RESEARCH PAPER

Global Trends in Pharmaceutical Marketing: A Bibliographic Analysis

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ABSTRACT

This bibliometric analysis examines the evolution and impact of pharmaceutical marketing, emphasizing its role in shaping healthcare innovation and industry practices. Utilizing data from PubMed and Scopus, the study analyzes 2,981 articles, identifying key trends, themes, and collaborative networks in pharmaceutical marketing research. Results indicate a substantial growth in publications, peaking between 2013 and 2018, driven by regulatory advancements and marketing innovations. Core themes include patient compliance, drug efficacy, regulatory adherence, and cost-effectiveness, reflecting the industry's shift towards evidence-based, patient-centric marketing strategies. The network analysis highlights prominent contributors like McMaster University and Karolinska Institutet as hubs of global collaboration, with keyword co-occurrence revealing critical topics such as clinical trials, patient safety, and risk assessment. The study underscores the intertwined nature of marketing with regulatory, economic, and ethical dimensions, advocating for strategic integration of these aspects to optimize healthcare outcomes. While limited by database scope and reliance on quantitative methods, the research provides actionable insights for aligning marketing strategies with public health goals and regulatory standards. Future studies should explore digital transformation, regional perspectives, and the long-term impact of marketing on patient outcomes. This analysis underscores the strategic role of pharmaceutical marketing in fostering innovation, ensuring compliance, and enhancing patient trust in an increasingly scrutinized industry.

Key Words: Pharmaceutical marketing, healthcare innovation, patient compliance, drug efficacy, regulatory adherence, and evidence-based strategies are key themes in the evolution of industry practices.

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1. Introduction:

The pharmaceutical industry drives global healthcare innovation, balancing profitability with responsibility by advancing treatments and ensuring affordable solutions to meet evolving health challenges (1). Pharmaceutical marketing heavily influences prescribing practices, raising ethical concerns, with tactics like MR visits and promotions shaping decisions; policymakers must promote balanced, ethical practices and reduce medication costs (1). Leading pharmaceutical companies are frequently noted to allocate more funds toward marketing their products than toward research and development, highlighting a shift in priorities that has sparked debate over the balance between innovation and promotion(2).

Pharmaceutical marketing is essential for generating revenue to sustain the high costs of drug discovery and development, which often reach billions of dollars without external funding, except for orphan drugs (3). Lack of marketing reduces sales and profits, limiting funds for research and development (R&D) and hindering innovation(3). While top pharmaceutical companies invest significantly in R&D to ensure long-

term returns, smaller firms prioritize marketing to recover revenue quickly(4). Effective marketing strategies are vital for promoting products, balancing financial pressures, and supporting the industry's ability to innovate and address global health challenges.

Modern pharmaceutical marketing practices, often seen as a recent development, trace their roots to 19th-century patent medicine advertising (5). The so-called “nostrum-mongers,” a term coined by novelist Henry James, were pioneers of advertising, establishing many techniques still in use today(6). These included print advertisements, trademarks, distinctive packaging, demand-stimulation strategies, and medical almanacs promoting disease awareness(6).

The pharmaceutical industry intertwines profit-driven marketing with ethical objectives, framing disease as an opportunity and fostering a shared vision with Western consumers, while integrating stakeholders into distribution channels under the guise of empowering choice, which paradoxically undermines true freedom by compromising scientific objectivity, ethical healthcare, and medicine’s autonomy to prioritize patient welfare(7).

Pharmaceutical marketing differs significantly from consumer marketing due to the unique nature of pharmaceutical products, the healthcare industry's operational dynamics, and industrial atmospheres, making it a specialized subset of marketing science that blends general principles with specific inter-industry considerations(8). It is due to the involvement of multiple decision-makers like physicians, hospitals, and regulators, with strict safety regulations for delivering medicines, especially prescription drugs, requiring complex processes such as registrations and licenses, while maintaining direct interaction between staff and patients; this is crucial for e-pharmacies where mail delivery without face-to-face contact is often restricted due to ethical and regulatory concerns, and pharmacists must ensure safe medicine delivery, particularly in preventing counterfeit drugs during mail orders (9).

Bibliometric analyses have historically been instrumental in identifying trends within academic literature, particularly in fields like medical and healthcare economics. Previous studies have highlighted expanding research areas, publication hotspots, and collaboration patterns across geographic and social networks (10). Recent bibliometric research in the pharmaceutical sector has either examined the broader scope of pharmaceutical research or focused on specific disease types or insights into evolving research areas, collaboration dynamics, pricing models and the geographic distribution of scholarly activity, contributing to a deeper understanding of trends within the pharmaceutical and healthcare literature (11–13).

Pharmaceutical marketing likely investigates the strategies and challenges in navigating compliance, market demands, and competitive landscapes while addressing the needs of patients and healthcare providers. This research aims to understand the scope of pharmaceutical marketing, including its ethical considerations. The study seeks to identify key thematic areas, interrelations, and implications for marketing strategies, regulatory compliance, and patient-centric approaches in the pharmaceutical industry.

Objectives:

1. To analyze the historical and contemporary trends in pharmaceutical marketing through bibliometric visualization of scholarly literature.
2. To identify the key themes and topics, such as regulatory frameworks, patient compliance, drug efficacy, and safety, that shape marketing strategies in the pharmaceutical industry.
3. To evaluate the interconnectivity of marketing practices with scientific, economic, and ethical considerations in drug approval, pricing, and distribution.

