

Shifts in the Use of Population Health, Health Promotion, and Public Health

A Bibliometric Analysis

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ABSTRACT

Objective: Bibliometric analysis can be used to objectively compare the usage of terms over time. The purpose of this research was to compare the use of population health, health promotion, and public health using bibliometric indicators of the published literature.

Methods: Bibliometric indicators, such as scientific productivity and the overlap between the terms, were analyzed in the Web of Science. Indexing of population health, health promotion, and public health was explored in MEDLINE, CINAHL, and EMBASE.

Results: The most productive country in population health was Canada, while the most productive country in health promotion and public health was the United States. The number of published articles using the public health term was surpassed by health promotion around 1990. Both were surpassed by population health around 2000. Population health was the only concept which lacked an index term in all three databases.

Discussion: There has been a shift in the usage of public health, health promotion, and population health concepts over time. Country analysis revealed that Canadian researchers are leaders in population health, while researchers based in the United States are leaders in public health and health promotion. This may indicate differences rooted in the social, historical and economic traditions.

Although the publication rate of articles described as 'population health' research is increasing, it is lacking an index term across major electronic databases. We suggest that without timely acceptance of terms, new concepts that represent different ways of thinking about health may be limited, delayed or glossed over.

Key words: Bibliometric analysis; public health; health promotion; population health

La traduction du résumé se trouve à la fin de l'article.

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Numerous definitions have been proposed for population health, health promotion, and public health. Population health has been defined as "the health of a population as measured by health status indicators and as influenced by social, economic, physical environments, personal health practices, individual capacity and coping skills, human biology, early childhood development, and health services".¹ The 1974 Lalonde Report acknowledged that health should be broader than biomedical interventions² and was followed shortly by the Ottawa Charter, which defined health promotion as "the process of enabling people to increase control over and to improve their health".³ Public health is "one of the efforts organized by society to protect, promote, and restore people's health".⁴

These definitions indicate that population health, health promotion, and public health are inter-related. All pertain to the health of individuals, as well as to the population's health status and the reduction of health disparities or inequalities to various degrees, yet subtle differences are apparent.⁵ For example, public health focuses on governments' responsibilities for health protection and includes disease surveillance and communicable disease control.⁴ In Canada, public health policy-makers work with public health workers including practitioners and administrators at the local, provincial, and national level. Most major Canadian universities have public health programs at the graduate level. Health promotion aims to empower individuals and communities to gain control over their environment and better overall health through community-based partnerships.^{3,6} In Canada, health promoters work at the community, provincial, national, and international levels and a few graduate-level programs are available. Population health focuses on measuring and changing the health of a population either at the societal level or group level and includes discussions of the social (i.e., non-medical) determinants of health to address health inequalities.⁷ In Canada, population health is largely focused 'upstream' (i.e., root causes of disease) by provincial and national levels of government. One graduate-level program names population health in its title in Canada (University of Ottawa), yet overlap is apparent in other curricula.

