



Research article

Bibliometric analysis of scholarly publications related to family medicine in Thailand

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ARTICLE INFO

Keywords:

Bibliometric analysis

Family medicine

Primary care

Thailand

ABSTRACT

Background: Family medicine has been recognized as a medical specialty in Thailand. However, there is a lack of information about scholarly publications. Bibliometric analysis is a valuable methodology for identifying research trends and knowledge gaps in this field. This study aims to analyze scholarly publications related to family medicine in Thailand.

Method: This bibliometric analysis was conducted based on the PubMed search in March 2023. All relevant literature related to 'family medicine' and 'Thailand' was retrieved. Performance analysis examined the publication trends from 1963 to 2023, the top 10 journals publishing relevant articles, and the number of publications by research areas. Science mapping depicted clusters of co-occurring author keywords, their relationships, and the research themes' trend over two decades.

Results: A total of 1483 publications were retrieved. The number of publications showed an upward trend, increasing from 61 before 2000 to 359 in 2020. The Journal of the Medical Association of Thailand was the leading journal, publishing 267 articles (18.0 %). Research areas were categorized into Basic Knowledge (n = 211), Clinical Problem Solving (n = 714), Health Service (n = 256), Health System (n = 254), and Medical Education (n = 48). Science mapping identified six clusters based on 106 co-occurrence keywords, including public health, health services, medical issues in older adults, healthcare access, epidemiology, and others. Research themes have shifted from infectious diseases and public health to primary care and non-communicable diseases.

Conclusion: Future research should focus more on implementation at a population level and healthcare system, with more investigation into geriatric care and child and maternal health.

1. Background

Family medicine was derived from general practice and has been a medical specialty for over five decades, focusing on holistic and

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coordinated patient care rather than a disease-focused approach [1,2]. In Thailand, family medicine has been recognized as a medical specialty since 1998, emphasizing population-based healthcare, comprehensive care, coordinated clinical services, cost-efficient care, preventive care, and communication skills [3]. Often used interchangeably with primary care and primary health care, family medicine is specifically delivered by family physicians, adhering to eight principles including "access or first-contact care," "comprehensiveness," "continuity of care," "coordination," "prevention," "family orientation," "community orientation," and "patient-centeredness" [4–7].

Thailand is facing evolving health needs driven by its aging society and the increasing prevalence of chronic diseases [8]. The growing incidence of conditions such as diabetes, hypertension, and cardiovascular diseases emphasizes the necessity of robust chronic disease management [9]. To address these challenges and achieve the Universal Health Coverage (UHC) scheme, Thailand is strengthening the primary care system by enhancing healthcare providers' capacity (e.g., increasing number of family medicine training centers) and accessibility of primary care services (e.g., building more primary care units in the community) [10]. These strategies aim to deliver more comprehensive and continuous care, reduce hospital admissions, and improve overall health outcomes, ensuring equitable, affordable, and high-quality healthcare for all [10].

Enhancing primary care quality involves improving both health services and research within family medicine. Key aspects include better access, continuity of care, and patient-centered approaches supported by evidence-based practices and continuous professional development for practitioners [11]. Additionally, targeted research addressing prevalent diseases, socio-cultural factors, and healthcare disparities is essential. Scholarly publications can provide insights and evidence to inform effective interventions and policies, ultimately improving care quality and health outcomes for communities [12].

In Thailand, to the best of our knowledge, the information about scholarly publications related to family medicine is limited. While funders and policies support family doctors conducting research, there is a lack of measuring its performance, such as number of publications, number of citations, journal characteristics, research areas, and trend of research topic over time. This information is important in identifying and analyzing gaps in family medicine research, which helps design the strategy to strengthen evidence-based medicine in Thailand.

Bibliometric analysis is a quantitative method that examines academic literature using statistical tool to explore the impact and trend within a particular research field [13–15]. It involves evaluating various metrics such as the number of publications, citation counts, journal characteristics, authorship patterns, and research topics. Applying bibliometric analysis to family medicine research can provide a better understanding of this field's trend, impact, and needs [16,17]. Identifying research gaps and emerging topics using bibliometric methods can inform policy-making and enhance training programs by promoting evidence-based practices and innovations [18]. Moreover, identifying understudied issues and areas that require further investigation also helps researchers design studies to address the gaps, expand knowledge, and conduct more impactful research [19,20].

