

## **Trends of Social Impact of Medical Research Utilization in the Web of Science Database**

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### **Abstract**

The social dimension is crucial when evaluating initiatives and policies requested or promoted by public and private organizations and society. This research aims to investigate the social impact of medical research utilization based on the Web of Science database from 1990 to 2022. The scientometric method and co-word analysis were used to analyze the data. The Web of Science database was used to collect the data. VOSviewer, HistCite, Bibliometrix R package, and Excel software were employed. There has been an upward trend in the publication of scientific articles on the social impact of medical research utilization, peaking in 2021. Most of these records were published between 2017 and 2022, indicating that the significance of the social implications of research reached its zenith during this period, coinciding with the emergence of fourth-generation universities. The United States (U.S.) and Canada have the highest number of scientific articles on this topic. The countries with the highest coefficients of collaboration in this field are the U.S., Canada, England, and Australia. Graham, Legare, Lewis, Strauss, Stabrooks, and Grimshaw authored the most prominent scientific articles. Notably, "Graham" is the most influential author in this field, having garnered 4,846 citations. Key conceptual terms in this field include knowledge translation, public health, healthcare, knowledge management, quality of life, knowledge transfer, quality improvement, science implementation, dissemination, evidence-based medicine, primary care, health politics, medical education, health promotion, social media, social value, and facilitators. This research serves as a roadmap for future researchers interested in social impact assessment. It contributes to advancing research into social impact and medical research utilization.

**Keywords:** Co-authorship, Social Impact, Research Utilization, Medical Research, Scientific Map, Scientometric.

### Introduction

The social dimension is an essential component when evaluating initiatives and policies. These initiatives and policies are requested and promoted by public and private organizations and society at large. Consequently, there is a growing interest in social impact research. This interest is mainly focused on its measurement and evaluation (Baraibar-Diez, Luna, Odriozola & Llorente, 2020). Evidence of external influence can manifest in various ways. This includes references to, citations of, or discussions related to individual researchers, their work, or the results of their research (Wilsdon et al., 2015). Conversely, recipients of scientific publications are experts. They can assess the quality of cited publications. However, recipients outside the scientific field are generally unable to do so (Bornmann & Haunschild, 2017).

Research utilization is a relatively recent development. Only a handful of countries have a significant engagement history in this area. There is no earnest agreement on a single definition of research utilization. However, many studies have investigated research utilization in various countries. A set of factors related to knowledge utilization has been introduced. The newness of the subject of social impact poses several challenges. These challenges affect the utilization of existing knowledge in this field. Therefore, it is crucial to utilize the research findings in this area. For example, a research study was conducted to survey the views of 153 faculty members from the University of Tabriz. The study aimed to investigate the social impact of their research using a quantitative approach. The findings suggest that faculty members can better evaluate the social impact of their research by engaging in projects outside the university. Establishing partnerships with external organizations is also beneficial. By immersing themselves in real-world issues and societal concerns, faculty members can contribute to academic research's more significant social impact (Atapour, Hamdipour & Akbarzadeh, 2021). Another study was conducted to determine the status of knowledge translation at Qazvin University of Medical Sciences (QUMS). This was based on the perceptions of faculty members. Data were collected using a three-part questionnaire. The goal was to identify and transform the audience's needs into research projects. This would generate evidence to inform decision-making and facilitate the practical utilization of research findings for end-users. According to faculty members, the status of knowledge translation at QUMS was not ideal. There was limited translation of research findings into the language of the audience. However, implementing incentive strategies and policies can help encourage researchers to share their findings with users. This can bridge the gap between knowledge and practice (Hosseini, Ahmadi, Sadeghi, Mirbaha & Safarizadeh, 2015).

Another study investigated the extent of knowledge transfer from Golestan University of Medical Sciences (GUMS) research. This was done using 102 questionnaires completed by faculty members. The results showed that findings from basic science studies were disseminated at conferences and seminars. In contrast, clinical research and health system results were primarily published in domestic and international journals. Furthermore, the budgets allocated for knowledge transfer activities are considered low. Therefore, it is crucial to provide motivation and training for researchers in research transfer (Qorbani et al., 2010). In another study, researchers examined self-evaluation of knowledge transfer activities using a questionnaire. The findings revealed that researchers often overestimate their involvement in knowledge translation activities. Therefore, training and familiarizing researchers with all aspects of knowledge transfer and knowledge transfer evaluation methods can enhance research utilization (Nedjat, Ashoorkhani, Gholami & Majdzadeh, 2009).

Furthermore, Lauronen (2022) reviewed policy documents and conducted semi-structured interviews with 14 policy advisors, evaluation experts, and academic staff members from 2003 to 2018 in Finland. The findings indicated that integrating research utilization into research policies and evaluation can enhance the social capacity of the social science in comprehending these fields' impact on public policy and public debate. Another study used a qualitative approach to generate social value via digital activity within the online health community. The research team used in-depth and semi-structured interviews with seventeen members of the African medicine community. They also conducted six months of online observation from 2016 to 2018. The findings indicated that for-profit platforms can generate social value by increasing user participation and data collection. Additionally, for digital activism to be effective, there needs to be evidence of collective online activity aimed at challenging and transforming the current state of affairs. This ultimately creates social value (Chamakiotis, Petrakaki & Panteli, 2021).

The reviews reveal a notable research gap in the Social Impact of Medical Research Utilization and underscore the necessity for a scientometric study to clarify trends, productivity, and impact in this area. Zhao (2017), Chen, Dubin, and Kim (2014), and Gholampour Noruzi, Elahi, Barranco Gil, and Gholampour (2024) stress the importance of contextualizing scientometric analyses within specific subject areas, demonstrating that such research can offer valuable insights into the dynamism of various fields.

Knowledge translation that is timely and targeted within the context of a research study is required to guide health service providers and researchers on increasing the impact of research in health service organizations. Furthermore, it is essential to consider the organizational, social, economic, or cultural contexts. Indeed, organizational preparedness to foster a research culture where knowledge is shared and appreciated is a critical success factor (Minogue, Matvienko-Sikar, Hayes, Morrissey, Gorman & Terres, 2021). In analyzing the strengths and weaknesses of various methods and impact frameworks, it is vital to consider models such as knowledge mobilization, knowledge utilization, and knowledge creation. These models aim to enhance awareness of the entire knowledge translation process and the necessary capacities for engaging user communities in research. This, in turn, will contribute to a deeper understanding of the various types of research impact and the resources needed to realize them (Pedersen, Grønvad & Hvidtfeldt, 2020).

In the realm of journal evaluation, studies by Valenzuela, Merigó, Johnston, Nicolas and Jaramillo (2017), Moradi, Gholampour and Gholampour (2023), and Donthu, Kumar and Pattnaik, (2020) present methodologies for assessing journals, serving as critical criteria for evaluating the quality and impact of publications in the relevant field. Moreover, research that investigates scientific misconduct through the lens of scientometrics-such as studies by Wang, Xing, Wang and Chen (2019), He (2013), Gholampour, Gholampour, Noruzi, Arsenault, Haertlé and Saboury (2022), and Liu & Lei. (2021)-has sparked significant debate about ethical practices in research and the implications of credibility and trust in scientific communication.