2. Methods:

2.1 Search strategy:

A comprehensive two-step search strategy was employed to gather publications relevant to pharmaceutical marketing. Electronic databases including PubMed and Scopus were systematically searched using Boolean operators and a mix of keywords and MeSH terms such as "pharmaceutical marketing," "drug marketing," "ethical marketing," "compliance," "regulations," "scope," and "strategies." Specific search syntax for each database is detailed in the Table 1. The search included all the articles published till December 2024 in both the databases. The analysis was limited excluding preprints, systematic reviews, and meta-analyses. Gray literature sources, including WHO and Google Scholar, were explored for additional insights.

Inclusion criteria :

1. Articles focused on pharmaceutical marketing strategies, challenges, or ethical considerations.
2. English-language publications.
3. Full-text availability.

Exclusion criteria included off-topic articles, duplicates, and preprints. Initial screening was conducted via titles and abstracts, followed by full-text review for uncertain cases. Records from multiple databases were imported into EndNote 20.2.1 (Clarivate Analytics, Philadelphia, PA) for de-duplication. Only unique entries were retained for further analysis.

Table 1: Search Strategy

Database searched	Search Terms	Results
PubMed	((("pharmaceutical marketing"[All Fields] OR ("marketing of health services"[MeSH Terms] OR ("marketing"[All Fields] AND "health"[All Fields] AND "services"[All Fields]) OR "marketing of health services"[All Fields]) OR (("biopharmaceutics"[MeSH Terms] OR "biopharmaceutics"[All Fields] OR "pharmaceutic"[All Fields] OR "pharmaceutics"[All Fields] OR "pharmaceutical preparations"[MeSH Terms] OR ("pharmaceutical"[All Fields] AND "preparations"[All Fields]) OR "pharmaceutical preparations"[All Fields] OR "pharmaceutical"[All Fields] OR "pharmaceuticals"[All Fields] OR "pharmaceuticals"[All Fields] OR "pharmaceutically"[All Fields]) AND ("advertise"[All Fields] OR "advertisement"[All Fields] OR "advertisements"[All Fields] OR "advertiser"[All Fields] OR "advertisers"[All Fields] OR "advertises"[All Fields] OR "advertising"[MeSH Terms] OR "advertising"[All Fields] OR "advertised"[All Fields] OR "advertisings"[All Fields]))) AND "health policy"[All Fields]) OR "ethics"[All Fields]) AND "evidence based medicine"[All Fields]	2946 Articles
Scopus	("Pharmaceutical Marketing" OR "Drug Marketing" OR "Pharma Marketing") AND ("Ethical Marketing" OR "Ethics in Marketing" OR "Compliance") AND ("Regulations" OR "Compliance Challenges" OR "Efficacy" OR "Balance") AND (challenges OR scope OR strategies)	90 Articles

2.2 Bibliometric Analysis:

Bibliometric techniques were applied using VOSviewer, R (Bibliometrix package), and Excel for data visualization and synthesis. Publications per year were analyzed to identify trends in research output. Temporal patterns were visualized using R and Excel for descriptive statistics. Analysis focused on identifying leading journals contributing to pharmaceutical marketing research. The top five journals with significant publication volume were examined for trends and impact. Author and institutional affiliations were extracted to map research activity geographically and institutionally. At least five common authors with significant contributions were highlighted. Collaboration patterns among authors and their affiliations were analyzed using VOSviewer. Networks were constructed with a minimum threshold of five co-authored publications to ensure meaningful connections. Citation trends were examined, focusing on at least five authors with significant cross-references. The most influential articles and authors were identified based on citation frequency and co-citation patterns. Co-occurrence of keywords was analyzed to uncover thematic clusters. A minimum threshold of five common citations was set to identify robust research themes and connections between topics. Temporal distribution of key topics and citations was assessed. Articles with at least ten common citations were analyzed to detect evolving trends and emerging areas of interest. Network maps for co-authorship, keyword co-occurrence, and citation networks were generated. Temporal patterns and publication trends were visualized using line graphs and density plots.

3. Results and Discussion:

3.1 Overall Publications

A fundamental bibliographic analysis technique involves examining the number of publications over time to assess the degree and evolution of researchers' interest in a specific field which provides insights into the growth, trends, and dynamics of scholarly focus within the area being studied (14,15). The consolidated analysis of publication trends from PubMed and Scopus databases reveals significant insights into the trajectory of research on pharmaceutical marketing. The PubMed data demonstrates a steady growth in publications from two articles in 1995(16,17), peaking sharply around 2018, followed by a gradual decline. This trend likely reflects increased focus during this period, driven by regulatory and technological changes, before tapering as the field matured or diversified. In contrast, the Scopus data shows a less consistent pattern, with publication peaks and troughs observed sporadically over the years, peaking around 2013. Both datasets underline the growing academic interest in this domain during the early 2000s and the sustained research efforts across different aspects of pharmaceutical marketing. The temporal patterns suggest significant milestones in the field's evolution, correlating with policy developments, innovations in marketing strategies, and global healthcare challenges. The combined analysis highlights that while there is variability in research intensity across databases, the overall trend underscores the increasing significance of this field over time. This comprehensive perspective emphasizes the continued importance of pharmaceutical marketing as a critical area for academic exploration and policy evaluation.