This study aims to analyze scholarly publications related to family medicine in Thailand in order to 1) define the characteristics of family medicine publications and 2) identify the gap in family medicine research in response to the health needs of Thai population in primary care settings.

2. Methodology

2.1. Data source and search strategy

This bibliometric analysis was conducted in March 2023. The search query was based on two terms: "family medicine" and "Thailand," gathering relevant literature from PubMed. The term "family medicine" was defined by adopting the framework from Gupta et al. [4], covering all eight core principles, including "access or first-contact care," "comprehensiveness," "continuity of care," "coordination," "prevention," "family orientation," "community orientation," and "patient-centeredness." These eight core principles of Family Medicine were used as search terms. A full search strategy was provided in [Appendix 1](#).

2.2. Eligible criteria

The inclusion criteria for this analysis were defined by any study related to "family medicine" and "Thailand" There was no restriction on the publication date and the study design. Search filters were applied for studies on human subjects and articles published in English.

2.3. Data management, analysis, and visualization

The data analysis was performed for two measures: performance analysis and science mapping.

Performance analysis examined several aspects in terms of the number of publications, including (i) the number of publications and citations over five-year periods (1963–2023), (ii) the top 10 journals published relevant publications and their impact factors, (iii) article types, (iv) the number of publications by research areas, and (v) co-authorship.

The quantitative data was analyzed by using descriptive statistics. The research areas were categorized into five main areas: basic knowledge, clinical problem solving, health service and practice implementation, health system and policy content, and medical education ([Table 1](#)) [21,22]. Four authors (NW, SM, NB, SP) independently screened article abstracts and identified the research areas. Any discrepancy among the four authors was discussed and resolved by a consensus of all authors. Subsequently, the titles and abstracts of family medicine publications were screened and grouped by four authors independently (NW, SM, NB, SP). Any discrepancies

were discussed and resolved with the final author (AM) to ensure the relevance of the content to the topic areas. The final categorization is presented in Table 4. Zipf's law was adopted to analyze the co-authorship, demonstrating the association between co-authorship rank and frequency.

For science mapping, VOSviewer (Leiden University, The Netherlands) was used to visualize and identify the relationships and patterns within and between different research areas. The visualization showed two key pieces of information: (i) clusters of co-occurrence author keywords and relationships between each cluster, (ii) a trend of research themes using co-reference analysis, and (iii) a trend of research themes over a two-decade period. After grouping keywords by computerized methods, each cluster was named by five authors (NW, SM, AM, NB, SP) independently before discussed to define the final cluster names and their range of topics (Table 5).

3. Result

3.1. Performance analysis

3.1.1. The number of publications and citations

A total of 1483 publications were retrieved from PubMed. Before 1980, each five-year period had no more than 20 publications. Then, there was a gradual increase, with approximately ten publications per five-year period from 1981 to 1995. The trend shifted significantly, with a sharp rise from 61 publications from 1996 to 2000 to 153 publications in 2001–2005. This upward trajectory continued, reaching 346 publications in 2011–2015. In the ongoing five-year period from 2021 (to 2023), 307 publications were found, nearly matching the 359 publications in the previous five-year period (2016–2020) (Fig. 1). The number of citations is also increasing, corresponding to the upward trend of publications. (Fig. 2).

3.1.2. The top 10 journals with the highest relevant number of publications

A total of 530 relevant publications (35.7 %) were published in 11 journals. "The Journal of the Medical Association of Thailand (J Med Assoc Thai)" accounted for the highest number of relevant publications ($n = 267$), though its impact factor was not available on the Web of Science. "Vaccine" follows with 54 publications and an impact factor of 5.5. "The Southeast Asia Journal of Tropical Medicine and Public Health" has 51 publications but lacks an impact factor. "PLOS ONE" has 37 publications with an impact factor of 3.7.