In a study aimed at assessing research utilization, findings related to measurement of utilization functions indicated that research could effectively convert practical knowledge for the benefit of research users, enabling the transformation of academic knowledge into social and economic contexts. This makes the research usable and applicable. Therefore, all social benefits derived from science ultimately depend on measuring the correlation between the newly produced scientific knowledge and the knowledge of those who convert that knowledge

(Benneworth & Olmos-Peñuela, 2018). Conversely, research utilization can be summarized through various processes, including knowledge management, knowledge transfer, knowledge utilization, knowledge outsourcing, and knowledge production. Research utilization is predicated on several elements: absorption capacity, resolution of customer issues, reputation, rewards and incentives, trust, and reciprocity. The research utilization process has been introduced as a model that includes knowledge identification, coordination and governance, communication (encompasses communication tools, knowledge systems, connection tools, and knowledge networks), knowledge presentation, protection, and trading (Diehr & Gueldenberg, 2017).

In the guideline entitled "*Knowledge Translation and Implementation Science in Health Professions Education: Time for Clarity?*" Knowledge translation is defined in four stages: identifying research-practice gaps, identifying supports and barriers to the uptake of educational evidence, designing interventions to reduce these gaps, and evaluating the impact of the interventions on academic practices. For each stage, objectives, methods, and expected outcomes are specified. This guideline also considers various contexts, such as schools, clinics, communities, emergency and surgical departments, and stakeholders, including teachers, faculty, and program managers. Additionally, to achieve the ultimate goal of knowledge utilization, three distinct and interrelated processes-diffusion, dissemination, and knowledge translation implementation science- are taken into account. This evidence-based approach aims to enhance professional health education (Thomas & Bussi eres, 2016).

The research literature indicates that knowledge transfer resulting from research and the budgets allocated for knowledge transfer activities are often quite low. However, training researchers in knowledge transfer and research evaluation methods can be beneficial for effectively applying research and utilizing its results. Social impact concepts have also been incorporated into research utilization practices, policies, and evaluation. Furthermore, digital activities within the online health community can generate social and economic values. To enhance the impact of research in health organizations, it is crucial to implement timely and focused knowledge translation activities. These activities, supported by knowledge mobilization, utilization, and creation efforts, aim to raise awareness about the knowledge translation process and the necessary capacities for incorporating research findings within user communities.

Additionally, the work of Elahi, Gholampour, and Dickson (2021), Gholampour and Noruzi (2021), and Nawaz et al. (2023) in creating scholarly portraits through the visualization of contributions offers a unique perspective for understanding trends and the influential research by key authors in a field. The exploration by Bornmann et al. (2014), Costas, Zahedi, and Wouters (2015), and Gholampour, Lim et al. (2024) stress introduces a contemporary method for evaluating the impact of publications, providing a complementary perspective (Altmetric) that enhances traditional scientometric analysis while aligning it with digital trends. One crucial aspect to consider is the role of knowledge facilitators in promoting research utilization. In summary, knowledge facilitators can use bibliometric analysis to identify impactful research findings and examine how they are disseminated and utilized. This information helps knowledge facilitators design and implement more effective knowledge translation strategies, ultimately promoting the practical application of research across various domains.

Knowledge facilitators are crucial in promoting research utilization by leveraging bibliometric analysis. They can identify impactful research findings and assess how they are

disseminated and utilized. This analysis provides valuable insights that enable knowledge facilitators to design and implement more effective knowledge translation strategies. Ultimately, this process enhances the practical application of research across various domains, bridging the gap between research and its real-world impact. It is worth noting that no bibliometric analysis has been conducted regarding the social implications of medical research utilization. Obtaining an overview of the thematic research process in this field can serve as a valuable guide for future research and aid in policy-making and research planning. Therefore, the aim is to answer the question “What is the Social Impact of Medical Research Utilization trend?” The research will include the following sub-questions:

RQ1. What is the trend of the scientific map of publications related to the Social Impact of Medical Research Utilization?

EQ2. What is the trend of the scientific map of authors related to the Social Impact of Medical Research Utilization?

RQ3. What is the trend of the scientific map of keywords related to the Social Impact of Medical Research Utilization?

RQ4. What is the trend of the scientific map of journals related to the Social Impact of Medical Research Utilization?

RQ5. What is the trend of the scientific map of organizations and institutions related to the Social Impact of Medical Research Utilization?

Therefore, one of the goals of scientific maps is to present a comprehensive picture of the state of research and its relationship to different fields and to understand how these fields evolve and develop over time. This map is drawn using various methods, one of which is co-word analysis. Co-word analysis can also be used to assess the similarity of article content through keywords or create a semantic map of the articles' content. This research aims to examine the research process and the co-occurrence of the social impact of medical research utilization using the Web of Science database from 1990 to 2022. The findings of this study can serve as a guide for policymakers and planners in the health field. By considering the social impact of utilizing medical research in programs and policies, they can effectively shape the management of research and policy-making processes. Additionally, they can develop appropriate plans in terms of infrastructure, financing, education, monitoring, and other areas to manage and enhance community health effectively.

### **Materials and Methods**

This research is applied in terms of its purpose and is a type of scientometric study in terms of its methodology.

#### **Bibliometric analysis tools**

Co-word analysis, scientometric and network analysis techniques, VOSviewer software (version 1.6.18), HistCite, Bibliometrix R Package, and Excel, were used to achieve this goal. VOSViewer is specifically designed to create and visualize bibliographic maps, focusing on graphic display, including maps. The HistCite software analyzes search results in the Web of Science citation database. Researchers in any subject area can use it to obtain information related to their search results in a specific subject area, country, organization, or journal. The R software, on the other hand, can analyze and review various data sets, including articles, references, and content components. Generally, these software programs are used to illustrate

and cluster subjects, conduct co-word analysis, and visualize the structure of scientific domains. It can also analyze the relationships between authors, organizations, and countries in the desired field.

### **Database selection**

The data required for this research was obtained from the Web of Science database on July 11, 2023. The statistical population for this research comprised all the articles indexed in the Web of Science database from 1990 to 2022 that focused on the social impact of medical research utilization. The Web of Science database was chosen due to its strict journal indexing criteria and accurate presentation of scientometric statistics (Gholampour, Gholampour & Noruzi, 2022a).

### **Search query**

The notions of knowledge translation and knowledge utilization lack universal agreement in their definitions. Hence, both terms were selected as keywords, given their application and importance in public health, medicine, and rehabilitation research. Canadian researchers use the term "knowledge translation," while in the United States and England, the term "knowledge utilization" is more commonly used (Honarvar, Sekhavati & Bagheri Lankerani, 2020). The search strategy used to extract scientific products is as follows.

Given that social impact and Knowledge utilization do not have a precise definition, the vocabulary related to social impact is based on a literature review. Simultaneously, the selection of terms associated with the Knowledge utilization Approach (Diehr & Gueldenberg, 2017), along with their medical equivalents.

TS=((("social impact" OR "social outcome" OR "social value" OR "social quality" OR "social benefit" OR "social relevance" OR "Knowledge Management" OR "Knowledge Transfer" OR "Knowledge Outsourcing" OR "Commercial Exploitation" OR "Knowledge Production" OR "Application of research" OR "Effective dissemination" OR "knowledge Attitudes" OR "knowledge communication" OR "knowledge cycle" OR "knowledge dissemination" OR "Knowledge innovation" OR "Knowledge of Results" OR "knowledge Practice" OR "knowledge to action" OR "knowledge transformation" OR "knowledge translation" OR "knowledge uptake" OR "knowledge utilisation" OR "knowledge utilization" OR "research implementation" OR "research Utilization" OR "research utilisation" OR "Results Knowledge" OR "science Utilisation" OR "Science Utilization" OR "Science Translational" OR "Translation Knowledge" OR "Translational Sciences" OR "Translations Knowledge")) AND ("health" OR "biomedical" OR "Medical" OR "Medicine" OR "experimental" OR "clinical"))

### **Data extraction**

#### **Inclusion and exclusion criteria**

Articles related to the social impact of medical research utilization, limited to English, were extracted between 1990 and 2022. This study selected original research and review articles from the retrieved articles in the Web of Science™ Core Collection subset. All English research and review articles in medicine, health, etc., were extracted as text. This strategy yielded the retrieval of 6,427 records.

