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Title: What is generated and what is used: a description of public health research output and citation.

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Abstract

The aim of this study was to describe the output and citation rates of public health. Data-based publications and literature reviews from the year 2008, and their 5 year citation rates were extracted from 10 randomly selected public health journals. In total, 86.2% of publications were descriptive/epidemiological studies, 3.0% were studies pertaining to measures, and 10.8% were intervention studies. The most common research studies used cross-sectional (56.8%) designs and 77.8% were classified as research translation stage 2 (T2). Reviews and publications describing RCTs were the most highly cited, but were infrequently published.

Keywords: public health, citation, bibliographic, translation, research impact

Introduction

Internationally, billions of dollars are invested in public health research. Despite this, only a small proportion of research leads to changes in health care practice.[1] Bibliographic studies are a useful tool to monitor research output and identify research priorities within scientific disciplines. A number of such studies have previously been conducted in the public health field and have suggested the need for a greater focus of public health research activity towards intervention trials, replication, and dissemination studies.[2, 3]

Citation rates represent an objective measure to assess the use and academic impact of published research.[4, 5] While this metric has been frequently used in bibliographic reviews of medical disciplines to describe research impact,[6-8] no recent studies have used citation rates to characterise the impact of research in the field of public health. Monitoring both research output and citation rates is important to inform strategies to improve the quality, relevance and impact of research in this field.[9, 10] As such, the aim of this study was to describe the output and citation rates of public health research by study type, research design, and research translation stage characteristics.

Methods

Design

A cross-sectional bibliographic study was undertaken in 2013.

Sample

Ten public health journals listed in the 2008 *'Journal Citation Reports – Web of Science'* database in the category *'Public, Environmental and Occupational Health'* were randomly selected using a computerised random number generator.[11] Journals not published in English or those focussing on environmental or occupational health were excluded.

All data-based papers published in the ten selected journals for the year 2008 were eligible for inclusion, as were reviews of scientific research. Data-based publications were defined as original research manuscripts presenting new data (quantitative or qualitative) such as epidemiological studies and research trials.[2, 3] Non-data-based manuscripts, such as editorials or commentaries, were excluded.

Data collection

The abstracts of all manuscripts published in the ten journals in 2008 were extracted. Two reviewers independently screened the abstracts to identify eligible publications and extract data. Full texts were obtained if required. The academic database 'Scopus' to access 5-year citation data for all included publications

Measures

Study type

Consistent with previous studies,[2, 3] publications were classified as being: descriptive/epidemiology research; measurement research; or intervention research.

1. *Descriptive/epidemiological research* (including reviews) – examines the frequency, patterns, predictors or correlates related to a health behaviour, disease, illness or injury.

2. *Measurement research* (including reviews) – describes the psychometric properties or measurement characteristics of instruments used to assess psychological constructs, behaviours, physiology or other outcomes.

3. *Intervention research* (including reviews) – examines the effects of a trial.

Papers focusing on both descriptive/epidemiological and measurement issues were classified as measurement research. Publications focusing on both descriptive/epidemiological and intervention issues were classified as intervention research.

Research Design

The research design of included studies were categorised using definitions included in seminal methodological texts.[12, 13]

1. *Systematic reviews/meta-analysis* – reviews using a systematic and explicit method to identify, appraise and synthesise research with or without meta-analysis.

2. *Non-systematic reviews* – reviews which do not use systematic and explicit methods.

3. *Randomised controlled trials* – including cluster randomised trials

4. *Non-randomised trials* –using non-randomised means of group or individual allocation to conditions (e.g. quasi-experimental designs, time series), or intervention studies without a parallel comparison (e.g. before and after studies).

5. *Cohort studies* – studies reporting on a population that have or may be exposed, or not exposed, to a factor hypothesised to affect the probability of a disease or other outcome.

6. *Cross-sectional studies* – studies examining the prevalence or relationship between a disease or other health related characteristic, and variables of interest in a defined population at one point in time.

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7. *Decision/cost-effectiveness studies* – studies estimating the health consequences of alternate actions, or the economic costs per gain in health status.

8. *Other study designs* – research designs such as case-control studies, or case studies.

Translation stage

The research translation focus of publications were coded using the translation stages (T1-T4) endorsed by the National Institute of Health (NIH) and Institute of Medicine (IOM).[14] The translation stage was assessed using the primary aim and outcomes reported in a publication.

1. *Translation stage 1 (T1)* – laboratory-based or basic-science studies that lead to studies conducted in humans (e.g. Phase 1 and 2 clinical trials, animal research). Such studies are unlikely to be published in public health journals.

2. *Translation stage 2 (T2)* – human studies that lead to the development of evidence-based guidelines (e.g. efficacy research, epidemiological research).

3. *Translation stage 3 (T3)* – studies examining ways of moving established guidelines and best practice recommendations into health practice (e.g. effectiveness research, dissemination research, implementation research)

4. *Translation stage 4 (T4)* – studies that examine how changing health practice leads to changes in populations (e.g. public health outcomes research, policy and impact research).

Citation rates

The academic data-base 'Scopus' was used to retrieve 5-year citation rates (i.e. for the year 2013) for all included studies.[15]

Statistical Analysis

All analysis was undertaking using SAS9.3 (SAS Institute Inc., Cary NC, USA). Descriptive statistics were used to describe the characteristics of included publications. Analysis of Variance (ANOVA) was used to examine differences in mean citations by study type, research design and translation stage characteristics. All significance tests were two tailed using an alpha of 0.05 and allowed for clustering by journal.

Results

Of the 1648 publications screened, 1204 were original data-based studies or reviews and were included in the study. When classified by study type, the majority of publications met the

criteria for descriptive/epidemiological research (*n*=1038, 86.2%). Cross-sectional studies were the most commonly employed research design (*n*=683, 56.8%), followed by cohort studies (*n*=191, 15.9%). Over 75% of research focussed on translation stage 2 (T2) (*n*=937, 77.8%) (see Table 1).

Citation rates

There were significant differences in 5-year citation rates between publications by research design (p<.001), but not by study type or translation stage. Mean citation rates were highest for intervention studies (*M*=22.9) relative to other study types. When examining mean citation rates by research design, systematic reviews/meta-analysis had the greatest 5-year citation rates (*M*=40.2), followed by non-systematic reviews and RCTs (*M*=30.2 and *M*=25.6 respectively) (see Table 2).

Discussion

Consistent with findings in the medical literature,[6, 8, 16] the study found discordance between public health research output and research citation by study type, research design and translation characteristics. While intervention studies, publications reporting systematic reviews and RCTs, and research focussing on translation stage 4 were the most highly cited, they were infrequently published. Furthermore, 57% of all publications described cross-sectional studies – far exceeding that of other research designs with similar citation rates.

The infrequent publication of intervention trials (particularly RCTs) and T4 research may reflect the greater time, resources and complexities of conducting such studies relative to other research, or the need for a strong epidemiological base to guide intervention development prior to conducting trials.[17, 18] Nonetheless, the findings suggest that consideration should be given as to whether a shift towards the generation of research with greater academic impact would better serve the public health field. A number of strategies could be employed to better align public health research production with impact, including changes to funding schemes and enhanced opportunities to present and publish research, such as studies focussing on translation stage 4.[19, 20] Our findings suggest that the implementation and evaluation of such strategies is warranted.

Conflict of interest

The authors declare that they have no conflict of interest.

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