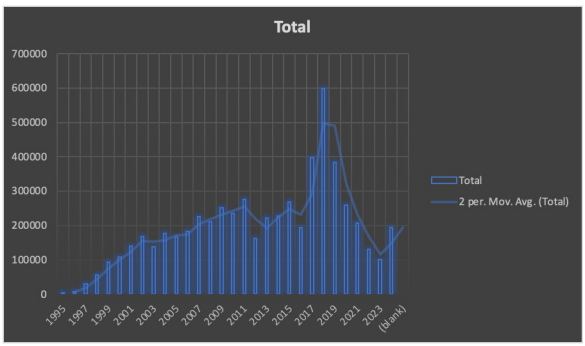

Figure 1: Overall publications by year in Pubmed

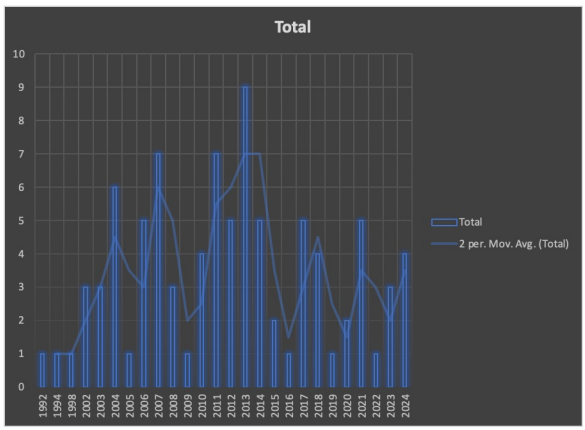

Figure 2: Overall publications by year in Scopus

3.2 Publication Sources:

A critical component of analyzing the structure of a research area is conducting a comprehensive quantitative and qualitative assessment of the leading journals where researchers predominantly publish, as this provides valuable insights into the field's key contributors, the dissemination of knowledge, and the thematic focus of scholarly activity within the domain (18). The graphs figure 3 and figure 4 provided depict the distribution of publications across journal sources obtained from PubMed and Scopus as part of a bibliometric analysis. n the PubMed graph, a wide array of journals contributes to the dataset, with significant peaks indicating high publication volumes in specific journals. Notable spikes, such as those in "BMC Pregnancy Childbirth" and "JAMA," suggest that these journals are primary contributors in their respective fields. The diversity in the data also reflects a broad focus on medical and health-related research. The horizontal axis includes journals with varying levels of output, showing the extensive scope of PubMed's indexed literature.

The Scopus graph, in contrast, shows a comparatively narrower distribution of publications per journal, with most journals contributing minimally. A prominent peak in "Pediatric Blood and Cancer" highlights it as a key source, dominating over other journals. This graph suggests that Scopus may provide a more focused or specialized coverage, emphasizing pharmaceutical, clinical, and healthcare research.

Together, these graphs highlight differences in publication trends and source focus between PubMed and Scopus. PubMed reflects greater breadth in medical journals, while Scopus appears more specialized with fewer high-output journals. This comparison is instrumental in understanding the strengths of each database for bibliometric research and identifying key journals for targeted analyses.

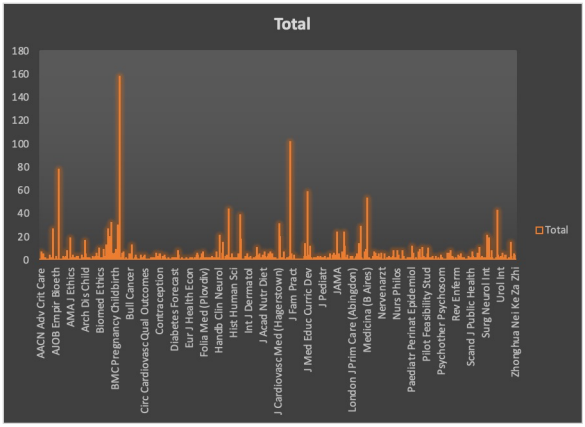

Figure 3: Lead Publication Sources from Pubmed

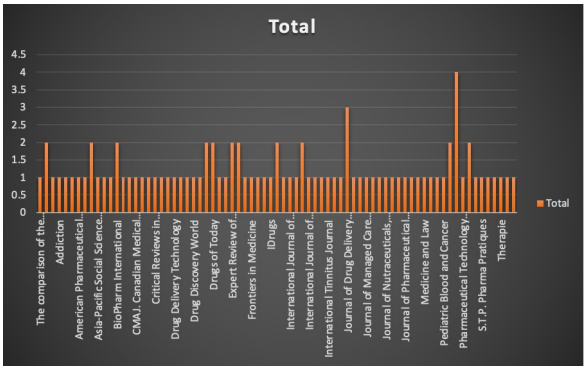

Figure 4: Lead Publication Sources from Scopus

3.3 Authorship and Affliations:

The authorship affiliation visualization from the PubMed database reveals key collaborative linkages among institutions globally but no leaders in publication was found. The bibliometric map shows clusters of affiliations, with connections depicted as lines linking institutions, indicating co-authorship patterns. The color gradient (2018–2021) highlights the temporal dimension of collaboration, with more recent interactions shown in brighter shades.

