

# ***Bibliography of Bioethics and Index Medicus:* Comparison of Coverage, Publication Delay, and Ease of Recall for Journal Articles on Bioethics**

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## ABSTRACT

Citations selected from the bibliographies of recent texts, a specialized subject bibliography, and review articles were checked in both *Cumulated Index Medicus (IM)* and the *Bibliography of Bioethics (BB)* to compare coverage, publication delay, probable causes of indexing and retrieval failure, and the ease with which relevant citations were retrieved. The study also attempted to determine whether *BB* included appropriate articles from the MEDLINE database in a timely and systematic manner. While 98% of the *IM* citations appeared within a year of publication, 79% of the *BB* citations appeared two to three years after their publication dates. The average citation appeared twice as frequently in *IM* as in *BB*.

**INTEREST** IN the complex interdisciplinary issues of bioethics has grown rapidly since the late 1960s. Much of this increased concern may be attributed to the rapid technological advances that support diagnoses, treatment, and the prolongation of life and the unconscionable increase in the cost of this improved health care.

In less than a generation, ethics has grown far beyond a simple code of professional conduct for the health care practitioner. Bioethics now encompasses patient rights, research ethics, the social impact of new technologies, and controversies about what constitutes life itself. Articles on bioethics have proliferated throughout the professional literature of medicine, law, philosophy, religion, sociology, and biology. In addition, many important articles on bioethics appear regularly in the popular media.

The wide dispersion of this literature and the difficulty of accessing it through commonly available indexes prompted this study. A 1976 editorial in the *Annals of Internal Medicine* suggested that bioethics, one of a growing number of topics referred to as the "other literature of medicine," is not well covered by such indexes as *Index Medicus* and *Excerpta Medica* [1]. The editorial implied that the health care professional who relies solely

on these narrow biomedical indexes will overlook much significant material. Walters, a developer of the *Bibliography of Bioethics*, responded to this editorial by reporting that only 24% of the 1,200 documents in Volume II of the *Bibliography of Bioethics* appeared in publications indexed by *Index Medicus* [2]. Gardner and Goodyear reported a study reinforcing the notion that interdisciplinary coverage cannot be easily accomplished even through numerous indexes [3].

## PURPOSE OF THE STUDY

Although the *Cumulated Index Medicus (IM)* and the *Bibliography of Bioethics (BB)* vary considerably in scope and purpose, their value to the bioethics researcher is clear: they are the two major print indexes attempting to cover this dispersed literature. This study compared these indexes in terms of coverage, publication delay, probable causes of indexing and retrieval failure, and the ease with which relevant articles are retrieved.

This study also attempted to discover to what extent *BB* included appropriate articles from the MEDLINE database. Although the selection procedure was not presented in detail in any of the sources consulted [4-6], the *BB* front-matter states that MEDLINE is searched for relevant citations, which are then included in its printed version and its cumulated online format, BIOETHICSLINE.

## METHODOLOGY AND RESULTS

### *The Citation Population*

References appearing in the bibliographies of twenty-five selected review articles, four recent texts, and a specialized subject bibliography were examined. The review articles were selected from those appearing in *IM*'s "Bibliography of Medical Reviews" between 1974 and 1983 under the headings ethics, medical ethics, professional ethics, human rights, human experimentation, and

informed consent. The four recent general texts on bioethics were selected for their currency and the large bibliographies they contained [7-10]. The specialized subject bibliography, the *Bibliography of Society, Ethics and the Life Sciences*, contributed by far the largest number of citations to the population [11].

The entries selected for analysis were restricted to periodical articles in English that were published between 1973 and 1982 and cited by personal authors. Articles were restricted to English because unlike *IM*, *BB* excludes foreign language documents.

#### Sample Selection and Description

Of the 698 citations randomly selected for the samples, 205 (29%) were from recent texts, 292 (42%) from the specialized bibliography, and 201 (29%) from review article bibliographies. Six hundred fifty were unique, but 48 were represented two or more times in the sample.

While only 25% of the citations were published during 1978-1982, the decline from the 54% published during 1975-1977 should not be interpreted as evidence of a decrease in the number of bioethics articles. This may reflect a time lag between an article's publication and citations to it. This especially applies to monographs and review articles. Although the publication dates of many sources were quite recent, the contents of the works were often already several years old. Another factor contributing to the large number of older citations is the fact that the *Bibliography of Society, Ethics, and the Life Sciences* contained only eight citations with publication dates later than 1977. Citations from that work constituted 42% of the sample.

It was originally assumed that the citations would be complete and accurate, but many mistakes were detected, and these proved time-consuming to resolve. They included misspellings of authors' names, inconsistent use of one or two initials, and incorrect citation of journal titles, and even inconsistent citing of the article title. Another problem was that the indexes occasionally differed in whom they cited as the primary author for a collaborative work.