## Results

### Scientific map of publications

Between 1990 and 2022, the Web of Science database identified 6,427 articles, including 5,656 research articles and 771 review articles, all focusing on the social impact of medical research utilization (Table 1).

Table 1

*Frequency distribution of records indexed in the Web of Science database*

Publication Year	Number of Publish	Time of Citation	Publication Year	Number of Publish	Time of Citation
1990	3	209	2007	118	6694
1991	15	514	2008	126	5115
1992	24	993	2009	195	10484
1993	18	671	2010	258	13647
1994	22	524	2011	262	9835
1995	20	1329	2012	294	10565
1996	33	1223	2013	287	8180
1997	41	2163	2014	382	9463
1998	31	1179	2015	366	12140
1999	40	7597	2016	375	8486
2000	38	2784	2017	458	8680
2001	33	1006	2018	452	7188
2002	54	2493	2019	471	4962
2003	53	3564	2020	563	6194
2004	53	3872	2021	713	3537
2005	86	4083	2022	434	846
2006	98	7387			

Most articles on this topic were published between 2017 and 2022. In recent years, the social impact of research has reached its peak, coinciding with the emergence of fourth-generation universities (Nasrolahinia & Rashidhaji Khajeloo, 2016). 2009 to 2015 were the most frequently researched periods for this topic. One possible reason for this increased attention could be the initiation of early activities related to social influence. The form and concept of social influence have grown and evolved in alignment with the mission of third-generation universities, transitioning towards the mission of fourth-generation universities (Lukovics & Zuti, 2017). These changes are also evident in the research conducted by researchers.

Figure 1 depicts the publication and citation trends of articles in the social impact of medical research utilization in the Web of Science database over three decades. It is worth noting that the first article in this field was published in 1990. The trajectory of research publications exhibited a consistent upward trend from 1990 to 2000 until the mid-second decade (2001-2011). Subsequently, beginning in the middle of the second decade, there was a more pronounced surge in the number of articles published, reaching its highest point in 2021 with 713 articles during the third decade (2012-2022).

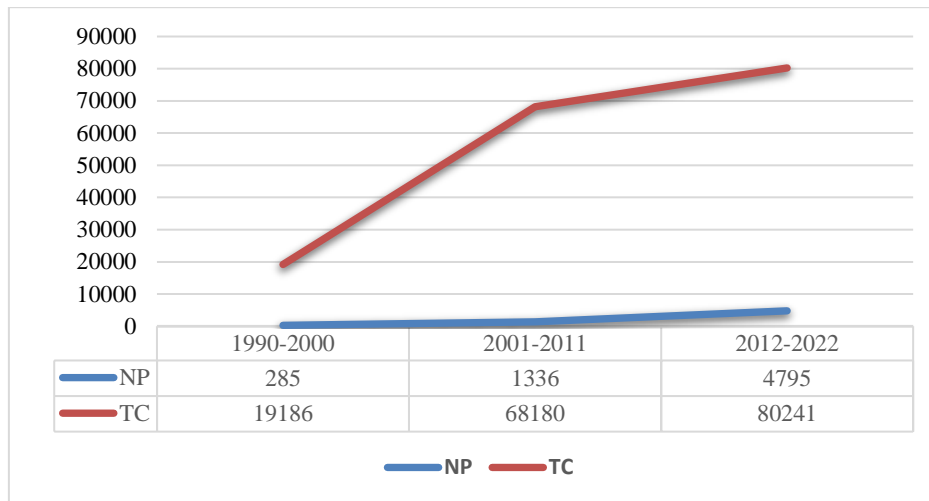


Figure 1: The process of publication and citation of articles in the field under study

**Scientific map of authors**

In the scientific map compiled by the authors of this study, over 2,890 researchers were involved. The most influential researchers in this field are Graham (University of Ottawa), Legare (Université Laval), Lavis (McMaster University), Straus (University of Toronto), Estabrooks (University of Alberta), and Grimshaw (University of Ottawa), who have the highest number of publications. Graham (4,846 citations) and Straus (4,292 citations) were the most cited authors in this field. The most frequently cited authors in this field are Lavis, with 3,236 citations, and Grimshaw, with 2,769 citations. Additionally, although Harvey (Queensland University of Technology), Kothari (University of Western Ontario), and Dobbins (McMaster University), had fewer publications than other researchers, they received a significant number of citations and are among the most cited authors (Table 2).

Table 2  
Frequency distribution of top researchers

#	Author	NP	TC	#	Author	NP	TC
1	Graham ID	66	4846	8	Harvey G	27	1958
2	Legare F	46	1138	9	Kothari A	27	1424
3	Lavis JN	45	3236	10	Hartling L	23	443
4	Straus SE	44	4292	11	Haynes RB	23	778
5	Estabrooks CA	34	1885	12	Dobbins M	22	1248
6	Grimshaw JM	32	2769	13	Squires JE	22	2329
7	Gagnon MP	27	411				

On the other hand, the researchers involved in this study hail from various Canadian universities, including the University of Ottawa, Laval, McMaster, Toronto, Alberta, and the University of Western Ontario. This selection of institutions may indicate the allocation of substantial research budgets at these universities. Figure 2 illustrates the scientific collaboration network of researchers. In Figure 2, the nodes represent the researchers, and the links also represent the relationship between the researchers. The thickness of the links indicates the intensity of scientific cooperation (Gholampour, Gholampour & Noruzi, 2022b). In the analysis of social networks, the size of the nodes indicates the pivotal and irreplaceable role of

researchers in the subject being studied. Legare, Graham, Strauss, Grimshaw, Estabrooks, Squires, and Lavis are at the center of these clusters. It is worth mentioning that Straus is the scientific leader of the red cluster. The researchers in this cluster engaged in scientific collaboration with each other in most of the articles, which is why they were grouped in the same cluster. She has also led in Graham's pale green cluster, Legare's blue cluster, and Lavis's dark green cluster. Additionally, a separate examination of the authors' collaboration network (co-authorship) (Figure 2) reveals that the authors' collaboration corresponds to the period from 2008 to 2019

