Global Health Insurance Research: Integrating Bibliometric Analysis and Expert Perspectives to Identify Research Themes and Emerging Priorities

Abstract:
Introduction: This study explored thematic networks in global health insurance research to identify major themes and emerging priorities for future research and policy development.
Methods: A mixed-methods design was employed. First, Scopus-indexed health insurance publications were systematically identified. Second, bibliometric and keyword co-occurrence analyses were conducted using VOSviewer. Third, thematic networks were refined through an expert panel of eight health insurance specialists and visualized using MAXQDA.
Results: Six major thematic dimensions were identified: health and prevention, quality, access, epidemiology, health economics, and health insurance systems. Health policy, economics, healthcare delivery, and hospital services were the dominant research themes, whereas pharmaceutical services insurance, telehealth, and self-care emerged as underexplored priorities. Expert concept mapping also revealed strong interconnections among policy, access, cost control, and epidemiology.
Conclusion: The findings provide a roadmap for future health insurance research and highlight emerging areas requiring greater attention to support integrated, equitable, and sustainable health insurance policies.
Keywords: Health Insurance, Concept Mapping, Health Policy

1. Introduction

Approximately 150 million individuals worldwide experience financial hardships each year due to out-of-pocket expenses related to their medical needs[1] . Consequently, various organizations within the healthcare sector have worked diligently to improve patient safety and the quality of care. Furthermore, the accessibility and efficiency of healthcare services have been continuously enhanced to meet customer demands [2]. Many countries are increasingly committed to achieving universal health coverage (UHC), which entails establishing financing mechanisms that ensure "all people can access the health services they need, of sufficient quality to be effective, while also guaranteeing that the use of these services does not lead to financial hardship for the user" [3]. This advancement toward UHC should be equitable, ensuring that lower-income and other vulnerable or disadvantaged groups benefit fairly from these improvements rather than being marginalized until later [4].

Health insurance is considered one of the pathways to achieving universal coverage, making it a significant topic in the field of health financing [5]. One of the key scientific concepts that plays a crucial role in global health systems is health insurance [6]. Health insurance encompasses a wide range of topics, including financing, payment methods, out-of-pocket expenses, resource accumulation, and equity. Therefore, paying attention to bibliometrics and examining the future trends of health insurance research is vital due to the increasing population, aging, disease burden, and its consequences. For instance, an aging population leads to a significant portion of society suffering from chronic diseases, high-cost treatments, and physical and functional disabilities. This process will place immense pressure on health insurance systems[7] .

Another emerging concept influencing the future of health insurance is information science and information technology. The rapid growth of digital technology and computer sciences has enabled individuals to access healthcare options more consciously and individually[8] . Like many other sectors, the insurance industry has witnessed an exponential growth in the use of technology. Insurance firms are testing new methods for tracking, assessing, and mitigating risk, driven by advancements in technology and digital platforms. Key technologies being implemented for insurance analytics and technology include the Internet of Things, artificial intelligence, blockchain, machine learning, big data analytics, and insurance management platforms[9] . A report titled "The Impact of Artificial Intelligence on the Future of Insurance/2030" envisions a transformative future for the insurance industry, shaped by major AI-driven trends. These include an explosion of data from connected devices, a growing role of physical robotics, the establishment of data ecosystems with open-source protocols, and advancements in cognitive technologies that will redefine industry standards and operations[10] .

One of the analytical methods for scientific outputs that has gained considerable attention in recent decades is bibliometric analysis. Bibliometric studies influence future research policymaking as well as science and technology[11] . By examining bibliometrics and existing studies, one can discern future trends in specific fields and make informed decisions in response to the rapid pace of change and existing uncertainties. Decisions made based on such insights are likely to have a higher chance of success and competitiveness [12]. Analyzing existing capacities aids policymakers and research managers in systematically ranking,

evaluating performance quality, and appropriately allocating budgets, leading to a better understanding of entities and trends[13] . Quantitative evaluation of scientific findings from research activities assists decision-makers and planners in maximizing the use of financial and human resources with minimal costs, thus contributing to the optimization of the socio-economic structure of the country. Bibliometrics, as an evidence-based strategy, can help balance budgetary and economic costs. Furthermore, examining scientific production provides a suitable tool for accurate policymaking and planning based on past experiences, helping to focus scientific studies and set research priorities while also allowing for a clearer understanding of existing weaknesses and gaps in scientific content production [14].

Pandey et al. conducted a bibliometric analysis titled "Blockchain Technology in Healthcare and Insurance," examining articles published between 2016 and 2021. The United States, China, and India had the highest contributions. Statistical and network analysis indicates that there is significant potential for blockchain work in achieving greater integration, security, and privacy [15]. In 2023, Mall's study titled "Bibliometric Analysis of Big Data Applications in the Insurance Sector" showed that most research articles originated from the United States, India, and China. Seven areas, including fraud detection and prevention, risk assessment, pricing and rate-setting, technology utilization, risk management, claims processing and prediction, and finally, digitization, were the primary focus of research articles regarding big data applications in the insurance business[16]. Given the aforementioned points, and considering that insurance is one of the industries predicted to undergo significant transformation according to McKinsey's future study over the next fifty years, this serves as a warning for industry stakeholders. Insurance companies must adapt to contemporary technology based on innovative approaches aligned with the economic conditions and business environments of their countries, enhancing their capabilities in line with future predictions to maintain their effective roles as before. Therefore, this research aims to identify and delineate the structural networks of thematic studies in the field of health insurance.

2. Methodology

The present study was a mixed-methods research combining quantitative and qualitative approaches. It was conducted in three complementary phases: (1) extraction and screening of articles through a bibliometric approach, (2) network analysis to identify scientific trends using data analysis software, and (3) qualitative validation with experts to ensure conceptual accuracy. Thus, the mixed-methods design was systematically implemented, with each phase building directly on the results of the previous one.

Phase 1: Identification of Articles Related to Health Insurance

The research population in this phase comprised all scientific articles published in the field of health insurance between 2000 and 2023 and indexed in the Scopus database as of March 2, 2024. Specific criteria were established for article inclusion, which included: publication date (2000-2023), originality of findings (the article must be original), and the presence of key terms related to health insurance in the title or keywords of the article (alignment with research topics).