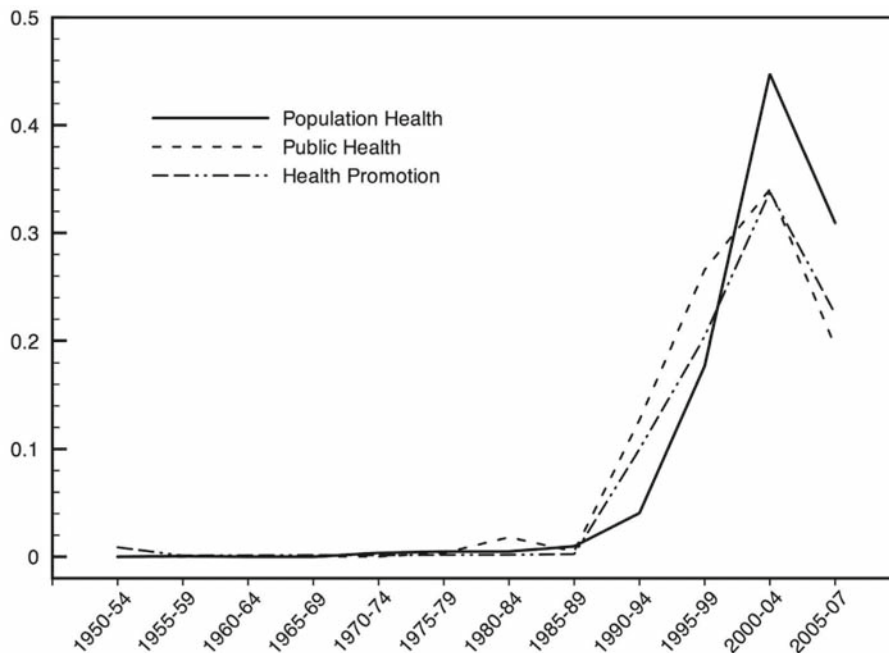


Figure 1. Publication rates of population health, health promotion, and public health over time
Data are from 1945-May 2007.

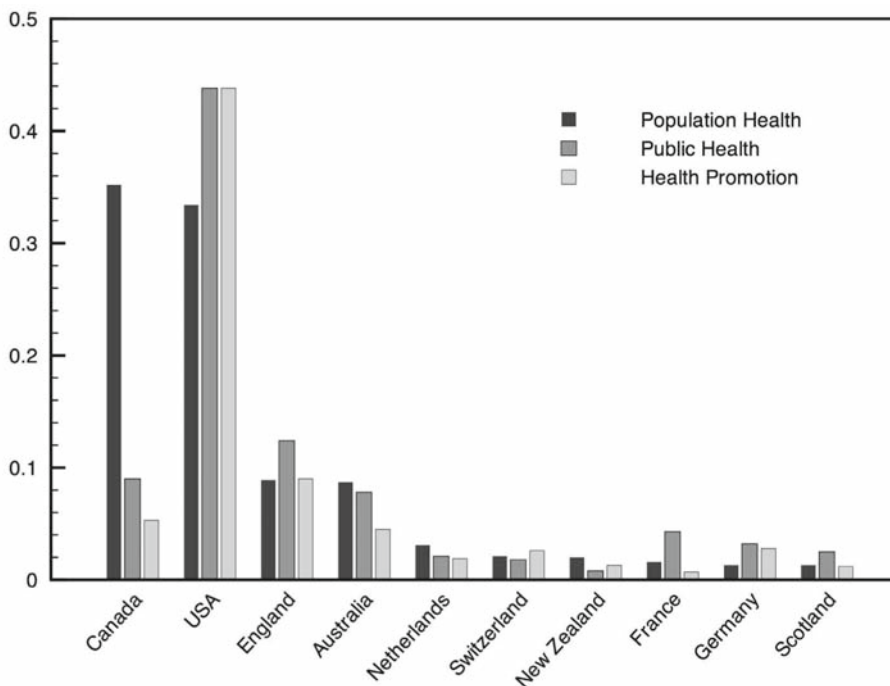


Figure 2. Most productive countries across population health, health promotion, and public health
Data are from 1945-May 2007.

Although the similarities and differences between the definitions and application of these terms are widely debated,^{5,8} a bibliometric analysis has never been conducted. Such an analysis may provide clarity to these terms and how they have been used over time. We aimed to conduct such an analysis using the published literature.

The Science of Bibliometrics

Bibliometrics can be defined as “the use of statistical methods in the analysis of a body of literature to reveal the historical development of subject fields and patterns of authorship, publication, and use”.⁹ The term was first known as “statistical bibliography”¹⁰ and was later coined as “bibliometrics”.¹¹

Bibliometric indicators provide an objective measure of scientific output and its impact over time.¹¹⁻¹³ They have been used to analyze social networks in information science¹⁴ and assess the medical literature.¹⁵⁻¹⁹

The Web of Science

The Web of Science (WoS) is an online resource that combines three databases: Science Citation Index Expanded (SCIE), Social Sciences Citation Index (SSCI), and Arts and Humanities Citation Index (AHCI). WoS is commonly used for bibliometric research due to its multi-disciplinary, global representativeness of core scientific output, and citation analysis functions.^{11,13}

METHODS

A comprehensive literature search was conducted in the SCIE, SSCI, and the AHCI from 1945 to May 1, 2007 through the WoS. Key words were “public health”, “health promotion”, and “population health”. An experienced information specialist (MS) reviewed the search to ensure its validity. A pilot-study was conducted within the Canadian context in November 2005 to assist with variable selection.