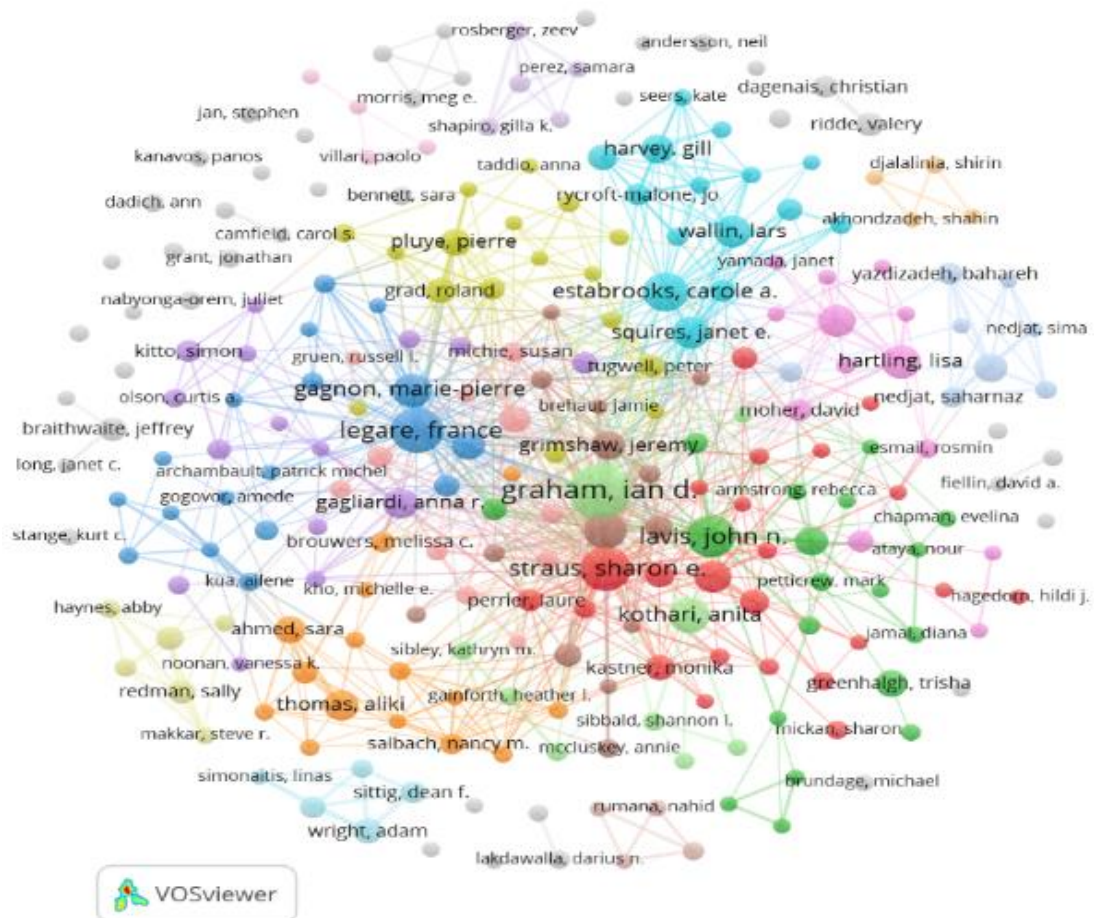


Figure 2: The network of the best researchers in the field under study

Moreover, in the depicted map (Figure 3), the red lines illustrate the scientific activity of a researcher over time. The bubbles represent publications, with the size of each bubble indicating the number of publications resulting from collaboration (Gholampour, Gholampour & Noruzi, 2022). This map reveals that Grimshaw is the oldest researcher in the field of social impact of medical research utilization, having worked for 23 years (1997-2020). Lavis and Heinz are also active and well-established in this field, having contributed for 19 years. Next, the researcher named Graham, one of the most prolific authors, published the highest number of articles from 2016 to 2020. Additionally, Hartling is the youngest researcher in this network, having commenced his work in 2009. The pinnacle of his scientific endeavors occurred in 2019, during which he collaborated extensively with Scott on 13 articles.

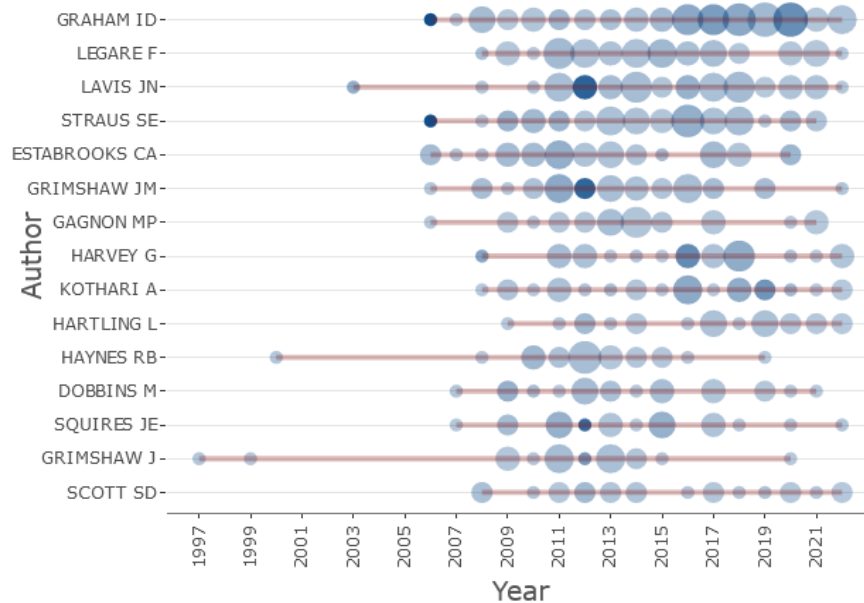


Figure 3: Publication status of the most active authors by time

### Scientific map of keywords

Co-word analysis of authors' vocabulary helps researchers identify a field's leading issues and developments. More closely related words are positioned closer to one another in the co-word network of articles about the social impact of medical research utilization, as shown in Figure 4. In this map, the most important words are positioned at the center of the map. Additionally, the terms "knowledge translation, public health, implementation, co-production, capacity, knowledge broker, knowledge exchange, knowledge sharing, knowledge dissemination, knowledge utilization, knowledge production, policymakers, and evidence-based policy-making" are organized into thematic clusters based on colors such as red, purple, blue, green, yellow, etc. These clusters represent activities within the field of science policy. Health knowledge, attitude, practice, and public awareness are grouped in another thematic cluster representing the activities required for and associated with the social impact of medical research utilization.

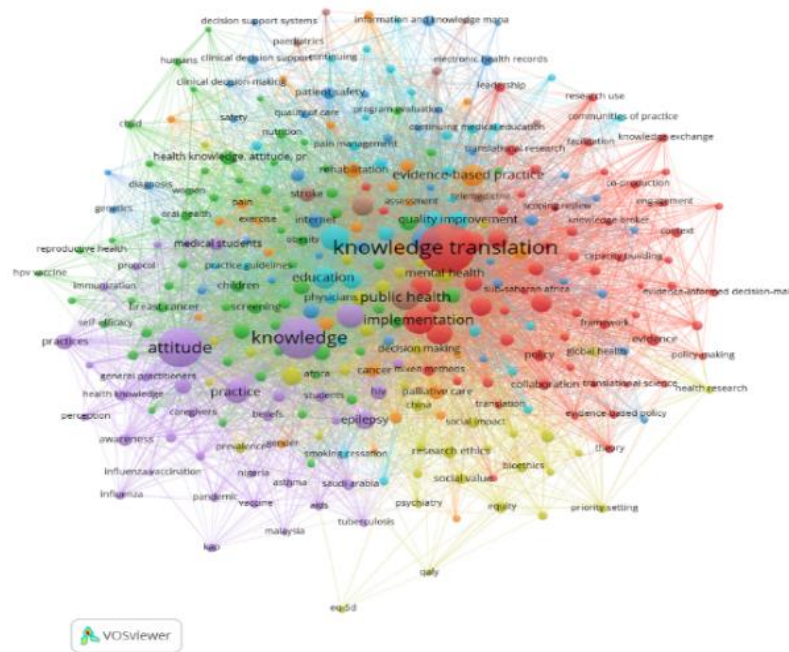


Figure 4: The most frequently used terms in the field under study

On the other hand, the analysis focused on 18,741 words from various authors. This included 8,051 abstract keywords and 10,691 words automatically extracted by the system. The examination examined words that co-occurred at least 5 times within an author's work. Based on this analysis, the terms "knowledge translation, knowledge, attitudes, public health, healthcare, knowledge management, quality of life, knowledge transfer, quality improvement, implementation science, diffusion, evidence-based medicine, primary care, health policy, medical education, health promotion, social media, social value, and facilitators" were found to have the highest frequency in the co-word network. Given this circumstance, future researchers must concentrate their investigations on these matters and pay close attention to the implications of these terms within the social impact of medical research utilization.