Notably, the visualization identifies prominent hubs such as McMaster University in Canada, which exhibits strong linkages with institutions like Lanzhou University in China and Karolinska Institutet in Sweden. These connections suggest McMaster's central role in fostering international research collaboration in evidence-based medicine. Similarly, the Norwegian Institute of Public Health and the University of Oslo emerge as vital nodes in European research networks.

Smaller clusters, such as the collaboration between the American University of Beirut and institutions in Canada, underscore the geographical diversity and expanding global partnerships in health research. The data also reflects an interdisciplinary approach, as affiliations span medical schools, health management departments, and research institutes.

Statistically, the network density and strength of linkages reveal well-established partnerships, particularly between North America, Europe, and Asia. These patterns provide insights into dominant research centers and trends in collaborative health science efforts over the analyzed period.

A notable feature of the network is the identification of institutions with high degree centrality, which corresponds to a larger number of co-authorship links. Institutions such as the Department of Obstetrics and Gynecology at the University of California, San Diego, and the Cleveland Clinic, among others, emerge as central nodes in the network. These institutions are well-connected, indicating their pivotal role in the collaborative research landscape. This centrality can be statistically linked to their significant contribution to the body of literature in the field. The strength of these connections underscores their research leadership, and the degree centrality is a reflection of their influence in shaping research trends and knowledge dissemination within obstetrics and gynecology.

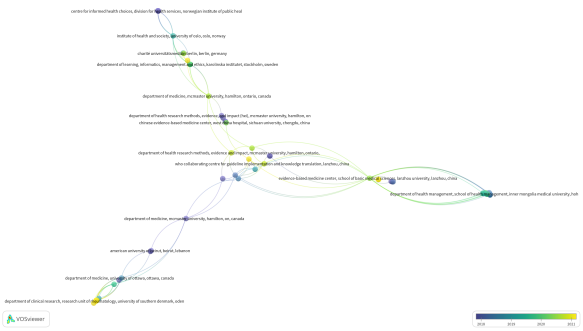

Figure 5: Network visualisation of Author's Affiliation towards Institutions in Pubmed

The bar chart illustrates the total number of contributions by various authors in the field of pharmaceutical marketing research, as indexed on the PubMed database. The most productive author in this domain is Phillips B, with a total of 15 contributions, significantly higher than other researchers in the list. This indicates that Phillips B has been highly active in publishing research, making substantial contributions to the academic discourse in pharmaceutical marketing.

Other notable authors include Loughlin M with 11 contributions and Gupta M with 9 contributions. These authors also demonstrate a strong presence in the field, but their output is relatively lower compared to Phillips B. Authors like Brody H and McCullough LB have 7 and 5 contributions, respectively, while others such as

Stretch D, Miles A, and Cosgrove L each have 8 contributions.

This data highlights a concentration of research output, particularly around Phillips B, suggesting that they may be a leading voice or have a significant impact on the development of knowledge in pharmaceutical marketing. The productivity of other researchers, while valuable, indicates a more collaborative or varied contribution pattern across the field. The disparity in the number of contributions also suggests potential areas of growth or emerging scholars who may increase their research output in the future.

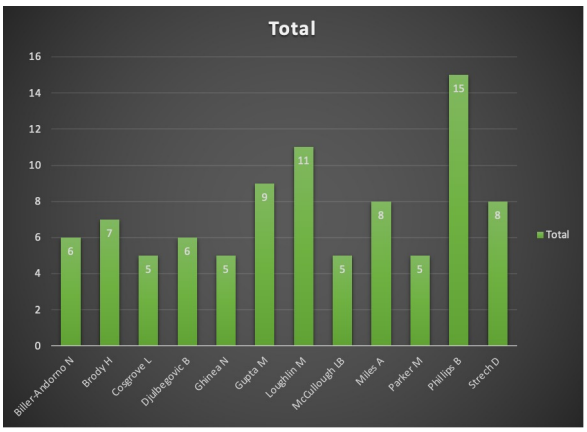

Figure 6: Top 10 most productive Authors in Pubmed

In scopus, Wechsler J has the more number of publication while others have not more than 2. Thus most productive publication analysis in Scopus was not proceeded further.

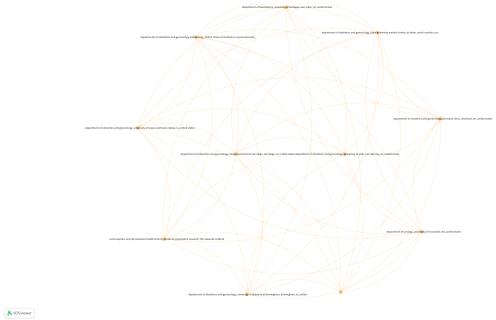

Figure 7: Network visualisation of Author's Affiliation towards Institutions from Scopus

3.4 Co-authorship Analysis:

Figure 8 represents a co-author network visualization from a bibliographic analysis of publications sourced from the PubMed database. The nodes represent individual authors, with color coding to differentiate between their publication years, ranging from 2016 to 2020. The links connecting the nodes indicate co-authorship relationships, showing the collaborative nature of research in a specific domain.

From the visual, we observe several distinct clusters of authors who frequently collaborate within their respective networks. These clusters, identified by groups of tightly connected nodes, suggest research groups or teams with shared publication interests. The presence of larger and more central clusters with greater interconnections implies a higher level of collaboration among those authors, while the peripheral nodes with fewer connections represent authors who may be less involved in co-authoring with others or have more isolated publication patterns.