Three bibliometric indicators were examined. To assess scientific productivity, the number of citations was counted per term. Such a “paper count” provides an approximate measure of the quantity of work produced by a scientist, institution, or country over time.¹¹ In addition, the most commonly used journals for publication were counted per term. Overlap for most productive authors, institutions, and common journals were examined qualitatively across the three concepts. Overlap was also evaluated by determining the number of articles that used combinations of the concepts to describe their article (e.g., health promotion and public health), which was presented with a Venn diagram. All analyses were conducted via the WoS.

An indexing analysis of the concepts was also conducted in three commonly used biomedical journal databases: MEDLINE, Cumulative Index to Nursing and Allied Health Literature (CINAHL) and EMBASE. The thesaurus of each database consists of a controlled vocabulary or preferred terms, known as subject headings, and associated entry terms or lead-in vocabulary. Entry terms map and expand to various preferred terms.²¹ For each preferred term, the thesaurus may have a defi-

tion, date of introduction, related terms, and synonyms, depending on the database. The preferred terms, entry date and scope note for each concept were recorded.

RESULTS

Scientific productivity

Between 1945 and May 1, 2007, 1,647 published articles used the term “population health”, while 9,066 used “health promotion” and 47,867 used “public health”. The use of “public health” was consistently greater than the other two terms until overtaken by the term “health promotion” around 1990 (Figure 1). The proportion of articles using the term “health promotion” was surpassed around 2000 by the term “population health” (Figure 2).

The most productive authors per term were proportionately consistent (e.g., all produced 0.4-1.0% of citations; Table I). The most productive authors in population health were Canadian while the most productive in public health and health promotion were based in the United States (Figure 2). The most productive institutions using the term “population health” to describe their research were Canadian while the most productive institutions using “health promotion” and “public health” were based in the United States (Table II).

In the WoS, the 10 most relevant articles using the term “population health” dealt with: whether democracy is good for health; developing population health competency among nurses; analyzing the relationship between disease and population health; reducing disparities; terminology; and sustainability of population health as a discipline. For “health promotion”, the 10 most relevant articles pertained to clinical nursing, theory, evidence-based practice, quality of life, and organizational arrangements. For “public health”, topics included the public health workforce, nursing issues, medical system, healthcare reform, and strengthening the public health system.

Publication sources

A high proportion of the articles were published in epidemiological and public health journals (Table III).

Overlap in bibliometric indicators

None of the most productive authors published across population health, health pro-

TABLE I

Top 20 Authors across Population Health, Health Promotion, and Public Health

Population Health		Health Promotion		Public Health	
Author	# articles (%)	Author	# articles (%)	Author	# articles (%)
PATTEN, SB	16 (1.0)	GLASGOW, RE	40 (0.4)	GOSTIN, LO	60 (1.3)
GALEA, S	14 (0.9)	PERRY, CL	39 (0.4)	MCKEE, M	59 (1.2)
CAIRNEY, J	13 (0.8)	SORENSEN, G	38 (0.4)	TSUGANE, S	49 (0.1)
KAWACHI, I	13 (0.8)	SALLIS, JF*	36 (0.4)	BROWNSON, RC*	48 (0.1)
KREWSKI, D	13 (0.8)	GREEN, LW	35 (0.4)	KRIEGER, N	42 (0.1)
ROOS, NP	13 (0.8)	OWEN, N*	28 (0.3)	KHOURY, MJ	41 (0.1)
STARFIELD, B	13 (0.8)	NUTBEAM, D	26 (0.3)	OWEN, N*	39 (0.1)
MATHERS, CD	12 (0.7)	GLANZ, K	24 (0.3)	SMITH, GD	38 (0.1)
MCMICHAEL, AJ	12 (0.7)	STONE, EJ	24 (0.3)	LINDSTROM, M	37 (0.1)
MURRAY, CJL	12 (0.7)	WHITEHEAD, D	24 (0.3)	MERRICK, J	37 (0.1)
WANG, JL	12 (0.7)	BERENSON, GS	23 (0.2)	WECHSLER, H	37 (0.1)
ROOS, LL	11 (0.7)	POTVIN, L	23 (0.2)	BAUMAN, A*	35 (0.1)
BONAA, KH	10 (0.6)	CHEADLE, A	22 (0.2)	SALLIS, JF*	35 (0.1)
CHEN, Y	10 (0.6)	HUNT, MK	22 (0.2)	TANNER, M	35 (0.1)
EVANS, WK	10 (0.6)	BROWNSON, RC*	20 (0.2)	THACKER, SB	33 (0.1)
LYNCH, J	10 (0.6)	HAWES, P	20 (0.2)	ANGULO, FJ	32 (0.1)
RAPHAEL, D	10 (0.6)	JOHNSON, CC	20 (0.2)	BAYER, R	31 (0.1)
ROBINE, JM	10 (0.6)	O'DONNELL, MP	20 (0.2)	COOPER, C	30 (0.1)
SHI, LY	10 (0.6)	PETERSEN, PE	20 (0.2)	NORTHBRIDGE, ME	30 (0.1)
VEENSTRA, G	10 (0.6)	BAUMAN, A*	19 (0.2)	WEED, DL	30 (0.1)

