexing by methodological topic area is outside of the remit of the current database.

A random sample of 180 methodology studies spanning the lifetime of the database was selected, and records containing bibliographic details and an author abstract (if available) were downloaded. This represented approximately 10% of records classified as methodology papers on the database at that time. The sample was then subdivided into 4 batches of 45 references, stratified by date of publication. Each batch was assigned to a reviewer who assessed records according to the proposed indexing system. Once assessed, the batch was then re-allocated to a second reviewer who undertook their indexing whilst blinded to the decisions of the first reviewer. Subsequently, the index terms for each batch were compared using an Excel spreadsheet and the degree of agreement was analysed according to the following five categories: See box for results.

- Category 1: Full Agreement
- Category 2: Agreement on Study Type plus at least one Methodological Topic
- Category 3: Agreement on Study Type only
- Category 4: Disagreement on Study Type but agreement on at least one Methodological Topic
- Category 5: No agreement

In addition to the main analysis, it was decided post-hoc to conduct an analysis based on a sub-group of papers (138) which excluded papers potentially misclassified as methodology papers on entry to the database, see box. This sub-group analysis appeared justified given that, during the lifespan of the database, classification categories have changed, which means that some papers originally classified as methodology papers would no longer be considered as such. In addition, prior to the establishment of stricter inclusion criteria for methodology papers, other papers considered 'too useful to discard' by the NHS EED team had been included in this classification by default.

## Results

The results for the full sample and sub-group analyses are given in the following table.

Category	Original Sample (n=180)		Reduced Sample (n=138)	
	n	%	n	%
Category 1	27	15.0	19	13.8
Category 2	53	29.4	53	38.4
Category 3	20	11.1	19	13.7
Category 4	42	23.4	42	30.4
Category 5	38	21.1	5	3.6

Table 1: Results for full sample and sub-group analyses

Reviewer agreement at some level of indexing was 78.9% for the full sample (n=180) and 96.4% for the sub-sample (n=138). Whilst there was general agreement among the reviewers that it was fairly straightforward to classify studies at the first level of indexing, there was often some level of disagreement at either level two, or level three, or both. Full agreement across all indexing was rare.

With respect to level two, the main source of disagreement was that several papers appeared to overlap the two potential indices, which had been intended to be mutually exclusive. Several papers reported a comparison of alternative methods but were not based on a review. Often, methodologies were compared in the context of their application within a single study, or with reference to several case study examples of their application. Additionally, there were also some papers that were clearly based on a review of the use of alternative methods in the published literature<sup>4</sup> and others which focused on a single method, or methodological framework, which had been informed by a review of published studies. These findings highlighted a deficiency in the proposed classification system at this level. Both the piloted indices and the revised indices, which are currently being evaluated prospectively, are outlined below.

### Piloted Indexing Level Two – Study design

- A. *Methodology study* - paper focuses on use of a single method/ methodological framework
- B. *Methodology review* – paper focuses on a review of alternative (or competing) methodologies

## **Revised Indexing Level Two – Study design**

- A. *Methodology study 1* - paper focuses on use of a single method/methodological framework, which may include application of the method in an empirical study or using one or more case studies.
- B. *Methodology study 2* - paper focuses on a comparison of alternative (or competing) methods/ methodological frameworks, which may include application of the methods in an empirical study or using one or more case studies.
- C. *Methodology review 1* - paper focuses on use of a single method/ methodological framework, informed by a review of its application in published studies.
- D. *Methodology review 2* - paper focuses on a comparison of alternative (or competing) methods/ methodological frameworks, informed by a review of their application in published studies.

The use of the indexing system also highlighted some further deficiencies and potential gaps in the level three index terms and the need for fine tuning of some terms. Within level three, the indexing system appeared too concept-specific in some areas and too broad in others, with the result that some indices may not necessarily assist database users to the degree that was intended in terms of retrieving records relevant to their specific areas of interest. Level three was concerned with the various methodological topics and, from the outset of the pilot project, it was anticipated that additional index terms might be required. The level three indexing terms used in the pilot phase are presented below.

## **Piloted Indexing Level 3 – Methodological topic(s)**

### *Methods for reviews of published economic analyses:*

1. Methods for reviews of published economic analyses: overall frameworks/ approaches
2. Methods for reviews of published economic analyses: search and retrieval methods
3. Methods for reviews of published economic analyses: assessment of methodological quality
4. Methods for reviews of published economic analyses: data extraction
5. Methods for reviews of published economic analyses: data analysis
6. Methods for reviews of published economic analyses: presentation of results
7. Methods for reviews of published economic analyses: interpretation of results

### *Economic evaluation methods:*

8. Economic evaluation methods: general frameworks/ approaches
9. Economic evaluation methods: disease specific approaches
10. Economic evaluation methods: trial-based methods
11. Economic evaluation methods: economic modelling methods
12. Economic evaluation methods: econometric methods
13. Economic evaluation methods: qualitative methods

14. Economic evaluation methods: economic interventions
15. Economic evaluation methods: costing methods
16. Economic evaluation methods: outcome measurement and/ or valuation
17. Economic evaluation methods: handling uncertainty
18. Economic evaluation methods: presentation and interpretation of results
19. Economic evaluation methods: externalities
20. Economic evaluation methods: distributional impacts

*Other economics methods issues:*

21. Generalisability and transferability
22. Publication bias
23. Applications of economics in health care decision-making (e.g. policy or clinical guideline development, or clinical practice).