#### COVERAGE OVERLAP

A combined list from all three source types—articles, texts, bibliography—was compiled and arranged alphabetically by the authors' surname within each year of publication. After all citations had been checked in both indexes, the data were analyzed and the following coverage code was

added for each citation: 0 = located in neither index; 1 = located in *IM* but not *BB*; 2 = located in *BB* but not *IM*; 3 = located in both indexes. As indicated in Table 1, approximately one third of the citations were found in both indexes; 17% were found in neither index; 28% were found in *IM* only and 21% were found in *BB* only.

A "coverage factor" was calculated for each index by adding the number of citations located in each index to the base of citations found in both indexes and dividing the total by the number of citations in the sample. This figure was then expressed as a percentage. Thus, for *IM*, the coverage factor was calculated to be 62%  $[(198 + 236) \div 698 \times 100]$ , while for *BB* it was 54%  $[(144 + 236) \div 698 \times 100]$ . These coverage factors seem fairly high, considering that a portion of the citations not in the indexes are ancillary to bioethics and appear in journals not regularly indexed by either tool. Those who write about bioethics do not always cite materials that refer directly or exclusively to bioethics. A small percentage of the citations used to evaluate the coverage of *IM* and *BB* cannot, therefore, truly be considered part of the literature of bioethics and would not be within the scope of either tool.

#### COVERAGE FAILURE

Two types of coverage failure were investigated: citations found in neither index, and citations found in *IM* but not in *BB*. While *BB* indexes numerous journals and other types of publications not covered by *IM*, this study concentrated on ascertaining the extent to which *BB* selected appropriate citations from *IM* and how quickly these citations appeared in *BB*.

#### Citations Found in Neither Index

The list of 120 citations not found in either index was sorted by the name of the source journal (Table 2). A "failure factor" was calculated by adding the number of omitted citations from journals covered by only one index to the number of omitted cita-

TABLE 1  
BREAKDOWN OF CITATION LOCATION DATA  
BY INDEX (N = 698)

Location	No. Found (%)
Both indexes	236 (34)
Neither index	120 (17)
<i>IM</i> only	198 (28)
<i>BB</i> only	144 (21)

TABLE 2  
POSSIBLE COVERAGE FAILURES: CITATIONS FOUND IN  
NEITHER INDEX (N = 120)

Journals	No. Citations Not Located (%)
Indexed regularly by neither	58 (48)
Indexed regularly by <i>IM</i> only	10 (8)
Indexed regularly by <i>BB</i> only	17 (14)
Indexed regularly by both	27 (23)
Indexing status unclear	8 (7)
Total	120 (100)

tions from journals regularly covered by both indexes. This number was divided by the total sample size and converted to a percentage. The failure factor for *IM* was calculated to be 5.3%  $[(10 + 27) \div 698 \times 100]$ ; for *BB* it was 6.3%,  $[(17 + 27) \div 698 \times 100]$ .

#### Citations Found in *IM* but not *BB*

In another measure of coverage failure, journal titles for articles found only in *IM* were compared to the journals titles regularly indexed by *BB*. Of these 198 articles, 102 (52%) were published in *BB* journals. If *BB* were selecting citations on bioethics as a matter of course from the database producing *IM*, the number of citations appearing only in *IM* would presumably be smaller. Not all of these titles are within the scope of *BB*, but a large percentage of them appear to be coverage failures.

No clear pattern emerged to explain why many articles were indexed in neither tool or why many were not included in *BB* even though they had appeared in *IM* earlier. Two neglected titles, *Science* and *Scientific American*, are selectively indexed by *IM*, and presumably by *BB* as well. This could account for the indexes' omission of several citations that were apparently unrelated to the health sciences or bioethics. However, two obviously valid citations from these journals were not indexed.

More puzzling is the large number of overlooked citations from journals known to be indexed cover-to-cover by *IM* and regularly indexed by *BB*—such periodicals as *Hastings Center Report*, *Journal of the American Medical Association (JAMA)*, *Lancet*, *Nature*, and *New England Journal of Medicine (NEJM)*. A number of missed articles were not substantial (many were letters and editorials), although an equal number of like documents were indexed by both tools. Some were clearly coverage failures.

One possible explanation for the apparent failures from the *Hastings Center Report* is that many of the articles tend to have multipart titles with "busy" typography that may contribute to different interpretations. To a lesser extent, this is also true of letters and editorials in journals such as *JAMA*, *Lancet*, and *NEJM*. They often have uniform titles or headings that are not cited consistently. A more scrupulous search for these articles might reduce the number of apparent coverage failures.

#### INDEXING DELAY

The time lag between an article's publication and its citation in the indexes is caused by several factors. Because the preparation and publication of the two indexes differs significantly, only infrequently does a citation appear in *BB* and *IM* in the same year. The first volume of *BB*, published in 1975, covers works published through 1973. This two-year lag pattern continued until recently; a one-year delay is now more common. Table 3 compares the raw delay for citations in both tools.

To ascertain the delay between the time the articles were published and the time they were cited in the indexes, the publication year for each citation was compared with the date of the index in which it was found (Table 4).