In developing the search strategy, to avoid double counting of duplicate studies and to ensure the originality of findings, articles categorized as erratum, letters to the editor, editorials, notes, or retracted papers were excluded from the search strategy. For the search of relevant scientific articles in the field of health insurance, the Scopus database was utilized. To identify scientific outputs related to health insurance, all keywords synonymous with the term "Health Insurance" were identified and selected based on MeSH Tree Structures (Table 1). The search was conducted using the TITLE and KEY fields in Scopus, thereby restricting retrieval to records containing the selected health insurance-related terms in their titles or keywords. The search was performed on March 2, 2024, and covered publications from January 1, 2000, through December 31, 2023, as specified in the final search strategy presented in Table 1.

Decisions regarding the combination of keywords and the search strategy were made considering the primary objective of the research and based on the number of articles obtained from initial searches. The search strategies were adjusted multiple times, and the results were continuously analyzed by the project supervisors and consulted with experts to ensure that the maximum acceptable number of articles was retrieved. Adjustments to the strategies during the search process were based on initial results, the research team's experience, and the outputs obtained from executing the search strategy, as well as a random review of the identified articles during the search.

The process of reviewing and screening articles through strategy adjustments and results analysis was conducted by four individuals from the fields of economics and health insurance in a group discussion format, ensuring that articles not aligned with the primary research objective were excluded from the analysis phase.

The final search strategy on March 2, 2024, yielded 123,348 results in Scopus (Table 1). Due to the limitations of Scopus in exporting large datasets in a single transaction, bibliographic records were

exported separately for each publication year and subsequently combined into a single dataset for bibliometric analysis.

Table 1 - Keywords and Search Strategy in Scopus

	Keyword	Mesh ID	Mesh Link	Search Strategy
1	"Health* insurance"	D007348	http://id.nlm.nih.gov/mesh/D007348	(TITLE ("Health* insurance") OR TITLE (health AND insurance) OR TITLE ("Medical Insurance") OR TITLE ("Third-Party Pay*") OR TITLE ("Prepaid Health Plans") OR TITLE (nursing AND insurance) OR TITLE ("Accident Insurance") OR TITLE (dental AND insurance) OR TITLE ("Hospitalization Insurance") OR TITLE ("Long-Term Care Insurance") OR TITLE ("Pharm* Services Insurance
2	Health insurance[1]	D007348	http://id.nlm.nih.gov/mesh/D007348	
3	"Medical Insurance"	D007354	http://id.nlm.nih.gov/mesh/D007354	
4	"Third-Party Pay*"	D007349	http://id.nlm.nih.gov/mesh/D007349	
5	"Prepaid Health	D017061	http://id.nlm.nih.gov/mesh/D017061	
6	Nursing Insurance	D007355	http://id.nlm.nih.gov/mesh/D007355	
7	"Accident Insurance"	D007346	http://id.nlm.nih.gov/mesh/D007346	
8	Dental Insurance	D007347	http://id.nlm.nih.gov/mesh/D007347	
9	"Hospitalization	D007350	http://id.nlm.nih.gov/mesh/D007350	
10	"Long-Term Care	D007353	http://id.nlm.nih.gov/mesh/D007353	
11	"Pharm* Services	D007356	http://id.nlm.nih.gov/mesh/D007356	
12	"Physician Services	D007357	http://id.nlm.nih.gov/mesh/D007357	
13	"Psychiatric	D007358	http://id.nlm.nih.gov/mesh/D007358	
14	"Surgical Insurance"	D007359	https://meshb.nlm.nih.gov/record/ui?ui=D007359	
15	"Vision Insurance"	D000077776	http://id.nlm.nih.gov/mesh/D000077776	

Search Strategy:

(TITLE ("Health insurance") OR TITLE (health AND insurance) OR TITLE ("Medical Insurance") OR TITLE ("Third-Party Pay*") OR TITLE ("Prepaid Health Plans") OR TITLE (nursing AND insurance) OR TITLE ("Accident Insurance") OR TITLE (dental AND insurance) OR TITLE ("Hospitalization Insurance") OR TITLE ("Long-Term Care Insurance") OR TITLE ("Pharm* Services Insurance") OR TITLE ("Physician Services Insurance") OR TITLE ("Psychiatric Insurance") OR TITLE ("Surgical Insurance") OR TITLE ("Vision Insurance") OR KEY ("Health* insurance") OR KEY (health AND insurance) OR KEY ("Medical Insurance") OR KEY ("Third-Party Pay*") OR KEY ("Prepaid Health Plans") OR KEY (nursing AND insurance) OR KEY ("Accident Insurance") OR KEY (dental AND insurance) OR KEY ("Hospitalization Insurance") OR KEY ("Long-Term Care Insurance") OR KEY ("Pharm* Services Insurance") OR KEY ("Physician Services Insurance") OR KEY ("Psychiatric Insurance") OR KEY ("Surgical Insurance") OR KEY ("Vision Insurance")) AND PUBYEAR > 1999 AND PUBYEAR < 2024 AND (EXCLUDE (DOCTYPE , "no") OR EXCLUDE (DOCTYPE , "le") OR EXCLUDE (DOCTYPE , "ed") OR EXCLUDE (DOCTYPE , "ch") OR EXCLUDE (DOCTYPE , "er") OR EXCLUDE (DOCTYPE , "bk") OR EXCLUDE (DOCTYPE , "tb") OR EXCLUDE (DOCTYPE , "dp") OR EXCLUDE (DOCTYPE , "Undefined"))*

Results	123,348

Phase 2: Bibliometric Analysis of Articles Related to Health Insurance

In this phase, to reveal the scientific trends in the field of health insurance, the most frequently occurring keywords in health insurance articles were initially examined. For this purpose, the bibliographic information of all relevant scientific articles (totaling 123,348 articles) extracted from the Scopus database in the previous phase was entered into VOSviewer version 1.6.20. Keyword selection and screening were reviewed by two members of the research team with expertise in health economics and health services management to ensure their relevance to the study objectives. A minimum occurrence threshold of more than 10 was used to identify frequently occurring keywords for further analysis. Then, density visualization mapping was used to more precisely reveal scientific trends in the field of health insurance. In density visualization, items (which in this study are keywords) are represented by their labels. Each point in the item density visualization has a color that indicates the density of items at that point. According to the default settings of VOSviewer, colors ranged from blue to green to yellow. The more items in the neighborhood of a point and the greater the weight of neighboring items, the closer the point's color is to yellow. Conversely, the fewer items in the neighborhood of a point and the lower the weight of neighboring items, the closer the point's color is to blue. Points that are yellower indicate a stronger scientific trend.