Level three classifications were not intended to be mutually exclusive, and a significant number of the papers were indexed under more than one term. Several papers were indexed under both 8) Economic evaluation methods: general frameworks/ approaches; and 9) Economic evaluation methods: disease specific approaches. These were usually papers that described one or more general methodological approach(es)/framework(s) and also application of the general approach(es)/framework(s) in a specific disease area. Although, in principle, the decision had been made to allow the use of multiple index terms, in this particular case the use of both terms seemed counter-intuitive. The decision was therefore taken to fine tune these terms for use in the next, prospective phase of piloting. This was achieved by replacing '9) Economic evaluation methods: disease specific approaches' with 'Economic evaluation methods: disease specific applications'. Therefore, papers focusing on the application of general approaches in a specific disease area and those which focused on methods designed for a specific disease area (which could not be applied more generally) could both be indexed under this term.

We also added several new indexing terms which were felt to be missing, but relevant, for use in the next, prospective phase of piloting. These included:

1. Value of Information methods
2. Analytic perspective
3. Grading economics evidence
4. Health care performance and management

Additionally, we deleted '14) Economic evaluation methods: economic interventions' as it was not used throughout the pilot and reviewers believed that there are unlikely to be any economic methods, specific to such interventions, which could not be applied more widely. The presentation and interpretation of results, index term '18', was split into two terms, one for presentation and one

for interpretation. There was lengthy discussion about the possibility of further sub-indices for the 'costing methods' index term. However, at this stage, it was decided that no further sub-indexing of this term would be conducted.

## **Discussion**

There are several potential benefits to be gained from further indexing of methodology papers in NHS EED. For experienced Health Economists (HEs), it has the potential to assist in speedy identification and retrieval of relevant records, or to facilitate identification of emerging methodology. However, it is worth noting that there may be issues around the indexing of new methodology, particularly if the indexing system requires continual evolution of the indices. Additionally, the user would need to know that the new emerging methodology existed in order to search for it. No level of indexing can assist in the identification of something that is not known to the searcher.

However, for inexperienced researchers involved in reviewing methods papers, there remains a question as to whether further indexing would really help? It seems appropriate to suggest that, in order to search efficiently, a searcher would require some knowledge of what they are searching for. Also, it seems logical to assume that some degree of understanding of the methodology will be required in order to assess the validity and relevance of what has been retrieved by the search. Therefore a further important question would be "is indexing sufficient?", or would it be more valuable to provide some form of structured overview of the original paper, as is done currently in the case of full economic evaluations. A critique may prove difficult, but alternative methods of obtaining critical commentaries could be investigated. This then leads on to determining what the aim of such a database would be. Potentially it could be twofold; firstly to allow easy identification and retrieval of methodology records, and secondly to help educate the database user in the methodology of economic evaluation.

A significant body of evidence exists that suggests that high numbers of poorly conducted economic evaluations exist in the published literature<sup>5-7</sup>. The potential reasons for this are many and varied; however, it is possible that one of the issues may be incorrect use of, or a lack of understanding of the methodology<sup>8</sup>. Could a database of structured commentaries on methodology papers be a means by which to provide some guidance to the wider research community in terms of what HEs regard as relevant methodology? This is a question that is outside the scope of this paper. However, we hope that this paper may serve as a catalyst to generate some debate, and that this debate may, in turn, provide some guidance for the next stage in the process.

The Cochrane Database of Systematic Reviews includes systematic reviews of methodological issues. To qualify for inclusion a review must evaluate the effects of applying alternative methods on reviews of effectiveness or on other studies designed to answer questions on choice of forms or



programmes of care. Comparative reviews of economic methods could qualify as Cochrane Methodology reviews. The first step towards this would be to identify previous reviews and methodology studies in the area concerned: this could be assisted by a system of classification and data extraction such as we have suggested.

If a database of methodology papers were to be developed, it would be likely to have several different target audiences, for example, health economists, other researchers, and decision-makers/users of economic evaluations. Some of the potential benefits to these groups of users are outlined below.

Currently, keeping up-to-date with continually evolving economic methods can be a time-consuming process. Many HEs have interests which could be grouped into specific areas, which could potentially match the proposed indexing system closely. Therefore, in theory, it should be possible for researchers to register their interests and receive monthly updates listing new methodology papers that have been added within that particular sphere. This would provide individual researchers with an easy means of obtaining new references to methodology papers of interest. Providing bibliographic references to this target audience could potentially be useful and time-saving.

For the other two potential audiences identified above, it is not clear that a bibliographic reference would be sufficient, as it is likely that individuals in these groups may not have the same level of knowledge and understanding of economic methods as HEs. Could a methodological database, that included a short structured abstract, have the potential to serve as an educational tool for individuals whose primary discipline is not health economics? A wider understanding of economic methodology could lead to wider acceptance of economic evaluations.

Currently, work is in progress to develop and improve the proposed indexing system by using it prospectively in a real-time environment. It is hoped that this prospective trial will assist in overcoming some of the problems identified in the initial stage of the project. It is also hoped that, once this prospective evaluation of the proposed system is complete, and the feasibility and usefulness of the project have been established, it can be implemented, either by incorporating the indexing system into the existing NHS EED, or by establishing a stand-alone database. There are several outcomes that the authors hope to achieve from the discussion of this paper, including:

- 1) to canvass wider opinion on the usefulness of further indexing of methodology papers in general
- 2) to elicit further thoughts on the proposed classification system and on whether the current indices it uses are appropriate and sufficient
- 3) to ascertain the views of other HEs regarding potential uses of a database of methodology papers, in particular:

- a. What would be the specific aims of such a database?
- b. Who would be the target audience?
- c. What would be the most useful content and format?

The responses to these questions will form the basis of further work and it is hope that, in conjunction with the present study, this will provide enhanced understanding and utility for those wishing to access health economics methodology papers.

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