Statistical linkage analysis from the visualization highlights key metrics such as author centrality, cluster density, and publication frequency. Authors in the central network hubs like "gartlehner, gerald" and "booth, andrew" demonstrate a higher degree of connectivity, reflecting their more prominent role in the research field. The analysis of collaboration patterns offers insights into the distribution of research efforts, potential research gaps, and key contributors to this scientific domain.

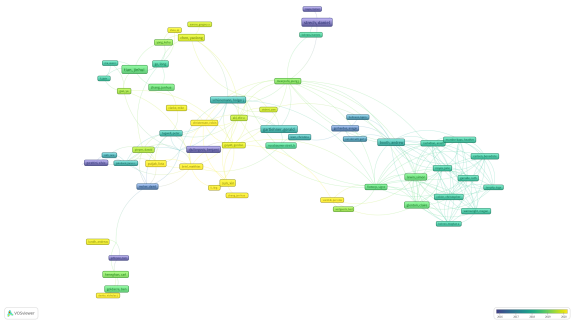

Figure 8: Network visualisation of Co-authorship from Pubmed

Figure 9 depicts a highly interconnected co-author network, with each node representing an author and the links signifying their co-authorship relationships from Scopus database search results. Statistical significance of the linkage analysis reveals that key authors such as "nygaard, ingrid" and "richter, holly e." demonstrate high centrality scores, indicating their pivotal role in the network. These authors act as primary connectors, facilitating collaboration across multiple co-author groups. The network exhibits high density, as most authors are connected to several others, reflecting a robust collaborative environment. This suggests a tightly-knit research community with frequent joint publications. The absence of distinct isolated clusters indicates that the authors are part of an integrated network rather than separate research teams. This enhances information and idea sharing within the field.

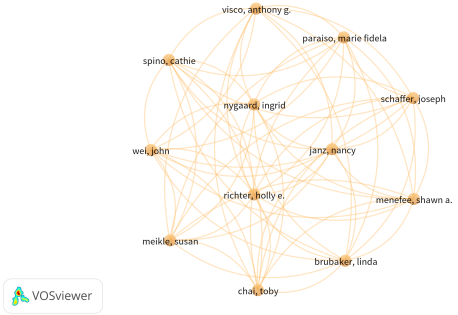

Figure 9: Network visualisation of Co-authorship from Scopus

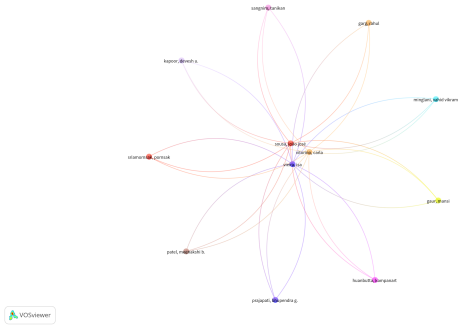

Figure 10: Citation analysis of authors from Scopus database

3.5 Citation Analysis:

The provided visualization in figure 10 depicts a bibliometric network generated using citation author analysis based on Scopus data. It shows authors with at least five co-occurrences, signifying their contributions and interconnections in the field of pharmaceutical marketing research. Central nodes represent highly influential authors (e.g., Sousa, José José; Vieira, Lisa), with links indicating co-authorship or shared references in publications.

The network layout forms a radial structure where central authors have connections with multiple peripheral authors, reflecting their prominence in the research domain. For instance, Sousa and Vieira emerge as pivotal contributors, influencing researchers like Kapoor, Devesh U., or Gaur, Mansi. Each cluster, marked by unique colors, represents distinct collaborative or thematic groups, suggesting specialization or shared research interests. For example, the orange cluster may focus on pharmaceutical strategies, while the pink cluster could emphasize consumer behavior studies in pharmaceuticals. The links between authors are proportional to their collaborative strength, determined by the frequency of co-authorship or shared citations. The visualization allows the identification of research networks, influential collaborators, and thematic areas dominating pharmaceutical marketing.

In pharmaceutical marketing, such analyses aid in recognizing influential researchers driving innovation, collaboration opportunities, and emerging trends. It helps strategists and academic institutions align research efforts with market needs, fostering impactful collaborations and innovation. This networked understanding enables a more targeted approach to tackling global pharmaceutical challenges.

3.6 Co-occurrence Analysis of Key-words:

Figure 11 represents a keyword co-occurrence density visualization generated using VOSviewer software. The analysis includes terms with a minimum of 10 co-occurrences, representing central themes and their interconnectedness in the dataset. The density map is color-coded, where brighter areas (yellow and green) highlight highly frequent and interconnected keywords, while darker regions (red and black) represent less frequent terms. Central themes like *"clinical trials," "risk assessment," "patient safety,"* and *"research design"* are highly prominent, signifying their frequent discussion and pivotal role in the analyzed body of literature. Peripheral terms like *"veterinary medicine"* or *"animals"* suggest specialized but less dominant topics. The density map indicates clusters of related keywords, suggesting thematic areas of focus. The green cluster emphasizes public health, patient-centered care, and ethics. The yellow cluster focuses on clinical trials, systematic reviews, and treatment outcomes. The red and darker regions reflect auxiliary or niche areas such as complementary therapies or editorial policies. The visualization highlights key thematic areas and interconnected terms, providing a comprehensive overview of research focus within the dataset. Potential outcomes of this analysis include the identification of dominant themes such as *clinical trials*, *patient safety*, and *risk assessment*, which can guide future research priorities. It reveals the relationships between critical concepts, like the linkage between *systematic reviews* and *treatment outcomes*, underscoring their role in evidence-based practices. The density map also uncovers research gaps, particularly in less-explored topics like *complementary therapies* or *veterinary medicine*, suggesting opportunities for diversification and innovation. Clustering of terms around core themes enables targeted exploration of specific fields, facilitating interdisciplinary collaboration.