[1] . Words that had suffixes based on MeSH, such as health care insurance, were not enclosed in quotation marks to prevent missing articles.

Keyword co-occurrence analysis was used to identify relationships among research topics. In this approach, the strength of a link between two keywords reflects the frequency with which they appear together in the same publications. VOSviewer was used to construct the co-occurrence network and group closely related keywords into thematic clusters. Association strength normalization was used to account for differences in keyword occurrence frequencies, provided that the default normalization setting was retained during the analysis.

Additionally, to elucidate the relational patterns between topics in the field of health insurance, network visualization was employed. In network visualization, items (which in this study are keywords related to health insurance) are represented by their labels, typically displayed in a circle in VOSviewer. The size of the label and the circle of an item is determined by the weight of that item. Therefore, the greater the weight of an item, the larger its label and circle. Lines between items indicate the links between them. The distance between two items on this map reflects the co-occurrence relationship between the two items. Generally, the closer two keywords are to each other, the stronger their connection. The strongest co-occurrence links between keywords are also represented by lines. Two network visualizations were generated to examine keyword relationships at different levels of detail. The first map displayed the 1,000 strongest co-occurrence links using the default VOSviewer visualization setting, providing an overview of the network structure. In the second map, the maximum number of displayed links was reduced to 100 to improve visual clarity and facilitate the identification of the strongest relationships. This adjustment affected only the visualization of links and did not alter the underlying co-occurrence network or clustering results.
In interpreting the bibliometric maps, keyword occurrence frequency, item density, and co-occurrence link strength were treated as distinct indicators. Occurrence frequency reflects how often a keyword appears in the analyzed publications, whereas item density represents the concentration and weight of neighboring keywords in the visualization. Link strength indicates the intensity of co-occurrence between two keywords. Accordingly, high keyword frequency or density was interpreted as an indication of research concentration rather than necessarily representing a recent or emerging research trend.
Phase 3: Mapping the Structure of Thematic Networks in Health Insurance Research
The identification of thematic dimensions and categories was conducted inductively based on the keyword clusters generated by VOSviewer. Two analysts (an assistant professor of health economics and an associate professor of health services management) independently examined the extracted keywords and their thematic relationships and grouped conceptually related keywords into preliminary categories. The two sets of categorizations were subsequently compared to identify areas of agreement and disagreement. Discrepancies were discussed in expert panel sessions, during which the preliminary categories were reviewed and refined to establish a conceptually coherent thematic structure.
The quantitative and qualitative components were integrated sequentially. The keyword co-occurrence networks and clusters generated by VOSviewer provided the initial framework for qualitative interpretation. These results were subsequently examined by the two analysts and validated and refined through expert panel discussions. The integration of bibliometric findings with expert judgments facilitated the development of a conceptually coherent thematic structure, while the comparison of independent categorizations and collective expert review strengthened the credibility of the final interpretation.
The qualitative research population consisted of professors and researchers in the fields of health insurance and health economics. Experts were included based on specific criteria: holding at least a master's degree in relevant fields, having a record of publishing scientific articles on health insurance–related topics, or possessing management experience in insurance organizations. Using purposive sampling, eight experts from both organizational and academic backgrounds were selected. Their characteristics are summarized in Table 2.

Table 2 - Characteristics of experts participating in the study

Characteristics		N (%)
Gender	Male	5 (62.5)
	Female	3 (37.5)
Education	Master of science	1 (12.5)
	PhD and above	2 (25.0)
	Faculty member	5 (62.5)
Field of study	Health care Management and Policy	4 (50.0)
	Health Information Management Sciences	1 (12.5)
	Health economics	3 (37.5)
	Publish experience	4 (50.0)

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Selection criteria	Management experience	2 (25.0)
	Both	2 (25.0)

Two structured expert panel sessions, each lasting approximately three hours, were conducted with eight experts who participated in both sessions. The sessions were chaired by an associate professor of health services management, with an assistant professor of health economics serving as the session secretary. During the sessions, the preliminary thematic categories and their corresponding keywords were reviewed and discussed collectively. Disagreements regarding the classification or interpretation of keywords were addressed through group discussion, and the final thematic structure was established through collective expert consensus rather than formal voting. Finally, MAXQDA software was employed to organize the categories and subcategories and to develop the final thematic network structure. The coding framework was informed by the preliminary keyword classifications and refined in accordance with the collective decisions reached during the expert panel sessions.

This research was derived from an approved research project, and the research proposal with the number IR.TUMS.SPH.REC.1402.225 was approved by the ethics committee in research of Tehran University of Medical Sciences.

3. Findings:

The bibliometric dataset comprised 123,348 Scopus records published between 2000 and 2023 and retrieved on March 2, 2024. Records were exported separately by publication year and consolidated for bibliometric analysis. The extracted bibliographic information was used to examine keyword occurrence, co-occurrence relationships, network visualization, and thematic clustering using VOSviewer version 1.6.20.

The density visualization map in Figure 1 shows which topics have received the most attention in health insurance articles. Areas with high density—indicated by light yellow and green colors—represent frequently discussed and popular topics in the field of health insurance. High-density areas indicate that the main trends in health insurance include: health care policy, health economics, healthcare delivery, and hospital services management.

Additionally, medium-density areas—shown in darker green colors—represent the main sub-trends in health insurance, which include chronic disease management, quality of life improvement, treatment outcome assessment, service availability, and epidemiological changes in diseases.

Low-density areas—indicated by blue colors—represent topics that have been less examined in the reviewed articles and provide new areas for future research. Some of these topics include: pharmaceutical services insurance, telehealth, self-care, and patient preferences and their role in health decision-making.