* Overlap in authors across health promotion and public health.

Data are from 1945-May 2007.

Total number of studies: population health (1647), health promotion (9066), public health (47,867).

TABLE II

Most Productive Institutions across Population Health, Health Promotion, and Public Health

Population Health		Health Promotion		Public Health	
Institution	# articles (%)	Institution	# articles (%)	Institution	# articles (%)
Univ Toronto*	112 (6.8)	Univ Texas	212 (2.3)	CDC&P*	1806 (3.8)
McMaster Univ	96 (5.8)	Univ Carolina	172 (1.9)	Harvard Univ*	1035 (2.2)
Univ BC	76 (4.6)	CDC&P*	145 (1.6)	JH Univ	720 (1.5)
Univ Ottawa	57 (3.4)	Univ Minnesota	140 (1.5)	WHO*	681 (1.4)
Univ Manitoba	48 (2.9)	Univ Washington	132 (1.5)	Univ NC	595 (1.2)
Harvard Univ*	47 (2.9)	Univ Michigan*	131 (1.4)	Univ Texas	540 (1.1)
Univ Calgary	47 (2.9)	Univ Toronto*	126 (1.4)	Univ Washington	525 (1.1)
Univ Michigan*	35 (2.1)	Harvard Univ*	121 (1.3)	Univ CASF	514 (1.1)
Univ Wisconsin	29 (1.8)	Univ Sydney	107 (1.2)	CO Univ	496 (1.0)
Univ Alberta	26 (1.6)	Univ CALA	105 (1.2)	Univ Michigan*	470 (1.0)
WHO*	24 (1.5)	SD Univ	88 (1.0)	Univ CALA	448 (0.9)
Australian NI Univ	21 (1.3)	Univ CASF	88 (1.0)	Univ Toronto*	404 (0.8)
Health Canada	20 (1.2)	Univ SC	86 (0.9)	Emory Univ	374 (0.8)
Univ Montreal	20 (1.2)	Univ BC	85 (0.9)	Univ Minnesota	347 (0.7)
CDC&P*	19 (1.5)	Univ Illinois	82 (0.9)	Univ LSH&TM	337 (0.7)
JH Univ	19 (1.5)	Stanford Univ	81 (0.9)	Univ Illinois	308 (0.6)
Queens Univ	19 (1.5)	Brown Univ	76 (0.8)	Univ CAB	305 (0.6)
Statistics Canada	19 (1.5)	McMaster Univ	75 (0.8)	Univ Pittsburgh	289 (0.6)
Univ Queensland	19 (1.5)	Univ Glasgow	75 (0.8)	Ministry Health	283 (0.6)
Univ Washington	19 (1.5)	WHO*	75 (0.8)	Univ Maryland	274 (0.6)

* Overlap in institutions across population health, health promotion, and public health.

Data are from 1945-May 2007.

Total number of studies: population health (1647), health promotion (9066), public health (47,867).