Figure 5 depicts the conceptual evolution of vocabulary over time, specifically highlighting the emergence and decline of new concepts in the social impact of medical research utilization. In this field, concepts and terminology have undergone both stability and change over time. As depicted in this figure, notions that have been progressively excluded from the domain of social impact of medical research utilization are denoted by yellow and blue colors. On the other hand, concepts introduced to this field are denoted by green, purple, and red colors.

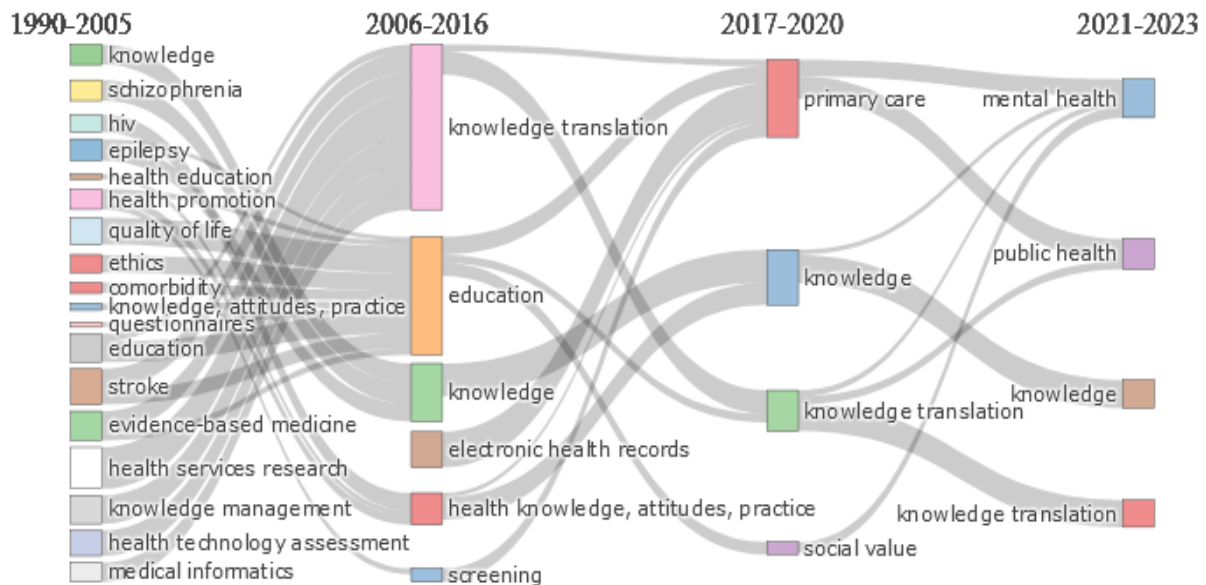


Figure 5: Changes in sub-thematic areas at different time points

Previous research in this field, conducted between 1990 and 2005, focused on health education, health promotion, quality of life, knowledge, attitude, practices, knowledge management, health service research, health technology assessment, and medical informatics. From 2006 to 2016, research gradually shifted its focus towards "knowledge translation, education, knowledge, electronic health records, etc." This was followed by emphasizing terms like "primary care" and "social value" in 2017-2020. In recent years, terms such as "mental health" and "public health" have become increasingly prevalent. There are several reasons for the shift from using the term "knowledge translation" to "public health."

However, from 1990 to 2005, terms such as "knowledge, health, and medicine" were gradually integrated into the term "knowledge translation." This integration continued from 2006 to 2016, and to this day, the concept behind this term remains unchanged. Additionally, the term "education" gradually superseded various terms between 2006 and 2016, such as "health promotion," "improving quality of life," "knowledge," "attitude," "practice," and "evidence-based medicine." Since 2017, "knowledge" has been progressively incorporated and defined to encompass it. Over time, the "social value and knowledge translation" channel has expanded. These changes reflect the increasing importance placed on the effectiveness of the knowledge-to-action process. Consequently, in recent years, one has encountered the terms "knowledge and knowledge translation" as well as "mental health and public health," which pertain to the notion of societal impact.

In Figure 6, it is evident that the authors who were most active in this field focused on terms such as "knowledge translation," "implementation," "science implementation," "primary care," "knowledge," "attitude," and "knowledge management," among others. Their work involved Canada, the United States, Australia, Britain, the Netherlands, Germany, Spain, China, Italy, and India, as indicated by the publication size and attention it received. Canada is ranked first, followed by the United States, Australia, Britain, and China, to prioritize the concepts of "knowledge translation, science implementation, public health, and knowledge management."

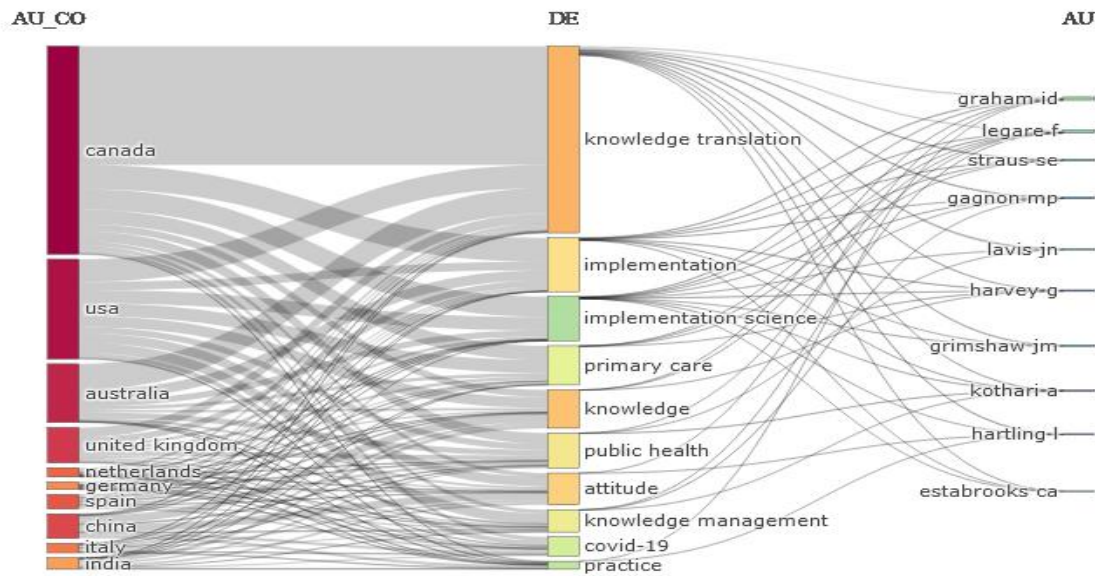


Figure 6: Changes in thematic sub-areas in different countries

In a further analysis of the co-word network of authors in Figure 7, the most significant concepts in this field, repeated over 10 years, include "knowledge utilization," "health promotion," and "education" in the first-order concepts. In the second place, with a repetition of 9 years, are the phrases "knowledge management", "quality of life", and "evidence-based medicine." On the other hand, the issue of knowledge utilization in applied social sciences is closely linked to policy research (policy analysis) and program evaluation studies. The words "health policy, knowledge translation, quality improvement, primary care, and evaluation" have been repeated for six years, from 2014 to 2020. Thereafter, there is a five-year repetition of the terms "public health and mental health" from 2016 to 2021. Recently, there has been a growing recognition and acceptance of terms like "science implementation" and "learning health system" in this field. These terms have been consistently used for the past two years and are gaining attention. In general, it can be stated that there has been a shift in the social impact of medical research utilization over time. This shift has been influenced by the emergence of fourth-generation universities, which have taken on the responsibility of social accountability. Additionally, the development of the social impact of medical research utilization has led to a transition from focusing solely on knowledge management for knowledge utilization to a greater emphasis on implementation and health systems for achieving the desired social impact of the research.