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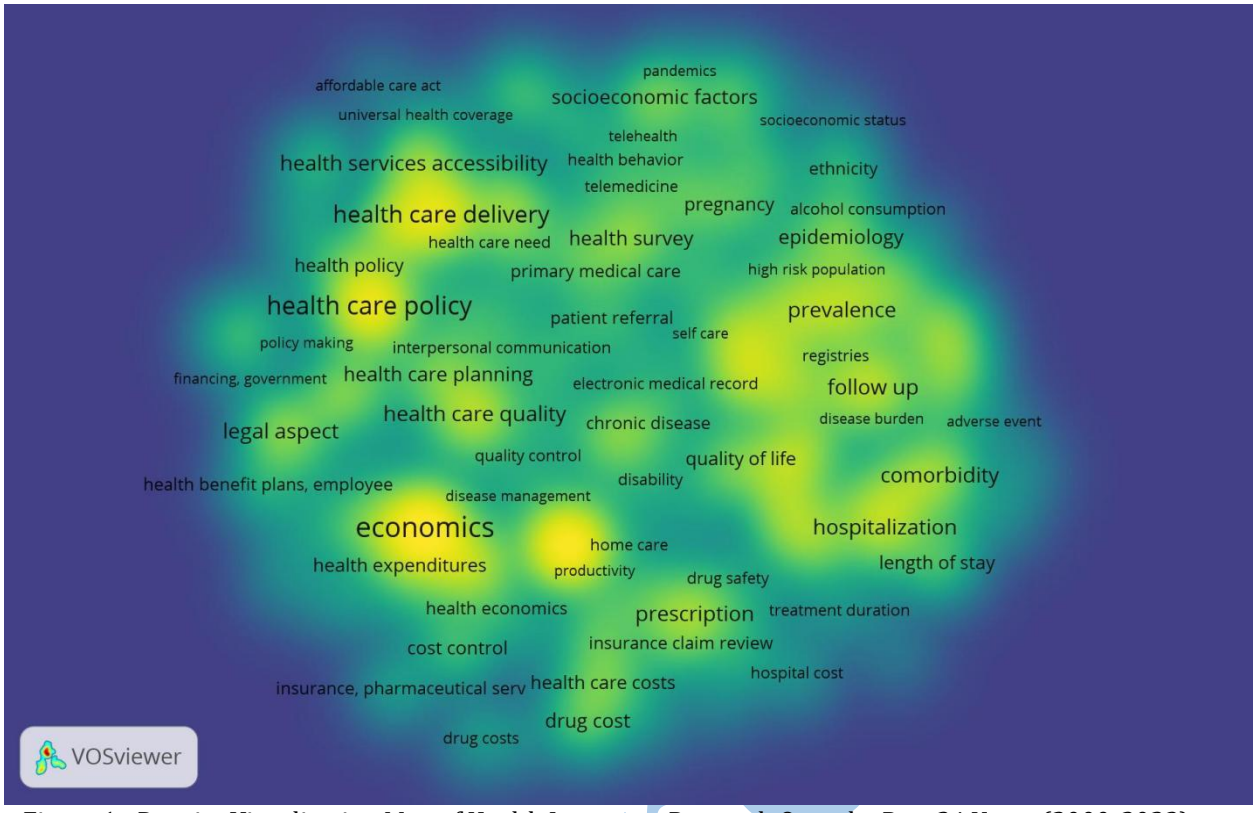


Figure 1 - Density Visualization Map of Health Insurance Research Over the Past 24 Years (2000-2023)

The network visualization map presented in Figures 2 and 3 illustrates the communication patterns among keywords in the field of health insurance. In this map, keywords are displayed in different colors based on their clusters, and the lines between them indicate co-occurrence links. Figure 2 shows one thousand of the strongest links, while Figure 3 summarizes only one hundred of the strongest links. As observed in this map, there are six main thematic clusters represented in blue, green, yellow, red, purple, and indigo.

There are also strong links between keywords such as "health care policy," "health care delivery," "health care quality," and "health services accessibility," indicating the relationship between policy-making, service delivery, and the quality of health services. This topic suggests that studies on health care policies are conducted to improve health service delivery and enhance its quality. Changes in health policies can have a direct impact on how health services are provided and their quality.

Additionally, strong links between keywords like "epidemiology," "prevalence," and "risk factors" indicate a focus on epidemiological analysis and disease risk factors in health insurance research. Furthermore, the presence of strong links between keywords such as "economics," "cost control," and "health care costs" highlights the importance of economic issues in insurance and the control of health care costs in this field. This indicates that health economics and health care costs are closely related, and economic research in insurance focuses on analyzing health care costs and mechanisms for controlling cost growth.