"Nursing & Health Sciences" and the "International Journal of Environmental Research and Public Health" each have 23 publications, with impact factors of 2.7 and 4.6, respectively. The "Journal of the International AIDS Society" has an impact factor of 6.0 with 19 publications, while the "Asian Pacific Journal of Cancer Prevention" has 18 publications and an impact factor of 2.5. The "Journal of Infectious Diseases" and "Human Vaccines & Immunotherapeutics" have impact factors of 6.4 and 4.8, with 14 and 12 publications, respectively. "Lancet" stands out with the highest impact factor of 168.9 and also has 12 publications.(Table 2).

3.1.3. Article types

Analyzing the number of publications by article type, reviews were the most common, with 886 publications. Clinical trials follow with 243 publications, and randomized controlled trials were next with 119. Comparative studies and multicenter studies had 86 and 34 publications, respectively. Observational studies accounted for 26 publications, while care reports had 22. Comments, editorials, guidelines, conference reports, and preprints have fewer publications, which were grouped into 29 publications. Meta-analyses were pretty rare, with only 8 publications (Table 3).

3.1.4. The number of publications by research areas

A total of 1483 research articles related to family medicine in Thailand were obtained and subsequently categorized into five distinct groups, as detailed in Table 4. The largest category, clinical problem solving, had 714 articles (48.15 %). Health service, health system, and basic knowledge followed. Medical education had the smallest proportion, with 48 articles (3.23 %). Each category was further divided into subcategories according to the study's objective. For example, basic knowledge included screening and diagnosis ($n = 72$), prediction tools ($n = 44$), treatment ($n = 27$), and others ($n = 68$). The category with the most articles focused on clinical

Table 1
Research area description.

Research area	Description of relevant articles
Basic knowledge	An article related to the development of research tools for primary care such as research methodology and the improvement of prediction, screening, and diagnosis tools.
Clinical problem solving	An article related to the management of common clinical problems, clinical process, burden of diseases and effectiveness of health interventions.
Health service and practice implementation	An article related to delivering and developing healthcare services in various settings.
Health system and policy content	An article related to perspectives toward health at regional, national, or global levels and the connection between social systems and health policies.
Medical education	An article related to the development of educational programs for medical staff in primary care and continuing professional development.

Table 2

The top 10 international journals and their impact factors.

Rank	Journal	No. of publications	Impact factor
1	The Journal of the Medical Association of Thailand (J Med Assoc Thai)	267	Not available
2	Vaccine	54	5.5
3	The Southeast Asian Journal of Tropical Medicine and Public Health	51	Not available
4	PLOS ONE	37	3.7
5	Nursing & Health Sciences (NHS)	23	2.7
6	International Journal of Environmental Research and Public Health	23	4.6
7	Journal of the International AIDS Society (JIAS)	19	6.0
8	Asian Pacific Journal of Cancer Prevention (APJCP)	18	2.5
9	Journal of Infectious Diseases	14	6.4
10	Human Vaccines & Immunotherapeutics	12	4.8
11	Lancet	12	168.9

Table 3

The number of publications by article type.

Article type	Number of publications
Review	886
Clinical trial	243
Randomized controlled trial	119
Comparative study	89
Multicenter study	34
Observational study	53
Case reports	22
Meta-analysis	8
Others	29

Table 4

Publications by research areas and subcategories.

Research area	Subcategories	No.
Basic knowledge	Screening and diagnosis	72
	Other knowledge	68
	Prediction tools	44
	Treatment	27
	Total: 211	
Clinical problem solving	Clinical treatment	258
	Vaccination	223
	Other	151
	Child and maternal health	82
Health service and practice implementation	Total: 714	
	Other health care	101
	Community health	96
	Inpatient care	39
	Vaccination	20
Health system and policy content	Total: 256	
	Vaccination	83
	Health care system development	62
	Health promotion and disease prevention	59
	Disease treatment	34
	Healthcare workers development	16
Medical education	Total: 254	
	Nursing education	19
	Medical student education	11
	Family medicine education	10
	Other	8
	Total: 48	

problem solving, covering treatment (n = 258), vaccination (n = 223), child and maternal health (n = 82), and others. Health services and practice implementation had 256 articles, while health system and policy content had 254 articles. Examples of articles in each category are provided below:

Basic knowledge, prediction tool: "Reliability and validity of a Thai version of the General Practice Assessment Questionnaire (GPAQ)" (Jaturapatporn, D et al., 2006) [23].