Abbreviations: Univ (University), BC (British Columbia), WHO (World Health Organization), NI (National), CDC&P (Centers for Disease Control & Prevention), JH (Johns Hopkins), CA (California), LA (Los Angeles), SD (San Diego), SF (San Francisco), SC (South Carolina), NC (North Carolina), CO (Columbia), LSH&TM (London School of Hygiene & Tropical Medicine), CAB (California Berkeley).

motion, and public health. However, four of the most productive authors published across health promotion and public health (Sallis JF, Owen N, Brownson RC, Bauman A; Table I). Five of the most productive institutions were common to all terms: one based in Canada (University of Toronto), three based in the United States (University of Michigan, Harvard University, Centers for Disease Control & Prevention), and one international agency (the World Health Organization; Table

II). Four of the most common publication sources consistent across all three concepts were public health journals (Canadian Journal of Public Health, American Journal of Public Health, European Journal of Public Health, Australian and New Zealand Journal of Public Health) and two were general medical journals (British Journal of Medicine, Social Science and Medicine; Table III).

With respect to the number of articles using the concepts to describe their work,

TABLE III

Most Common Journals for Publication across Population Health, Health Promotion, and Public Health

Population Health		Health Promotion		Public Health	
Journal	#articles (%)	Journal	#articles (%)	Journal	#articles (%)
Univ Toronto*	112 (6.8)	Univ Texas	212 (2.3)	CDC&P*	1806 (3.8)
CJPH*	101 (6.1)	HPI	369 (4.1)	AJPH*	1479 (3.1)
SS&M*	95 (5.8)	AJHP	294 (3.2)	PHR	817 (1.7)
JE&CM	43 (2.6)	HER	220 (2.4)	PH	669 (1.4)
AJPH*	39 (2.4)	PM	219 (2.4)	JAMA	609 (1.3)
AJPM	29 (1.8)	AMPM	183 (2.0)	Lancet	559 (1.2)
A&NZJPH*	29 (1.8)	SS&M*	177 (2.0)	BMJ*	553 (1.2)
Medical Care	24 (1.5)	CJPH*	175 (1.9)	CJPH*	534 (1.1)
AJE	23 (1.4)	JAN	163 (1.8)	AJPM	485 (1.0)
CJC	23 (1.4)	BMJ*	123 (1.4)	AJPH&NH*	460 (1.0)
IJE	20 (1.2)	AJPH*	120 (1.3)	SS&M*	444 (0.9)
Lancet	20 (1.2)	EJPH*	115 (1.3)	PH Nursing	373 (0.8)
Health Policy	18 (1.1)	Gesund	113 (1.2)	EJPH*	347 (0.7)
EJPH*	17 (1.03)	PH Nursing	110 (1.2)	EHP	346 (0.7)
Bulletin WHO	16 (1.0)	HE&B	101 (1.1)	JE&CH	328 (0.7)
BMJ*	15 (0.9)	PE&C	100 (1.1)	Bulletin WHO	314 (0.7)
HPI	13 (0.8)	HEQ	97 (1.1)	Pediatrics	304 (0.6)
IJHS	13 (0.8)	JSH	95 (1.0)	A&NZJPH	295 (0.6)
JCE	13 (0.8)	JO&EM	81 (0.9)	Gesund	257 (0.5)
MJ of Australia	13 (0.8)	BJGP	76 (0.8)	IJE	241 (0.5)
Acad Medicine	12 (0.7)	A&NZJPH*	73 (0.8)	AJE	231 (0.5)

* Overlap between population health, health promotion, and public health. Data are from 1945-May 2007.

Total number of studies: population health (1647), health promotion (9066), public health (47,867). Abbreviations: CJPH (Canadian Journal of Public Health), SS&M (Social Science & Medicine), JE&CM (Journal of Epidemiology and Community Medicine), AJPH (American Journal of Public Health), AJPM (American Journal of Preventive Medicine), A&NZJPH (Australian & New Zealand Journal of Public Health), AJE (American Journal of Epidemiology), CJC (Canadian Journal of Public Health), IJE (International Journal of Epidemiology), EJPH (European Journal of Public Health), WHO (World Health Organization), BMJ (British Medical Journal), HPI (Health Promotion International), IJHS (International Journal of Health Services), JCE (Journal of Clinical Epidemiology), MJ (Medical Journal), Acad (Academic), HER (Health Education Research), PM (Environmental Health Perspectives), PHR (Public Health Reports), PH (Public Health), EHP (Environmental Health Perspectives), JE&CH (Journal of Epidemiology & Community Health).