Scientific map of countries

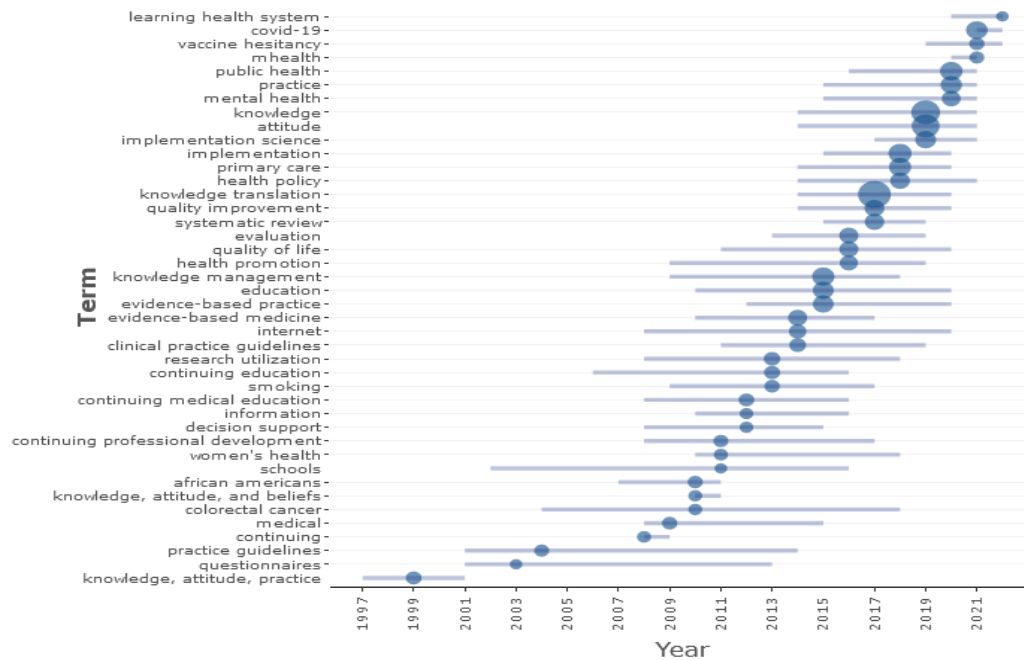


Figure 7: The dissemination status of top keywords according to time

According to the data generated by VOSviewer software (Table 3), the highest numbers of articles in the social impact of medical research utilization are associated with the United States and Canada. Furthermore, Great Britain, Australia, and the Netherlands ranked third through fifth.

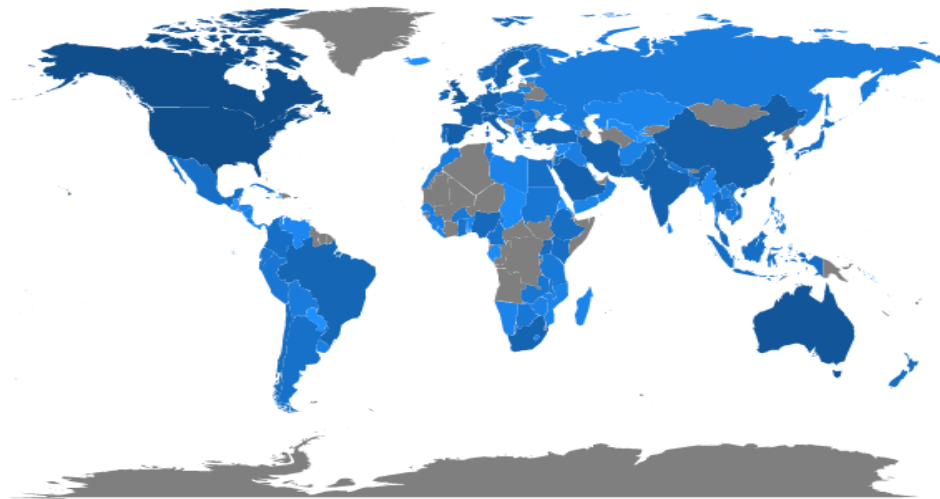
Table 3  
Top countries in the field under study

#	Country	Number of Publications	Time of Citation	#	Country	Number of Publications	Time of Citation
1	USA	1976	62122	8	Italy	184	4873
2	Canada	1441	48449	9	India	167	3296
3	UK	803	34164	10	Peoples R China	164	2585
4	Australia	655	17371	11	South Africa	162	2588
5	Netherlands	215	6483	12	Saudi Arabia	156	1346
6	Germany	191	4446	13	Switzerland	136	3556
7	Spain	189	3207				

These countries, respectively, received the highest article citation rank. Additionally, the articles with the most citations predominantly originate from European countries. Specifically, Switzerland stands out with 136 article titles, marking a remarkable 3556 citations. This surpasses the citation count of articles published in Asian and South African countries.

Figure 8 displays a geographical map illustrating the distribution of publications related to the social impact of medical research utilization. In Figure 8, the deep blue color represents countries with high publications, the light blue color represents countries with low publications, and the gray color represents countries without publications (Gholampour et al., 2022). Figure 8 suggests that most countries were receptive to research in this area; therefore, only a few

places can be found to have attracted researchers in this manner. In general, many countries in Europe, Asia, the Americas, and Oceania have paid serious attention to this topic. Additionally, African countries have also demonstrated a significant level of attention. Research activities in this field originated in North America, specifically in the United States and Canada. Subsequently, these activities expanded to Western European and Pacific countries, including Britain, Australia, the Netherlands, Germany, Spain, and Italy. Finally, they garnered attention from Asian and African countries, such as India, the People's Republic of China, South Africa, and Saudi Arabia. Although Iran is considered to have a high number of publications, an analysis of previous research has revealed that most studies have focused separately on research utilization (Estabrooks, Floyd, Scott-Findlay, O'Leary and Gushta, 2003; Mahmoudi & Adib, 2014; Ghāedrahmati & Bakhtiāri, 2017; Diehr & Gueldenberg, 2017; Daneshvari Nasab, 2019; Sadatmoosavi, Tajedini, Khasseh & Shabani, 2021), knowledge translation (Jacobson, Butterill & Goering, 2003; Sadighi et al., 2008; Babalhavaeji, Tajedini, Nooshinfard & Hariri, 2013; Tajedini, Babolhavaji & Sadatmoosavi, 2014; Tajedini, Azami & Sadatmoosavi, 2015; Akrami & Bahadoran, 2016; Mosadeghrad & Isfahani, 2021), the transfer and applicability of research results (Yazdizadeh, Nedjat, Gholami, Changizi, Nasehi & Majdzadeh, 2009; Karimian, Sabaghian & Salehsedghpoor, 2012; Ojagh, Sheikh Jabbari, Vesali, Zare & Dorostian, 2013; Prihodova, Guerin, Tunney & Kernohan, 2019; Minogue et al., 2021; Atapour et al., 2021), the social impact of research (Mostert, Ellenbroek, Meijer, Van Ark & Klasen, 2010; Salahi, Ghasemi & Hemati, 2018; Zavarraqi, 2019; Zheng, Pee & Zhang, 2021; Fecher & Hebing, 2021; Smit & Hessels, 2021; Doulani, Behpour & Abam, 2023), and social impact evaluation (Jamali, 2012; Kah & Akenroye, 2020; Pedersen et al., 2020; Corvo, Pastore, Manti & Iannaci, 2021; Gholampour et al, 2023). However, very few studies have addressed the common issue of the social impact of medical research utilization.