Table 5
Cluster identification.

Cluster	Range of topics	Number of keywords in the cluster	Color of cluster
Public health	This cluster focused on chronic and infectious illness to health-related services. It covers keywords such as stroke, depression, Parkinson's disease, activities of daily living, COVID-19, omicron, dengue, HIV, AIDS, vaccination, vaccine, antiretroviral therapy, attitude, cost-effectiveness, reliability, universal health coverage.	54	Red
Health services	This cluster focused on health-related services in addition to health education and research. The cluster included keywords such as age, health care delivery, demographic factors, education, evaluation, health services, research methodology, and studies.	15	Green
Aging and chronic diseases	This cluster focused on medical issues and health promotion associated with advanced age. The cluster included keywords such as diabetes, elderly, exercise, fall prevention, health promotion, hypertension, older adults, and physical activity.	12	Blue
Healthcare access	This cluster focused on the ability of communities and individuals to access health services. The cluster included keywords such as delivery of health care, health services, immunization, vaccination, community participation, and infections.	11	Yellow
Epidemiology	This cluster focused on the study of health and disease within South-East Asia. The cluster included keywords such as Asia, communication, developing countries, diseases, economic factors, immunization, south-eastern Asia, and viral diseases.	10	Purple
Others	This cluster focused on mortality and status epilepticus.	2	Cyan

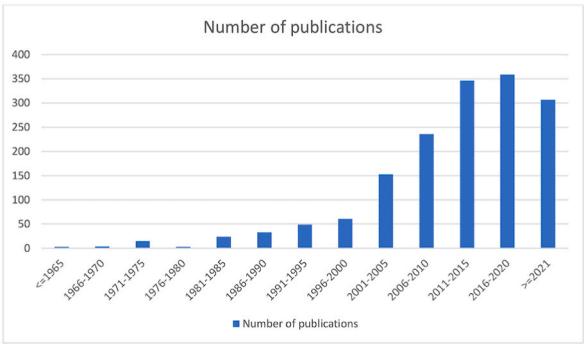


Fig. 1. Number of publications over five-year periods ranging from 1963 to 2023.

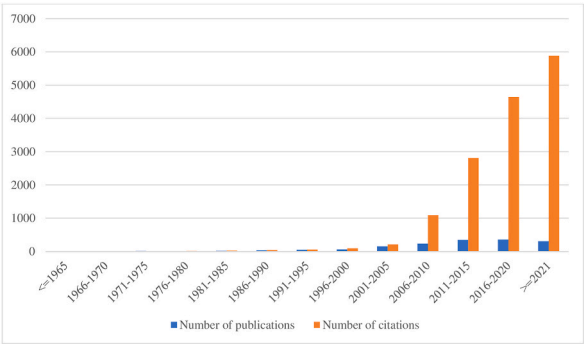


Fig. 2. The number of publications and citations over five-year periods ranging from 1963 to 2023.

Clinical problem solving, clinical treatment: "Assessment of capacity for cardiovascular disease control and prevention in Thailand: a qualitative study" (Aekplakorn, W. et al., 2005) [24].

Health service, community health: "Development of a community-based oral healthcare model for Thai dependent older people" (Prayoonwong, T. et al., 2016) [25].

Health system and policy content, health care system: "Measurement and explanation of horizontal (in)equity in health care utilization among Thais after universal coverage policy implementation" (Somkotra, T., 2011) [26].

Medical education, family medicine education: "General practice residency training program in Thailand: past, present, and future" (Prueksaritanond, S. et al., 2001) [27].