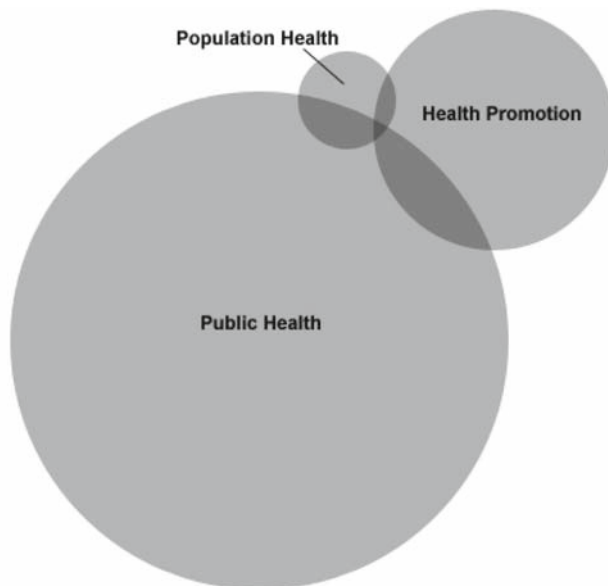


Figure 3. Overlap in articles using the terms population health, health promotion, and public health

Item	Count
Population health	1649
Health promotion	9066
Public health	47,867
Population health & health promotion	102
Population health & public health	327
Health promotion & public health	1040
Population health & health promotion & public health	46

Data are from 1945-May 2007.

the most overlap was observed between the terms “health promotion” and “public health” (Figure 3).

Indexing of the terms

Subject headings were apparent for public health and health promotion in MEDLINE, CINAHL and EMBASE. Population health was not a subject heading in any of the databases. Suggested terms varied, although public health appeared as the first or second suggestion in each (Table IV). Scope notes were available for health promotion in MEDLINE and CINAHL, yet a scope note for public health was only provided in MEDLINE (Table IV).

DISCUSSION

Our results indicate a shift in the usage of these concepts over time. This could be explained, in part, by a shifting in our perspective of health. For example, in the post-war period until the early 1970s, researchers were most concerned with decreasing infectious disease through sanitation and housing improvements.²¹ This may explain why the public health term was frequently used during this time. Health promotion articles became prominent in the literature in the mid-1980s, which may indicate an increased interest in health disparities or inequalities likely prompted by social movements of the 1960s and 1970s, critiques of biomedicine, and the release of influential documents, such as the Lalonde report² and Ottawa Charter of Health Promotion.³ Population health experienced an increase in citations in the mid-1990s, which may be explained by a shift in discourse from individual-level changes (e.g., lifestyle modifications) to societal changes through public policy, in addition to increased capabilities of measuring health, and calls for accountability of healthcare spending.⁷

This change in publication emphasis (to population health) may imply that public health and health promotion were already established; hence an explosion in publications due to novelty or profound and significant scientific developments may not be expected. Population health as a disciplinary approach, along with acceptance of determinants of health concepts and prescribed action to address them, are appar-

TABLE IV

Subject Headings, Scope Notes, and Entry Dates of the Concepts

Entry Term	MEDLINE	CINAHL	EMBASE
Population health	Health Status Public Health Population Surveillance Socioeconomic Factors Adult Sinusitis Russia Public Health Informatics Smoking Middle Aged Scope note: none* Entry date: none	Public Health Health Promotion Health Status Indicators Health Policy Health Behavior Models, Theoretical Preventive Health Care Curriculum Development Community Health Nursing Community Assessment Scope note: none* Entry date: none	Public Health Health Status Population Research Health Survey Life Expectancy Mortality Health Care Policy Income Methodology Medical Research Scope note: none* Entry date: none
Public health	Public Health Scope note: "branch of medicine concerned with the prevention and control of disease and disability, and the promotion of physical and mental health of the population on the international, national, state, or municipal level" Entry date: not reported	Public Health Scope note: not reported Entry date: not reported	Public Health Scope note: not reported Entry date: not reported
Health Promotion	Health Promotion Scope note: "Encouraging consumer behaviors most likely to optimize health potentials (physical and psychosocial) through health information, preventive programs, and access to medical care" Entry date: 1980	Health Promotion Scope note: "The process of fostering awareness, influencing attitudes, and identifying alternatives so that individuals can make informed choices and change their behavior to achieve an optimum level of physical and mental health and improve their physical and social environment" Entry date: not reported	Health Promotion Scope note: not reported Entry date: not reported

* Population health did not have a scope note, as it was not indexed in any of the three databases.

ently still emerging. This view is somewhat supported by the fact that population health lacks an index term in three major biomedical databases.