*Figure 8: Global map of partner countries in the studied area*

Figure 9 illustrates the structure of the co-authorship network among countries in the social impact of medical research utilization domain. Countries denoted by larger circles indicate greater participation and influence in scientific article production and dissemination within this specific domain. Based on an analysis of 6,427 articles, 153 countries have been classified into seven clusters, each represented by a different color. The degree of proximity and connectivity

within the research field is proportional to the thickness of the communication lines. The thickness of the communication lines in Figure 9 between the United States, Canada, England, and Australia is significant. Iran is not commonly included in the communication network of this field, which highlights the novelty of this issue in our country. Joint research activities may be proposed to Iranian researchers, who can enhance their scientific credibility by increasing international research cooperation in the social impact of medical research utilization.

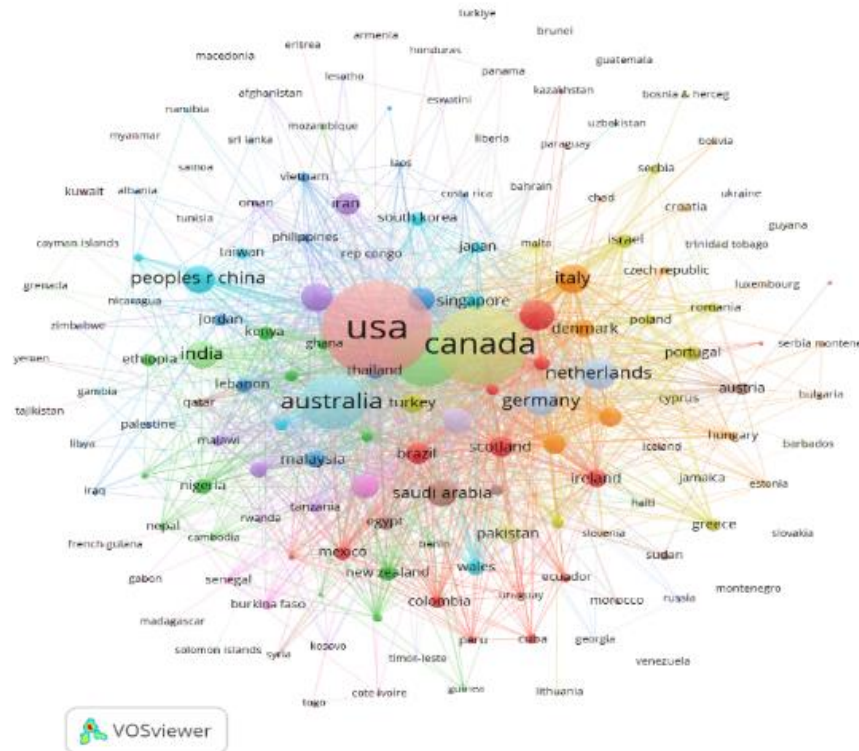


Figure 9: The co-authorship network of the countries in the study area

### Scientific map of journals

In this analysis section, the researcher drew the scientific map of 782 journals with at least three articles, irrespective of citations. The Journal of Implementation Science is categorized under health services, policy, and health care sciences and services. With 310 articles and 26,571 citations, this journal is the most prolific and highly cited publication on the social impact of medical research utilization. With 5,688 citations, the BMC Journal of Health Research Services specializes in various areas, including digital health, governance, health policy, health system quality and safety, health care delivery and access, health care financing and economics, and the health workforce. Following suit in terms of citation count is the Journal of Health Research Policy and Systems, which has 5,172 citations and thematic coverage of health sciences, continuing education evaluation, health care education, and health policy and systems, followed by the Journal of Health Research Capacity, which has 4,919 citations (Table 4).

Table 4

*The research trend of journals in the field under study*

#	Journal	Number of Publications	Time of Citation	#	Journal	Number of Publications	Time of Citation
1	Implementation Science	310	26571	8	Journal of Evaluation in Clinical Practice	84	1366
2	BMJ Open	297	2864	9	American Journal of Preventive Medicine	64	2332
3	BMC Health Services Research	258	5688	10	Journal of Community Health	64	1365
4	Health Research Policy and Systems	216	4919	11	Academic Medicine	63	2853
5	Journal of Continuing Education in the Health Professions	104	5172	12	Systematic Reviews	61	1722
6	Journal of Medical Internet Research	101	2728	13	JMIR Research Protocols	58	333
7	Vaccine	95	2757				

The Journal of Implementation Science and the Journal of Health Research Policy and Systems are in the first and second ranks of collaborations. The BMC Journal of Health Research Services and the BMJ Open Journal have many collaborations in the third and fourth ranks. These journals cover various topics, including health services research, health economics, surgery, qualitative research, research methods, medical education, and medical publications. These journals focus on health policy, health research, health promotion, and health care, among other related topics.

### Scientific map of organizations and institutions

From a total of 7,800 institutions, Canadian and Australian universities occupy the top ten positions in terms of research activity concerning the social impact of medical research utilization. The University of Toronto leads in the number of published articles in this field, with 411 titles. McMaster University follows with 294 titles, and the University of Ottawa has 245 titles. These universities are at the forefront in terms of both the highest citations and being the most cited in this field. Monash and Sydney universities in Australia have the highest number of citations, with 2,454 and 2,423 citations, respectively, compared to Laval and Montreal universities in Canada, which have 2,138 and 1,997 citations, respectively (Table 5).

Table 5

*The research trend of institutions in the studied field*

#	Institution	Number of Publications	Time of Citation	#	Institution	Number of Publications	Time of Citation
1	Univ Toronto	411	19205	8	Univ Sydney	133	2423
2	McMaster Univ	294	16019	9	Univ Montreal	111	1997
3	Univ Ottawa	245	11193	10	Univ Laval	109	2138
4	Univ Alberta	175	4649	11	Dalhousie Univ	108	3191
5	McGill Univ	166	4845	12	Monash Univ	98	2454
6	Univ British Columbia	159	2600	13	St Michaels Hosp	94	2947

#	Institution	Number of Publications	Time of Citation	#	Institution	Number of Publications	Time of Citation
7	Univ Calgary	152	3315				

Moreover, the Canadian universities of Alberta, McMaster, Toronto, and Ottawa are the most collaborative in this field. As indicated in the authors' scientific map analysis, Canada ranks highest among countries in terms of public research funds allocated to its universities. For this purpose, many collaborations and activities in this field, particularly those that emphasize the social impact and effectiveness of research, as well as knowledge translation and utilization, have originated and flourished within the universities of this country.