The most common diseases studied across all research areas, except in medical education, were HIV and AIDS (18.6 % in basic knowledge, 11.2 % in clinical problem solving, 11.3 % in health service, and 9.4 % in health system). Coronavirus disease 2019 (COVID-19) was another condition that has been examined across most research areas; however, the number was still far less than HIV infection, with 8 % in basic knowledge, 1.8 % in clinical problem solving, and 4.7 % in the health system. The details of the diseases and conditions examined are provided in [Appendix 2](#).

3.1.5. Co-authorship

The analysis of co-authorship showed that the top three authors who have submitted the most publications are Phanuphak N., Poovorawan Y., and Kupthiratsaikul V., followed by Phanuphak P., Prathanee B., Wiwanitkit V., Wanlapakorn N., and Apisanthanarak A ([Fig. 3](#)). The Zipf's plot illustrated the relationship between the frequency and rank of co-authorship. It demonstrated a similar frequency of authorship at the high end. The downward slope of the line graph towards the low end indicated a decreasing rank of authorship corresponding to a reduced number of authorships. The flat portion of the line graph at the low end reflected a consistent frequency of authorship ([Appendix 3](#)).

3.2. Science mapping

3.2.1. Co-occurrence keywords

The co-occurrence keyword map indicates the areas of research focus within the field of family medicine in Thailand. The keywords are represented as nodes, and lines indicate the strength of relationships between each node. Node size corresponds to its occurrence frequency: the larger the nodes, the higher the frequency of publications.

The co-occurrence analysis of 106 authors' keywords in 1483 articles is depicted in [Fig. 4](#). There were six main clusters displayed in different colors: public health, health services, aging and chronic diseases, healthcare access, epidemiology, and others. The details of each cluster were further elaborated in [Table 4](#). Four out of the ten most repeated keywords were related to the geographic area of Thailand: "Thailand," "Asia," "developing country", and "Southeast Asia." Other four keywords were related to healthcare and health services: "health," "primary health care," "health services," and "delivery of health care" ([Table 5](#)).

3.2.2. Trend of family medicine research themes in Thailand

In the early period, most publications related to infectious diseases and health in developing countries. Subsequently, topics on primary healthcare, communication, and community participation gained momentum. In recent years, primary care and HIV have remained the dominant themes, alongside increasing studies on non-communicable diseases such as hypertension, depression, and stroke. Additionally, the emergence of new diseases, such as COVID-19, has prompted research in this area ([Fig. 5](#)).

4. Discussion

In this study, a total of 1483 publications were analyzed, revealing an increasing trend in the number of publications over time. The Journal of the Medical Association of Thailand was a prominent journal that published articles related to family medicine in Thailand. Clinical problem solving was the largest research area, with the highest number of publications. Six main clusters were identified from science mapping analysis, including public health, health services, aging and chronic diseases, healthcare access, epidemiology, and others. The visualization of research themes over periods showed a shift from infectious diseases and public health to primary care and non-communicable diseases.

This study identified trends of increasing publications in family medicine in Thailand over decades. Before 1980, publications related to family medicine were sparse. From 2000 to the early 2010s, publications doubled from 192 to 389 articles. This positive trend was likely attributed to the establishment of a family medicine curriculum and the endorsement of family medicine board

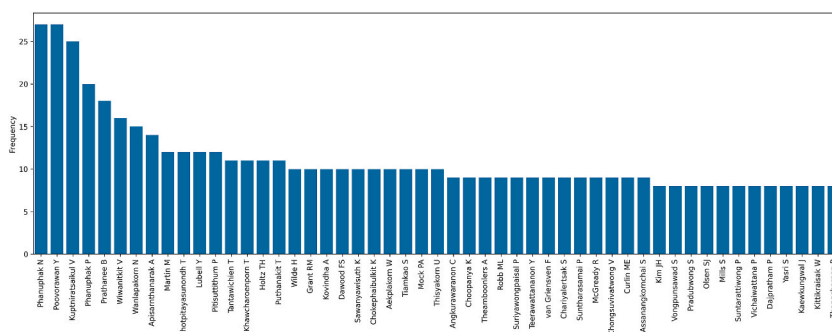


Fig. 3. The top 50 co-authorships.