Furthermore, the prominence of terms like *ethics* and *quality of health care* highlights the increasing emphasis on patient-centered approaches and ethical practices. This visualization thus serves as a strategic tool for researchers and policymakers to align efforts with prevailing trends and emerging opportunities.

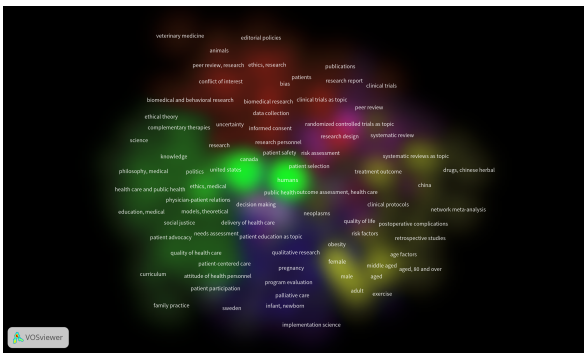

Figure 11: Density Visualisation of Key-words Co-occurrences from Pubmend

The provided visualization in figure 12 represents keyword co-occurrence analysis from Scopus database results, focusing on the domain of drug marketing. Central themes such as *drug marketing*, *drug efficacy*, and *patient compliance* emerge as pivotal topics, with strong interconnections suggesting their foundational role in pharmaceutical research and marketing strategies. **Red Clusters e**mphasizes regulatory aspects like *drug legislation*, *drug quality*, and the role of entities like the *Food and Drug Administration (FDA)*. **Blue Clusters high**lights industry-focused topics such as *drug manufacturing*, *cost-effectiveness analysis*, and *drug labeling*. **Orange Clusters f**ocuses on clinical and patient-centric themes, including *drug delivery systems*, *medication compliance*, and *drug absorption*. The visualization highlights the extensive scope of pharmaceutical marketing, showcasing its interplay with regulatory, industrial, and clinical domains. Pharmaceutical marketing goes beyond traditional promotion to include strategic areas such as *drug efficacy*, *patient compliance*, and *cost-effectiveness analysis*. The inclusion of themes like *drug legislation* and *FDA regulations* underscores the importance of navigating complex regulatory frameworks to ensure market access and compliance.

From an industrial perspective, topics such as *drug manufacturing* and *drug labeling* emphasize the significance of aligning production and marketing processes to meet market demands and enhance consumer trust. Clinical themes like *drug delivery systems* and *medication compliance* reflect the growing emphasis on patient-centric approaches, aimed at improving therapeutic outcomes and adherence.

This interconnected landscape highlights opportunities for innovation in personalized marketing strategies, digital platforms, and value-based approaches. Pharmaceutical marketing's broad scope supports collaboration between researchers, manufacturers, and policymakers to drive innovation, optimize healthcare delivery, and expand global market reach.

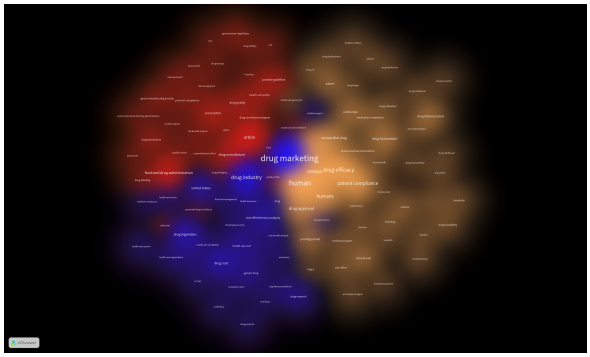

Figure 12: Density Visualisation of Key-words Co-occurrences from Scopus

3.7 Research Topic Trend Analysis:

The visualization in figure 13 represents a bibliometric network analysis of PubMed data, created using VOSviewer, highlighting topic trends with a significance level of 10 across all available years until 2024. The network consists of interconnected clusters that group related research topics, visualized by their co-occurrence and strength of association.

The largest nodes, such as "humans" and "evidence-based medicine," dominate the network, signifying their central role in medical research discourse. These nodes also exhibit high connectivity, linking to various smaller nodes like "decision making," "clinical trials," and "practice guidelines," which reflect the foundation of evidence-based approaches in clinical and policy-making contexts.

Clusters are color-coded to signify thematic groupings. For instance, green clusters emphasize policy and ethics-related topics like "conflict of interest" and "health policy," while purple clusters focus on systematic reviews and research designs. Red clusters capture demographic aspects, including "female" and "middle-aged," suggesting an emphasis on patient-specific variables in evidence-based practices.

Additionally, topics like "randomized controlled trials" and "meta-analysis" are prominent, underlining the methodological backbone of modern clinical research. The dense interconnections highlight a shift toward integrative and multidisciplinary approaches, linking ethical considerations, policy-making, and demographic studies with core clinical research principles.