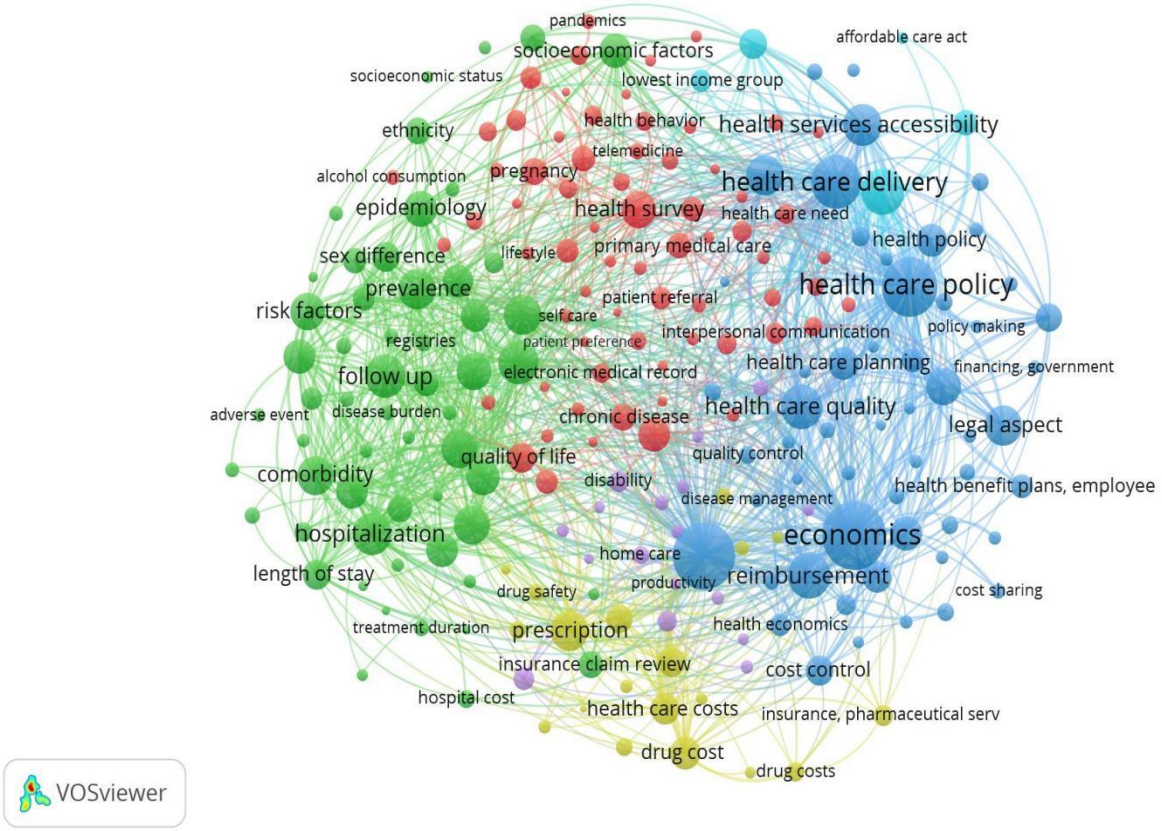


Figure 2 - Network Visualization Map of Health Insurance Research Displaying One Thousand of the Strongest Links

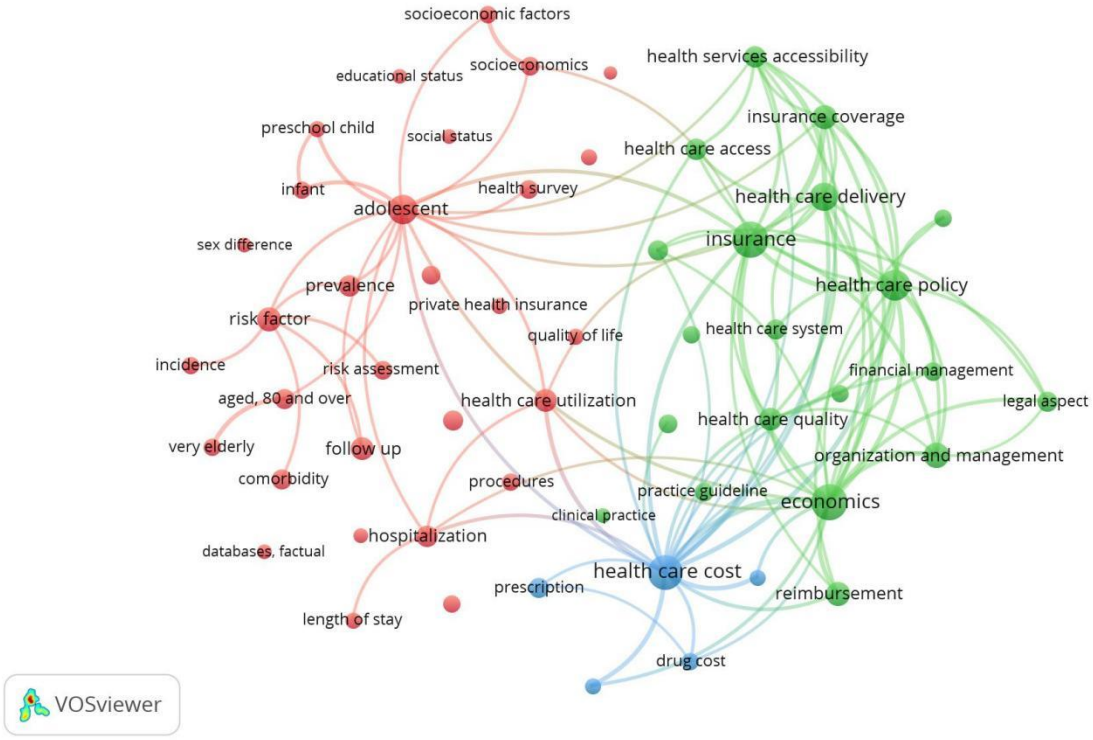


Figure 3 - Network Visualization Map of Health Insurance Research Displaying One Hundred of the Strongest Links

The keyword co-occurrence analysis identified six major thematic clusters in health insurance research. To provide a more detailed quantitative description of these clusters, Table 3 presents their thematic labels, the number of keywords reported in the project tables, and the three leading keywords in each cluster, together with their occurrence frequencies and reported link-strength values. Leading keywords were selected based on their link-strength values.

Table 3. Characteristics of the Six Keyword Co-occurrence Clusters in Health Insurance Research

label	Reported keywords (n)	Leading keywords	Occurrences	Reported link strength
1. Health promotion and quality of care	67	Health survey	6,967	41,386
		Practice guideline	6,312	34,176
		Quality of life	4,634	28,347
2. Healthcare utilization	57	Health care utilization	9,448	69,550
		Hospitalization	9,149	63,894
		Statistics and numerical data	8,547	60,439
3. Health insurance economics and health policy	55	Health care cost	22,861	155,176
		Economics	23,690	147,196
		Health care policy	17,882	111,506
4. Pharmaceutical economics and medical interventions	19	Prescription	8,047	46,490
		Health care costs	5,265	41,262
		Drug cost	5,759	40,407
5. Indirect costs of illness and long-term care	16	Cost of illness	2,686	20,724
		Long term care	2,196	14,825
		Disability	2,219	13,243
6. Health insurance coverage	5	Insurance coverage	10,587	63,320
		Medically uninsured	4,618	30,021
		Patient protection and affordable care act	3,543	23,651

The six thematic dimensions and their corresponding categories were developed through expert interpretation of the keyword clusters identified by VOSviewer. The assignment of keywords to thematic categories was based on their conceptual relevance and relationships within the identified clusters. Preliminary categorizations were independently prepared by two researchers and subsequently reviewed and refined through expert panel consensus. Table 4 presents the final thematic categories and representative keywords supporting each dimension. Also the structure of thematic networks in health insurance is shown in Figure 4. Based on the findings of this section, six main dimensions in health insurance include: health and prevention, quality, access, epidemiology of diseases, health economics, and health insurance systems.

The dimension of disease prevention includes four thematic categories: screening and early detection, lifestyle, health education, and vaccination. This dimension encompasses terms such as screening, health assessment, primary medical care, public health, patient education, health literacy, and preventive medicine.