This comparison shows that 98% of the *IM* citations appear no later than one calendar year after publication, while 79% of the *BB* citations appear two to three years after publication. Therefore, *IM* is the index of choice when currency of

TABLE 3  
CITATIONS BY INDEX YEAR

Index Year	<i>IM</i> Citations Found (%) (N = 434)	<i>BB</i> Citations Found (%) (N = 380)
1973	21 (5)	— —
1974	40 (9)	— —
1975	43 (10)	40 (11)
1976	95 (22)	43 (11)
1977	87 (20)	65 (17)
1978	54 (12)	109 (29)
1979	44 (10)	59 (15)
1980	24 (6)	22 (6)
1981	16 (4)	26 (7)
1982	10 (2)	14 (4)
1983	— —	2 (1)
Totals	434 (100)	380 (101)

TABLE 4  
COMPARISON OF CITATION DELAY

Citation Delay Category	<i>IM</i> Citations Found (%)	<i>BB</i> Citations Found (%)
Year of publication	273 (63)	— —
1 year later	152 (35)	70 (18)
2 years later	9 (2)	279 (73)
3 years later	0 —	21 (6)
4 years later	0 —	5 (1)
5 years later	0 —	3 (1)
6 years later	0 —	0 —
7 years later	0 —	2 (1)
Totals	434 (100)	380 (100)

information is important. Obviously, for researchers seeking journal article citations, the monthly version of *IM* has a clear advantage over the annual *BB*.

#### EASE OF RECALL

Efficiency and effectiveness of citation recall is as important as coverage. In an effort to measure the dispersion of the citations throughout the indexes under various subject headings, a method was devised to count the number of times each citation appeared and to calculate averages.

The 236 citations found in both *IM* and *BB* were searched in MEDLINE. The MEDLINE data were first examined by year and then by author's name in an effort to reduce the number of unwanted articles by each author and articles by different authors with the same name. This strategy yielded 158 usable citations; the search rejected those articles whose year of publication differed from the year it was added to MEDLINE. It was assumed that this analysis based on 67% of the citations indexed in both tools was sufficiently representative to reflect a general pattern of dispersal. The number of major descriptors for each citation was tallied, this number being equal to the number of times each article citation appears under a different subject heading in the printed *IM*.

The 158 citations were then checked in the author indexes of *BB*, which roughly indicate the number of times a citation appears in the tool by the different page numbers listed for it. However, this method is limited in that it does not reveal the number of unique headings under which the citations are dispersed (that is, citations on a single page could be under several headings).

The average number of times each citation

appeared in *IM* and *BB* was calculated. For *IM* this was under 2.6 different headings ( $411 \div 158$ ), while for *BB* the number is exactly half that: 1.3 ( $211 \div 158$ ). It can be seen from Table 5 that almost three quarters (72%) of *BB* entries appear under only one heading, while in *IM* 52% appear under at least three headings. It cannot be assumed, however, that this indicates that one is twice as likely to find the citation in *IM* than in *BB*.

#### DISCUSSION

Citations selected from recent texts, a specialized subject bibliography, and review articles were checked in both the *Cumulated Index Medicus* and the *Bibliography of Bioethics*. This study attempted to compare the coverage of English-language journal articles published between 1973 and 1982.

A coverage factor of 62% for *IM* and 54% for *BB* was established. Indexing lag is the delay between the publication of a work and the appearance of a citation to it in the indexes. In *IM*, 98% of the citations appear not later than one calendar year after publication, while in *BB* 79% of the citations appear two to three years after publication. Of the *BB* citations that were also indexed in *IM*, 43% appeared in *BB* two years after their publication in *IM*.

In studying a subset of the 236 citations indexed in both tools, the average number of times each citation appeared in *IM* under different headings was found to be 2.6, while for *BB* the number was exactly half that: 1.3 times. An apparent coverage failure factor for *IM* was calculated to be 5.3%; the factor for *BB* was 6.3%. Finally, no clear evidence was found to explain why many relevant *IM* citations never appeared in *BB* or why some appeared there only after a long delay.

TABLE 5  
NUMBER OF HEADINGS UNDER WHICH  
CITATIONS APPEARED

No. of Headings	<i>IM</i> Citations (%)	<i>BB</i> Citations (%)
1	25 (16)	113 (72)
2	51 (32)	38 (24)
3	54 (34)	6 (4)
4	19 (12)	1 (1)
5	8 (5)	0 —
6	1 (1)	0 —
Totals	158 (100)	158 (101)

Researchers will continue to use both the *Bibliography of Bioethics* and *Index Medicus* as the major indexes to the literature of bioethics. Each index has its strengths: *BB* contains abstracts and covers many periodicals and types of materials not covered by *IM*; *IM* indexes articles more rapidly, contains foreign-language materials, and is published more frequently. Although it seems unlikely that one would replace the other, *BB* could enhance its value greatly by adopting a more systematic method for selecting articles from MEDLINE and publishing them the same year that they appear in *IM*. *BB* could improve citation retrieval by using more indexed subject headings for each item and by including foreign-language materials.

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