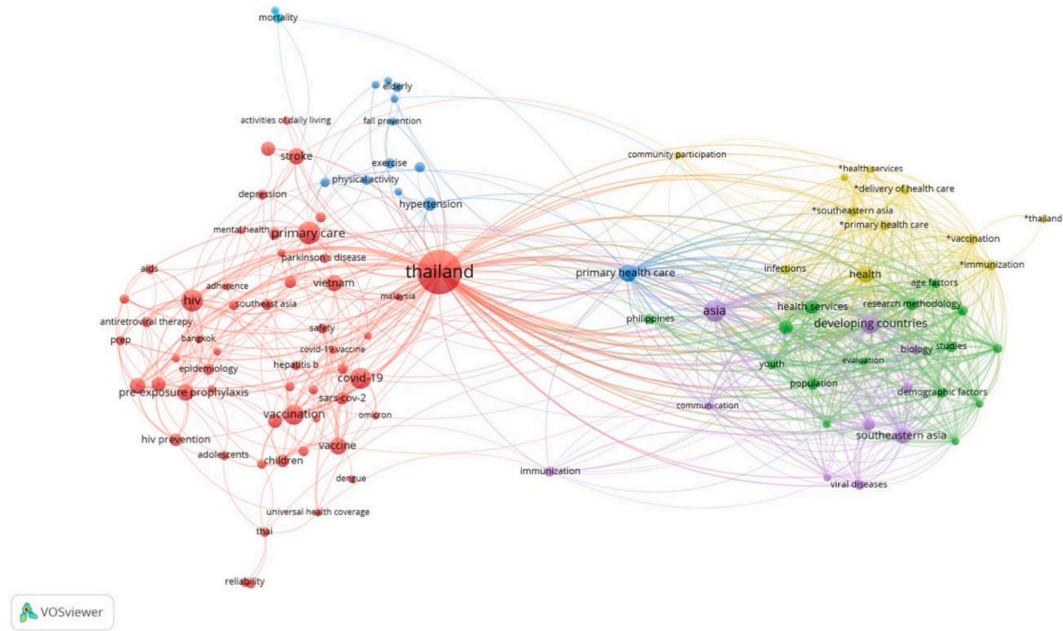


Fig. 4. Patterns of co-occurrence keywords.

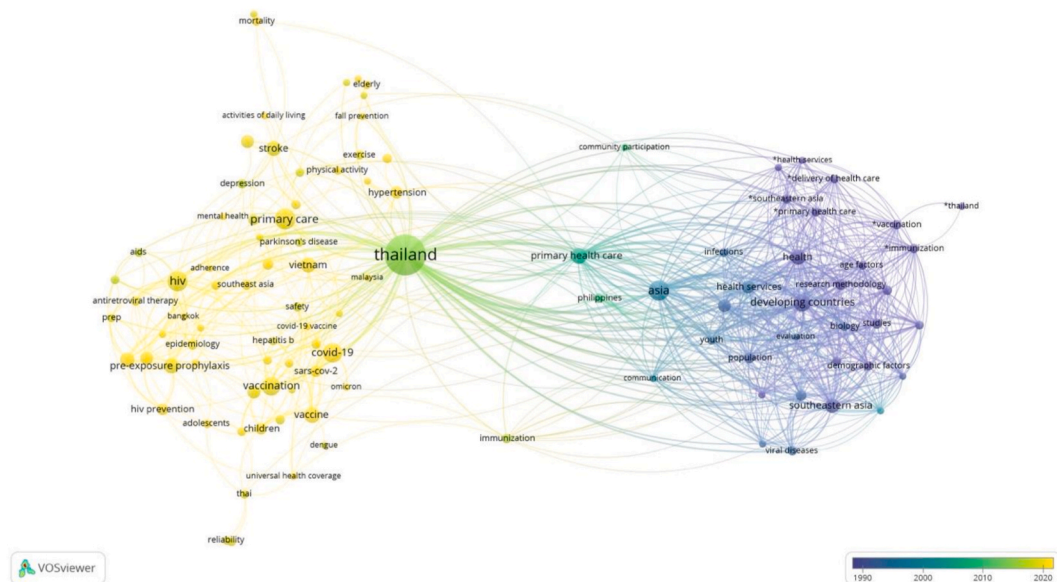


Fig. 5. Common keywords in family medicine research in Thailand.