This visualization provides insight into evolving research priorities, emphasizing the pivotal role of evidence-based medicine in integrating diverse topics to improve healthcare outcomes. The trends reflect a maturing research ecosystem with balanced attention to methodology, application, and social relevance.

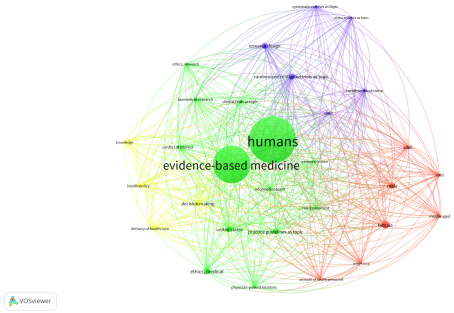

Figure 13: key word trends from Pubmed

The bibliometric visualization reveals key themes and interrelationships in pharmaceutical marketing, with an emphasis on frequently occurring topics derived from the Scopus database. The central clusters and nodes underscore the importance of human-related studies, including patient compliance, drug efficacy, and safety, which are heavily interconnected with marketing strategies.

The analysis indicates that pharmaceutical marketing heavily revolves around themes such as drug approval processes, regulatory frameworks (e.g., FDA), and the role of the drug industry. These findings highlight the significance of aligning marketing strategies with compliance and regulatory standards. The prominence of terms like "drug safety," "clinical trials," and "patient compliance" suggests that pharmaceutical marketing increasingly targets patient-centric approaches, focusing on trust-building and adherence.

Another crucial outcome is the interaction between cost factors, including "drug cost" and "cost-effectiveness analysis," with marketing efforts. This reflects the industry's focus on pricing strategies as a marketing tool to appeal to healthcare providers and patients while maintaining profitability.

The clustering around "drug marketing" demonstrates its multifaceted impact, extending from product development to market approval and patient adoption. These insights indicate that future pharmaceutical marketing strategies must integrate evidence-based communication, regulatory adherence, and value-based pricing to stay competitive in an increasingly scrutinized industry.

The visualization emphasizes that marketing within the pharmaceutical sector is not isolated but interconnected with scientific, economic, and regulatory dimensions.

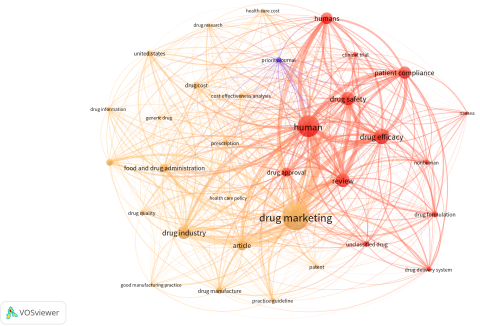

Figure 14: Key word trend from Scopus

4. Discussion:

The study on pharmaceutical marketing offers a comprehensive bibliometric analysis, highlighting its pivotal role in healthcare innovation. The research observes significant growth in publications over the decades, peaking between 2013 and 2018, driven by regulatory advancements and marketing innovations. It identifies key themes such as patient compliance, drug efficacy, regulatory adherence, and cost-effectiveness as critical to marketing strategies. A major finding is the interconnected nature of pharmaceutical marketing with scientific, economic, and ethical dimensions. The study reveals a shift from traditional methods to patient-centric approaches, emphasizing evidence-based and compliance-driven strategies. Network analyses underscore collaboration patterns among global institutions and researchers, with McMaster University and Karolinska Institutet emerging as central hubs. Keyword co-occurrence analyses reflect dominant themes like clinical trials and patient safety, underscoring their criticality in aligning marketing with healthcare outcomes. The analysis further identifies gaps in niche areas, presenting opportunities for future research and innovation. Overall, the study concludes that effective pharmaceutical marketing requires balancing profitability, regulatory compliance, and ethical standards to ensure patient trust and optimize healthcare delivery. This strategic approach aligns marketing efforts with global health priorities while fostering meaningful contributions to the industry.

The study has several limitations. Firstly, the bibliometric analysis relies on data from selected databases, primarily PubMed and Scopus, which may exclude relevant publications indexed in other platforms, such as Web of Science or Embase. This could result in incomplete data capture and potential bias in identifying key themes and trends. Secondly,

the study excludes preprints and gray literature, which may contain emerging insights or alternative perspectives on pharmaceutical marketing practices. The reliance on English-language publications also limits the inclusion of regional or non-English research, which might provide a broader understanding of global trends. Additionally, bibliometric methods focus on quantitative measures like publication counts and co-occurrence patterns, potentially overlooking qualitative nuances in the data. Temporal analysis may not fully account for context, such as regulatory changes or market disruptions influencing publication trends. Lastly, generalizations drawn from keyword clusters may oversimplify complex relationships between marketing strategies and healthcare outcomes.

Future research in pharmaceutical marketing should expand the scope by incorporating a broader range of databases, including Web of Science and Embase, to capture more comprehensive insights. Exploring non-English publications and gray literature could provide valuable perspectives on regional and emerging trends, enriching the global understanding of marketing practices. Integrating qualitative methods with bibliometric analysis would allow deeper exploration of nuanced themes, such as ethical dilemmas and patient-centric marketing approaches. Investigating the impact of digital transformation, including artificial intelligence and social media, on marketing strategies could reveal innovative trends and challenges in the evolving healthcare landscape. Future studies could also focus on the intersection of regulatory policies and marketing, analyzing how compliance frameworks influence promotional activities across different markets. Additionally, longitudinal analyses exploring the effects of marketing on patient outcomes and healthcare costs would provide actionable insights to align industry strategies with public health goals. Interdisciplinary research could foster innovation by bridging marketing, healthcare policy, and patient engagement.