Figure 10 displays five thematic clusters of university collaborations on the social impact of medical research utilization. These clusters involve universities from the United States, Canada, Australia, England, and other countries. This map displays prominent universities and countries associated with this field. In this network, the nodes represent institutions and universities, while the edges reflect co-authorship. The red color indicates the collaboration of Harvard, Carolina, Johns Hopkins, and Columbia universities, with Harvard University leading in this field. Johns Hopkins University is a private research university and the first university in the United States based on the European research institute model. This model has been instrumental in emphasizing the importance of this subject area. The blue color represents universities such as the University of Toronto, the University of Ottawa, McMaster University, and the University of Alberta. These universities are located in Canada. In this cluster, the University of Toronto is the leader in this field among Canadian universities. Yellow represents universities such as Sydney, Newcastle, Monash, and others. These universities belong to Australia and Malaysia, with the University of Sydney being the leading institution in this field among Australian universities. Finally, the green color represents the cooperation of UCL (a public research university), Oxford, and the London Institute of Tropical Health, which specializes in public health and tropical medicine. Oxford University is the leader in this field within this thematic cluster.

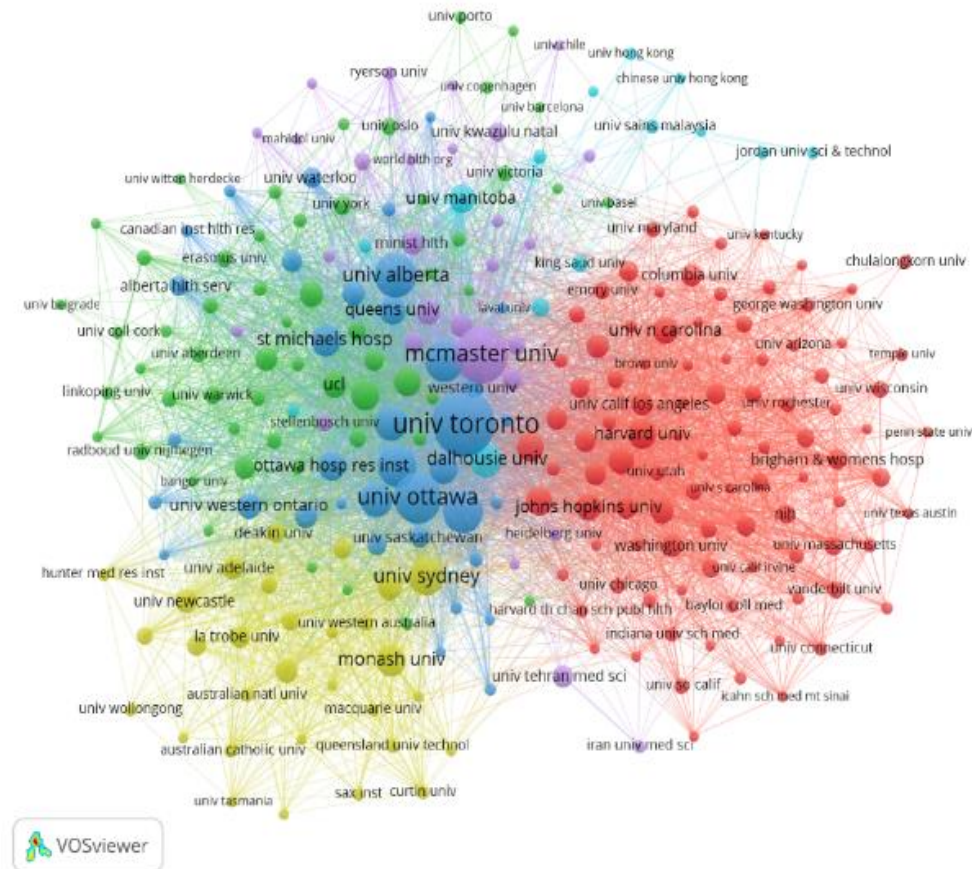


Figure 10: Co-authorship network of institutions in the studied field

## Discussion

Bibliometric analysis serves to identify the primary trends and research directions within a specific research area or journal. This study aimed to determine the publication trend of studies on the social impact of medical research utilization from 1990 to 2022. The results indicate that this field has made significant progress in recent years. The findings suggest a steady rise in both the number of publications and the number of citations. One possible reason for the increase in scientific production in 2021 could be the emphasis on social impact research and translating knowledge into action. Therefore, this publication trend continues to rise because of the significant potential for social impact in health. From a different perspective, the articles from the second decade have received more citations than those from the first and third decades. This indicates that researchers have paid more attention to the issue of social impact during these years. One of these reasons is the rapid dissemination of information and the capacity to effectively convert knowledge into action concerning the social implications of medical research utilization.

Also, the publication trends and citations of this research align with the findings of Gholampour et al. (2023) in the field of mega-events. Gholampour et al. (2023) highlighted the recent rise in publications and citations, which aligns with the current research findings in this particular domain. Therefore, these facts demonstrate the acceptance of the social impact of medical research utilization as an important research field in the health sector. In terms of countries and authors, the results indicate that the United States and Canada rank highest among the participating countries. Generally, the United States is considered a leader in most scientific

fields. For example, Laval University is ranked among the top 10 universities in research funding allocation. This issue has led Canada to rank first among various countries in terms of knowledge translation and utilization (Honarvar et al., 2020) and be the most active in social impact. Additionally, the researchers specialize in areas such as knowledge translation, science implementation, joint decision-making, health policies, and health systems, demonstrating their keen interest in this field.

The United States is also ranked first among productive countries in disseminating knowledge and conducting applied research (Honarvar et al., 2020). Therefore, the findings of this section are consistent with the research results of (Sadatmoosavi et al., 2021) and (Gholampour, Gholampour & Noruzi, 2022b). Another aspect to consider concerns the journals that publish research reports in this field. Notable examples include the Journal of Implementation Science, Journal of Health Research Policies and Systems, BMC Journal of Health Services Research, and BMJ Open Journal. The thematic coverage of these journals assists researchers in familiarizing themselves with the journals and articles about this field while also emphasizing the key terms within the field.

The literature analysis allows us to identify potential areas for future research. The literature, for instance, presents a unidimensional perspective concerning the utilization of research and social impact in Iran. Therefore, we suggest that future research consider various factors, including knowledge translation, science implementation, dissemination and exchange, knowledge brokers, policies, knowledge utilization and exploitation, social values, and public health. This will help yield a better understanding of what could potentially enhance the social impact of medical research utilization. Additionally, the practical map depicting the countries and authors, along with the co-word analysis of the authors, aided us in identifying the patterns of social impact of medical research utilization.

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### Conclusion

The publication trend on the social impact of medical research utilization continues to rise, indicating the significant potential of this topic in the health field. Interestingly, articles published in the second decade have received more citations than those from the first and third decades, suggesting that researchers have paid more attention to the issue of social impact during this period. Overall, this bibliometric analysis offers valuable insights into the publication trends and research directions related to the social implications of medical research utilization. The findings highlight the increasing significance of this domain and point to opportunities for further investigation. However, it is essential to note that the data for this study were extracted solely from the Web of Science database. As a result, the findings may not provide a comprehensive perspective on this field. Future studies should consider expanding the data sources by extracting bibliographic data from other databases, such as Scopus or other centralized repositories in the health domain. Additionally, the current analysis is restricted to research and review articles, and the results may vary if other record types are included.

Moreover, the rapid evolution of health services may lead to new concepts and subjects emerging within the domains of social impact and research utilization. It is highly recommended that future studies explore alternative research possibilities to capture these emerging trends and developments. Despite these limitations, this research serves as a roadmap for future researchers interested in social impact assessment. It contributes to advancing research into the social impact and utilization of medical research, providing a foundation for further exploration and understanding in this vital field.

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