The quality dimension includes four thematic categories: the process of delivering services to patients, provider-patient communication, medical ethics, patient satisfaction, and behavior. This encompasses concepts such as the service delivery process, clinical decision-making, health care delivery, quality of health care, total quality management, quality assurance, long-term care, provider-patient relationship, medical ethics, patient satisfaction, patient behavior, and hospital readmission.

The access dimension consists of five thematic categories: vulnerable groups, utilization of services, health equity, health information and communication technology, and complementary medicine. Concepts and terms such as elderly, infants, disabled individuals, low-income groups, access to health services, service utilization assessment, patient protection laws, affordable care, disparities in health care, socio-economic status, and medical information systems fall under this dimension.

The dimension of epidemiology of diseases includes three thematic categories: outbreaks, disease burden, and disease risk factors. It includes concepts and terms such as epidemics, mortality, disease burden, and disability.

The health economics dimension consists of five thematic categories: economic evaluation of health services and interventions, insurance economics, health system policy-making, pharmaceutical economics, and hospital economics and management. It includes concepts and terms such as insurance claims reporting, risk management, prospective payment, dental insurance, health policy, health reforms, universal health coverage, drug costs, drug safety, and generic drugs.

The health insurance system dimension focuses on financing methods for health insurance and payment to consumers, consisting of three thematic categories: health insurance structure, health insurance market, and insurance payment mechanisms. It includes concepts such as private health insurance, health maintenance organizations, the private sector, universal health insurance, collaborative behavior, and worker compensation.

Table 4- Main dimensions and topics in the field of health insurance

Dimension	Thematic category	Some related keywords
Health and prevention	Case detection and screening Healthy lifestyle Health education Immunization	mass screening, screening test, health promotion, health" knowledge, attitudes, practice", self-care, preventive health service, preventive medicine, screening test ,physical activity, alcohol consumption
Quality	Provider and patient relationship Health Services delivery process Medical ethics Patient satisfaction and behavior	clinical decision making, treatment planning, adverse event ,disease duration, time to treatment, health care quality, quality control, "quality indicators", rehabilitation, doctor patient relation, informed consent, personal experience, patient satisfaction, patient quality of life, hospital readmission
Accessibility	Vulnerable groups Utilization of services Health equity Health information and communication technology Complementary medicine	chronic disease, high risk population emergency ward, high risk patient, disabled persons, elderly care, health care facility, referral and consultation, health services accessibility, insurance coverage, patient protection and affordable care act, health care need ,socioeconomic factors ,medical information system ,telehealth ,medical documentation ,cancer registry ,palliative therapy ,alternative medicine
Epidemiology of diseases	Pandemic Burden of diseases Disease risk factors	Pandemic, population research, disability, mortality, prevalence, disease burden, risk assessment, years of life lost, disability-adjusted life years
Health economics	Economic evaluation of health services and interventions Insurance economics Hospital Economics and management Health system Policy making Pharmaco-economics	financial management, health expenditures, cost control, medical fee, "efficiency, organizational", cost benefit analysis, cost effectiveness analysis, medical record review, predictive value, economics, health economics, reimbursement mechanisms, cost sharing, "financing, government", fee-for-service plans, insurance claim reporting, hospital mortality, intensive care unit, hospital management, universal coverage, health care management
Health insurance system	Health insurance structure Health insurance market Insurance payment mechanism	public health insurance, managed care programs, health maintenance organization, private sector, universal health insurance, insurance carriers, "health benefit plans, employee", reimbursement