5. Conclusion:

The bibliometric analysis highlights the pivotal role of pharmaceutical marketing in shaping healthcare practices and outcomes. On analyzing trends in pharmaceutical marketing as first objective revealed a dynamic evolution influenced by regulatory frameworks, cost-effectiveness analysis, and patient-centered strategies. Over time, the field has expanded from traditional marketing techniques to integrate evidence-based and compliance-driven approaches, ensuring alignment with healthcare policies and ethical standards.

The second objective, identifying key themes and topics, underscores the dominance of concepts such as "patient compliance," "drug efficacy," "safety," and "drug approval" in marketing strategies. These themes are interlinked with industry priorities such as regulatory adherence (e.g., FDA compliance), pricing models, and the ethical dissemination of drug information. The prominence of patient-focused terms highlights the shift towards marketing that prioritizes healthcare outcomes and patient trust.

The third objective, evaluating interconnectivity, revealed that pharmaceutical marketing does not function in isolation but operates at the intersection of scientific innovation, economic considerations, and regulatory oversight. This interdependence demands a balanced approach that combines profitability with public health goals. Overall, the bibliometric analysis illustrates the increasingly strategic role of marketing in the pharmaceutical industry. To remain impactful, marketing efforts must prioritize regulatory compliance, address cost concerns, and adapt to patient needs while embracing technological advancements. This ensures not only business success but also meaningful contributions to global healthcare systems.

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7. References:

1. Al Thabbah DH, Almahairah MS, Naser AY, Alrawashdeh HM, Araidah M. The effect of pharmaceutical companies' marketing mix strategies on physicians prescribing practices in Jordan: a cross-sectional study. BMC Health Serv Res. 2022 Oct 27;22:1293.
2. Angell M. Excess in the pharmaceutical industry. CMAJ. 2004 Dec 7;171(12):1451–3.
3. Jacob NT. Drug promotion practices: A review. Br J Clin Pharmacol. 2018 Aug;84(8):1659–67.
4. Olson DRS. Dr. Randal S. Olson | Design critique: Putting Big Pharma spending in perspective. [cited 2024 Nov 26]. Dr. Randal S. Olson | Design critique: Putting Big Pharma spending in perspective. Available from: https://randalolson.com/2015/03/01/design-critique-putting-big-pharma-spending-in-perspective/

5. Young JH. The Toadstool Millionaires: A Social History of Patent Medicines in America before Federal Regulation. Princeton University Press; 2015. 311 p.
6. Laird PW. Advertising Progress: American Business and the Rise of Consumer Marketing. JHU Press; 2001. 520 p.
7. Applbaum K. Pharmaceutical Marketing and the Invention of the Medical Consumer. PLoS Med. 2006 Apr;3(4):e189.
8. Dogramatzis D. Pharmaceutical Marketing: A Practical Guide. Boca Raton: CRC Press; 2013. 400 p.
9. Mohammadzadeh M. An Analysis of the Relationship Between Staff Qualification and Export Readiness of Pharmaceutical Companies: The Case of Iran. Iran J Pharm Res. 2012;11(3):985–90.
10. Ismail S, Nason E, Marjanovic S, Grant J. Bibliometrics as a Tool for Supporting Prospective R&D Decision-Making in the Health Sciences. Rand Health Q. 2012 Dec 1;1(4):11.
11. Berthe A, Eljilany I, Kulkarni A, Diaby V. A bibliometric analysis and typology of drug pricing policies across the globe. Medicine. 2024 Oct 18;103(42):e40112.
12. López-Muñoz F, Srinivasan V, Gutiérrez-Soriano A, Shen WW, García-García P, Rubio G, et al. A bibliometric analysis of scientific research on atypical antipsychotic drugs in India during 1998-2013. 2016 Jan 11 [cited 2024 Nov 26]; Available from: http://repositorio.ucjc.edu/handle/20.500.12020/783
13. Wang Y, Rao Y, Yin Y, Li Y, Lin Z, Zhang B. A bibliometric analysis of global trends in the research field of pharmaceutical care over the past 20 years. Front Public Health [Internet]. 2022 Oct 17 [cited 2024 Nov 26];10. Available from: https://www.frontiersin.org/journals/public-health/articles/10.3389/fpubh.2022.980866/full
14. Ahmad SZ, Bakar ARA, Ahmad N. Social media adoption and its impact on firm performance: the case of the UAE. International Journal of Entrepreneurial Behavior & Research. 2018 May 8;25(1):84–111.
15. Det Udomsap A, Hallinger P. A bibliometric review of research on sustainable construction, 1994–2018. Journal of Cleaner Production. 2020 May 1;254:120073.
16. Caulfield TA. The allocation of genetic services: economics, expectations, ethics and the law. Health Law J. 1995;3:213–34.
17. Hope T. Evidence based medicine and ethics. J Med Ethics. 1995 Oct;21(5):259–60.
18. Rościszewski P, Stępień M, Berniak-Woźny J. Primary Healthcare Marketing: A Bibliometric Study and Research Agenda. Health Serv Insights. 2024 Aug 28;17:11786329241266648.