These shifts may also reflect differences ultimately rooted in social, historical and economic traditions of different countries, as well as the ideological preferences of their governments.⁷ For example, the population health interdisciplinary field in Canada was initially developed in part as the result of work from the Canadian Institute for Advanced Research,²² and subsequently through the Canadian federal government's development of the "Population Health Approach".²³ The justification for intellectual development of population health was based on concern for rising costs of health-care, and evidence that challenged the efficacy of the publicly available system.²² In the United States, current efforts to tackle the health of the population are through health promotion and public health. They focus on changing individuals' health and place less emphasis on the change of whole populations. For example, a heavily supported national program, Healthy People 2010, emphasizes evidence promoting individual-level change.²⁴ There is however, increasing evidence of acceptance of the role of the social environment on individual health in the United States.^{25,26}

Our bibliometric study has some limitations. We relied on publication timing, which occurs later than the time of research conduct. Published literature found in the WoS may not be entirely representative of the productivity of a certain area. For example, the WoS has a selection bias towards English language periodicals.^{27,28} Furthermore, the bibliometric indicator for the most productive institutions can vary depending on how the researcher affiliations are listed.¹¹ This is because some large universities or research groups may be listed under different names in a database.¹¹ It's also important to note that the use of terms in the literature is influenced by how researchers describe and label their research.

In summary, our use of bibliometric analysis offers an alternative means of historically accounting for shifts, trends in frequency of publication, and productivity variables. Future bibliometric analyses could map the country-base of research collaborations to further describe the history and possibly anticipate paradigm change, examine how research priorities have shaped the use of these terms over time, and determine the level of agreement between the terms in the literature and their application in practice. The adoption, incorporation, and use of a subject heading or controlled vocabu-

lary term over time may also indicate newer developments in science. Although controlled vocabulary terms are useful for consistency and systematization, the lack of inclusion of 'population health' as a controlled vocabulary term may have implications for theoretical development, research methods, and interventions. We suggest that without timely acceptance of terms, new concepts that represent different ways of thinking about health, which may add to discourse about health, may be limited, delayed or glossed over.

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RÉSUMÉ

Objectif : Les analyses bibliométriques sont utilisées pour comparer objectivement l'évolution de concepts au fil du temps. Nous avons voulu comparer l'utilisation des termes « santé des populations », « promotion de la santé » et « santé publique » dans la documentation en recourant à des indicateurs bibliométriques.

Méthode : Des indicateurs bibliométriques (la productivité scientifique, le chevauchement des termes) ont été analysés dans Web of Science. Le classement des termes « santé des populations », « promotion de la santé » et « santé publique » a été examiné dans les bases de données MEDLINE, CINAHL et EMBASE.

Résultats : Le Canada est le pays le plus productif dans le domaine de la santé des populations, tandis que les États-Unis le sont pour la promotion de la santé et la santé publique. Le nombre d'articles référant à la santé publique a été surpassé par la documentation sur la promotion de la santé au tournant des années 1990. Les deux concepts ont été distancés par la santé des populations au tournant des années 2000. La santé des populations est le seul concept qui ne soit pas indexé dans les trois bases.

Discussion : Il y a eu un changement dans l'usage des concepts de santé publique, de promotion de la santé et de santé des populations au fil du temps. L'analyse par pays montre que les chercheurs canadiens sont les chefs de file en santé des populations, tandis que les chercheurs des États-Unis dominent les champs de la santé publique et de la promotion de la santé. Ceci pourrait s'expliquer par des différences de traditions sociales, historiques et économiques.

Le taux de publication des articles de recherche sur la « santé des populations » s'accroît, mais ce terme n'est pas indexé dans toutes les grandes bases de données. Selon nous, si l'on n'accepte pas rapidement les nouveaux termes, on risque de faire abstraction de nouvelles notions qui correspondent à différentes façons de réfléchir à la santé, ou encore de limiter ou de retarder l'adoption de ces notions.

Mots clés : analyses bibliométriques; santé des populations; promotion de la santé; santé publique