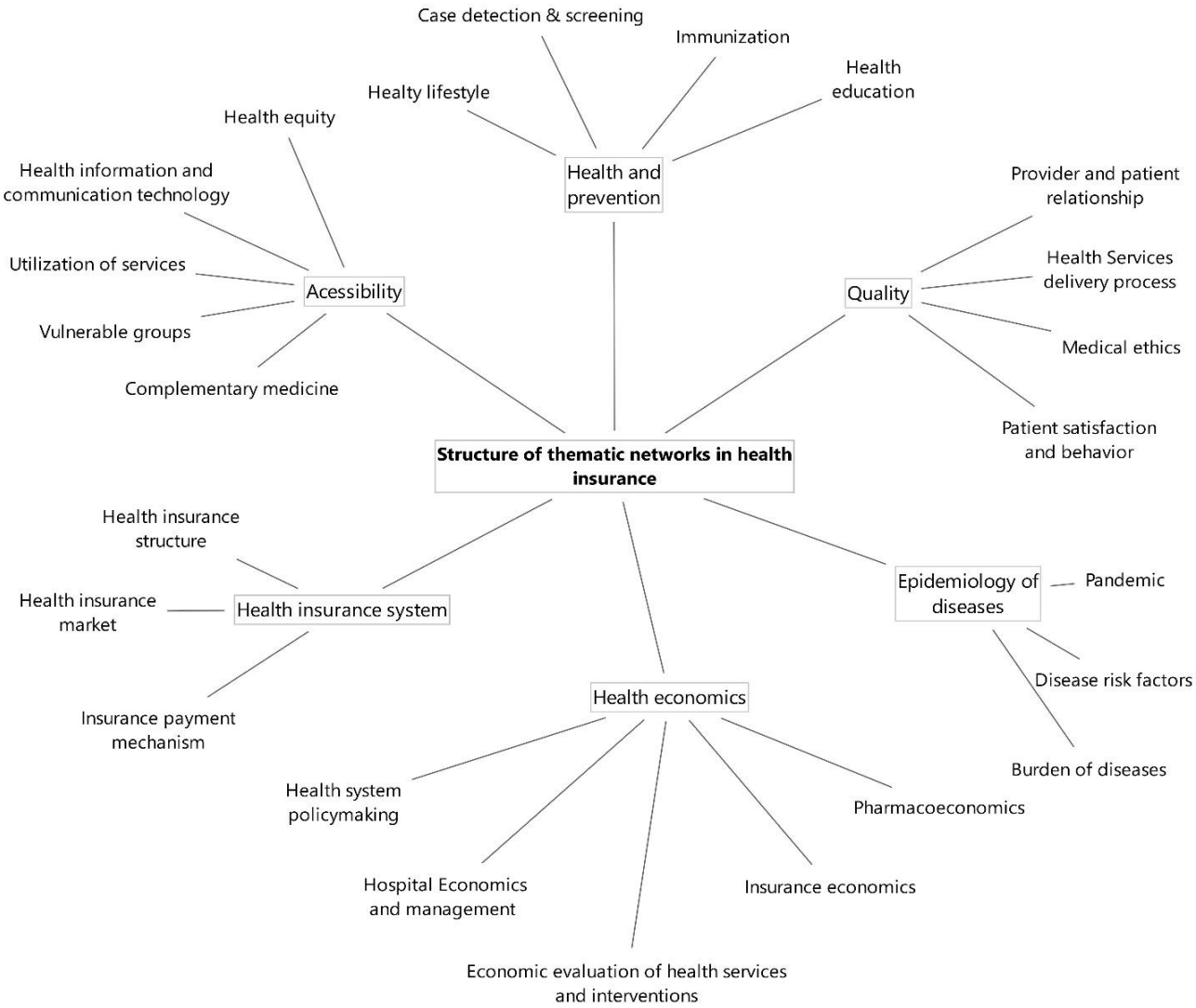


Figure 4 -Structure of Thematic Networks in Health Insurance Research

4. Discussion:
Interpretation of research trends and emerging topics

Based on the status of the density visualization map, it can be concluded that policy-making, health economics, healthcare service delivery, and hospital management are the main scientific trends in the field of health insurance. Additionally, topics such as pharmaceutical service insurance, telehealth, self-care, and patient preferences in healthcare decision-making present newer areas for future research. The appearance of telemedicine and Electronic Health Records (EHRs) among the less densely represented topics highlights the growing relevance of digital health technologies within the broader health insurance research landscape. The COVID-19 pandemic may have contributed to increased scholarly attention to remote healthcare delivery by highlighting the importance of maintaining access to healthcare services during periods of restricted physical contact. Nevertheless, the co-occurrence of these keywords does not establish that the pandemic directly caused their emergence in the literature. Rather, it suggests an increasing intersection between health insurance, digital health infrastructure, and alternative models of healthcare delivery. Although telehealth has become an important component of healthcare delivery in many settings, its integration into health insurance systems involves several unresolved issues, including regulatory frameworks, reimbursement arrangements, service eligibility, data protection, and the definition of covered services. These issues provide opportunities for further research into the design of insurance policies that support equitable and financially sustainable access to telehealth services [17].

Research shows that the development of human-centered artificial intelligence systems, the adoption of wearable technology, and personalization in health insurance studies have been underexplored. Consequently, researchers can guide future studies in these areas [16]. Additionally, future studies could explore telemedicine reimbursement methods in developed and developing countries before and after the COVID-19 pandemic [18].

Interpretation of keyword co-occurrence networks and six thematic clusters

Based on the network visualization map results, there are complex and diverse connection patterns between keywords in the health insurance field. In this map, six main clusters of health insurance topics with strong links between keywords provide a deeper understanding of research patterns and relationships between subjects in this field. These strong links indicate significant relationships between various health insurance-related keywords. For instance, the strong connections between keywords like "health care policy," "health care delivery," "health care quality," and "Health Services Accessibility" demonstrate the link between policy-making, service delivery, and health service quality. This finding shows that changes in health policies can have a direct impact on how healthcare services are delivered and their quality. Furthermore, the strong connections between keywords like "epidemiology," "prevalence," and "risk factors" indicate a research focus on epidemiological analysis and disease risk factors in health insurance.

In this regard, Uninsured adults have been reported to have lower utilization of screening services for chronic conditions, while differences in obesity, smoking, and alcohol consumption have also been documented between insurance groups [19]. These findings provide contextual evidence of the importance of insurance status in research on healthcare access and population health. Nevertheless, such differences should be interpreted in light of socioeconomic, behavioral, and demographic factors and should not be attributed exclusively to insurance status.

Moreover, the presence of strong links between keywords such as "economics," "cost control," and "health care costs" highlights the importance of health insurance economics and cost control in this field. This indicates that health economics and healthcare costs are closely related, and economic studies in the insurance domain focus on analyzing healthcare costs and mechanisms to control cost growth. Previous research in the United States has identified rising healthcare premiums as an important factor associated with declining insurance coverage during the 1990s. Estimates from large metropolitan statistical areas also suggested that increases in real per capita healthcare expenditure could be associated with increases in the number of uninsured individuals[20].

These findings illustrate the relevance of healthcare affordability and insurance financing to the broader economic literature on health insurance. However, they represent contextual evidence from a particular national setting and should not be interpreted as a direct result of the present bibliometric analysis.

Interpretation of the six conceptual dimensions of health insurance

Based on the keyword co-occurrence clusters and subsequent qualitative interpretation by the expert panel, six overarching conceptual dimensions were identified in health insurance research: health and prevention, quality, access, epidemiology of diseases, health economics, and the health insurance system.

The prevention dimension in health insurance aims to prolong life and improve human health through organized efforts and conscious choices made by communities, organizations, governments (both public and private), and individuals. This dimension is linked to objectives such as the role of insurance in screening, health checks, primary medical care, public health, patient education, health literacy, lifestyle, and preventive medicine. The prominence of preventive healthcare concepts within this dimension suggests that health insurance research considers prevention an important component of healthcare coverage, alongside the financing of diagnostic and treatment services. In particular, the relationship between insurance coverage and cancer screening has received considerable attention. Previous studies have generally reported an association between having health insurance and greater utilization of cancer screening services and adherence to recommended screening schedules [21, 22] .

One lifestyle item, physical activity, shows that the frequency of physical activity is higher among privately insured populations, while inactivity is present in both insured and uninsured groups. Some studies have indicated a link between physical activity, higher education, higher income, and health insurance coverage [23, 24].

In this study, **the quality dimension** in health insurance refers to the extent to which services provided in the healthcare system meet expectations and create value for patients. This dimension includes the role of insurance in service delivery processes, clinical decision-making, health care delivery, quality of care, total quality management, quality assurance, long-term care, service provider-patient communication, doctor-patient relationships, medical ethics, patient satisfaction and behavior, and hospital readmissions.

The inclusion of these concepts indicates that quality in health insurance research extends beyond the availability of insurance coverage and encompasses patients' experiences, the organization of healthcare services, and the performance of healthcare providers.
Some research has shown that insured individuals' perceptions of the quality of care differ from those of uninsured individuals, with insured individuals perceiving the quality as lower. In fact, the status of health insurance influences perceptions of healthcare quality[25] .
Regarding studies on quality and insurance, a 20-year review of health insurance in low- and middle-income countries showed that health insurance increases financial revenues for healthcare, as post-treatment payments to providers are replaced by pre-treatment premiums to ministries of health. Secondly, increasing patient choice and physician reimbursement through careful design enhances quality in healthcare sectors[26]. In the present research, **the access dimension in** health insurance seeks to ensure the availability of health, medical, and care services for all insured individuals, which is one of the most important government commitments to achieving equitable and universal access to medical services. This should be realized through the role of insurance organizations and appropriate prepayment financing systems.
This dimension includes five thematic categories (vulnerable groups, service utilization, health equity, health information and communication technology, complementary medicine) and encompasses concepts such as the elderly (age 80 and above), infants, disabled individuals, low-income groups, socioeconomic status, access to health services, service utilization reviews, and the Patient Protection Act. Populations with better socioeconomic conditions have broader access to information on healthy habits, private facilities for exercise, the ability to purchase healthy foods such as fruits, legumes, and vegetables, and greater awareness of the negative effects of smoking and other disease-causing factors[27] .
Moreover, the higher a household's income, the greater the likelihood of access to private health insurance. In Brazil in 2008, 84 percent of the population with income exceeding 20 times the minimum wage had private health insurance, compared to only 3 percent of the low-income population[28] .
The importance of studies on access to healthcare services and universal health coverage is also highlighted by a review of nine low- and lower-middle-income countries in Africa and Asia that designed national health insurance reforms to move toward universal health coverage. Key indicators for progress toward universal coverage, strongly influenced by insurance, include increased enrollment in government health insurance, movement toward comprehensive benefit packages, and reduced out-of-pocket expenses alongside a rising share of government spending on healthcare[29] .
The epidemiology dimension in health insurance focuses on the study of health and disease in populations and their relationship to the environment. Health insurance plays a crucial role in identifying epidemiology and disease burden and shapes social movements to achieve health. In recent decades, we have seen a wide range of research projects on the impacts of health insurance plans on public health.

The presence of keywords related to prevalence, mortality, disease burden, and risk factors in the identified clusters indicates that epidemiological concepts constitute an important part of health insurance research. Previous observational studies, natural experiments, and experimental investigations have examined associations between health insurance coverage and different health outcomes, including mortality, birth weight, blood pressure, self-reported health, and health-related quality of life. Reviews of this literature suggest that insurance coverage may be associated with improvements in selected health outcomes, particularly among vulnerable populations, including older adults, children, and low-income individuals with specific health needs [30, 31] .
Related research in China has reached similar conclusions [32]. Evidence from research suggests that health insurance designed to improve access to healthcare can reduce health disparities[33, 34] .
Additionally, the health economics dimension in insurance addresses topics such as the economic evaluation of health services and interventions, health insurance economics, health system policymaking, pharmaceutical economics, and hospital economics and management.
This dimension is particularly consistent with the network visualization results, in which healthcare costs, economics, and health policy were among the most frequently occurring and strongly connected keywords. Furthermore, the identification of a separate cluster related to pharmaceutical economics and medical interventions (Cluster 4) and another related to indirect costs of illness and long-term care (Cluster 5) demonstrates the diversity of economic concerns in the field. These patterns indicate that health insurance research addresses not only direct healthcare expenditure but also pharmaceutical

costs, long-term care financing, disability-related costs, and the broader economic consequences of illness.

Pharmaceutical economics and the issue of prescription drugs play a significant role in managing healthcare for the elderly. Many elderly people rely on prescription medications to maintain their health and well-being, but the cost of prescriptions can be very high, leading to non-compliance with prescribed regimens. As health needs and chronic health conditions increase with age, the use of prescription medications also rises[35] .

The financial disasters caused by extensive out-of-pocket healthcare expenses lead to significant debts for families, particularly in low-income and middle-income households. A proper insurance system can alleviate most of these issues [36]. Research has also shown that out-of-pocket expenses for individuals covered by employer-sponsored insurance have increased more rapidly[37] .

Evidence from India has also highlighted the substantial contribution of out-of-pocket payments to total healthcare expenditure, with inadequate insurance coverage identified as one of the factors associated with this financial burden [38] . These examples illustrate the continuing relevance of pharmaceutical affordability, financial protection, and healthcare expenditure in health insurance research.

Finally, the health insurance system dimension examines methods of financing health insurance and payment to consumers. In many health systems, there is generally inadequate consumer protection against medical expenses, leading to financially devastating medical bills[39] . Therefore, concepts such as private health insurance, health maintenance organizations, the private sector, universal health coverage, cooperative behavior, and workers' compensation hold special importance in insurance studies. In a study in Ireland, the main determinant of differences in breast, colorectal, and prostate cancer screening was the presence of private insurance [40]. Hence, the examination of health insurance systems in countries and the success of private insurance in them has profound implications for the selection and design of disease control strategies and public health policies.

Despite the strengths of this study, several limitations should be acknowledged. First, restricting the bibliometric analysis to Scopus may have excluded relevant publications indexed in other databases, such as Web of Science and PubMed, as well as gray literature. Second, the title-based search strategy may have overlooked studies mentioning health insurance only in their abstracts or fulltext. Third, , the classification of the six overarching dimensions was based on eight purposively selected experts, potentially may introducing selection bias related to their professional and disciplinary backgrounds and perspectives.. Finally, the dataset covered publications from 2000 to 2023 and was retrieved on March 2, 2024, excluding subsequent research. Future studies should use multiple databases, broader search strategies, more diverse expert panels, and longitudinal bibliometric analyzes combined with systematic reviews to validate the identified dimensions and capture emerging research trends.

5. Conclusion

The findings underscore the complexity of health insurance research and the necessity for designing a roadmap for future health insurance research. These patterns and relationships should be examined and analyzed in future research to propose effective strategies for improving the health insurance system and healthcare services. Emerging areas such as pharmaceutical services insurance, telehealth, and self-care present significant opportunities for innovation and should be prioritized in upcoming roadmaps to address contemporary challenges in health insurance. Given the strong links identified among key topics, future studies should focus on integrating these dimensions to develop comprehensive policies that enhance both service accessibility and cost control.

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6. References