certifications in 2000 [28] which resulted in a gradual increase in the number of family doctors from 2548 in 2002 to 7898 in 2018 [29]. The trend of increasing research output continued to rise remarkably, from 389 articles in 2011 to 692 articles in 2020. This could be a consequence of a policy implemented over the last decade to increase the number of family doctors and enhance their research capacity. For example, the "Family Medicine Research Framework" was presented at a Thai National Family Medicine Conference in 2019 [30]. This framework provides the scope of family medicine research in Thailand. It consists of setting up a network of primary care and family medicine centers to connect academic researchers with practitioners where research facilities are scarce, connecting each node in different areas to create more multicenter research, and providing more conferences for postgraduate doctors to increase their research capacity. Consequently, there have been 210 publications within the past three years, and the number of publications at the beginning of 2020 has significantly increased. A continuation of this rising trend in the number of publications is anticipated over the next decade [30].

The top 10 journals identified in our study were not specific to family medicine. The most published journal was The Journal of the Medical Association of Thailand, which accounted for half of the total publications out of the top 10 journals. This journal contains a lot of Thai publications with a wide range of scopes, such as tropical infections, non-infectious diseases, and other issues in public health [31]. However, previous research in this study had a predominant focus on infectious diseases and public health, reflecting a lack of research on core principles of family medicine. The analysis of co-authorship indicated that top authors who submitted most publications mostly have other specialist backgrounds (e.g., rehabilitation, infectious disease, and pediatrics) and work in medical centers rather than primary care settings. Studies such as primary care, continuity of care, and home care were not emphasized and should be highlighted. Support and resources should be directed towards developing and promoting core family medicine work in their specialized field.

Studies focusing on the quality improvement of service delivery and health care process in primary care and the implementation at the policy level from Thailand were still limited and need more exploration [32,33]. The literature review in this study revealed that publications in the field of family medicine and primary care in Thailand were mostly in clinical problem solving. Research areas with broader implementation scopes were less common, such as health services and practice implementation, health systems, and policy. This finding was relevant to the patterns of co-occurrence keywords (Fig. 4) in which the dominant cluster was "public health" (cluster relating to disease and treatment), followed by health services, aging and chronic diseases, and health care access, respectively. As a result, it reflects that the scope of studies does not reach the population and policy levels. In addition, there is a lack of studies on the development of the healthcare system. Further research is suggested in applying the existing clinical knowledge and guidelines to community-based practice and healthcare delivery systems [34].

This bibliometric analysis revealed that the three main topics related to infections (vaccination, HIV and AIDS, and COVID-19) have been studied across almost every area of research (from basic knowledge to health systems and policy). However, topics related to non-communicable diseases (NCDs), child and maternal, and family care were still limited in basic knowledge and clinic problem solving. It is plausible that this is because topics of infections have been studied for a longer time compared to NCDs, child and maternal health, and family care. As shown in Fig. 5, the keyword "infection" initially emerged in the 1990s, and communicable disease-related keywords only appeared in the 2020s, such as "COVID-19," "vaccine," and "HIV & AIDS." NCDs were associated with an aging society, which has been an issue in Thailand since 2005 [35]. The aging and chronic disease cluster in Table 3 had only the third highest number of keywords, with the keyword "elderly" appearing in publications only in the 2020s.

Moreover, the eruption of NCDs and communicable disease-related keywords that appeared in the 2020s can correlate to globalization's impact on public health issues, which has expedited the spread of communicable diseases such as COVID-19. Additionally, globalization has led to major lifestyle, diet, and physical activity changes that have contributed to the emergence of NCD prevalence in Thailand [36–38]. This reiteratively exhibits the relevancy of preventative care and self-management in primary care in reducing the burden of disease in primary care in Thailand.

Finally, there is a pressing need to promote research focused on developing comprehensive medical training programs across various disciplines (medical education). Such research endeavors are crucial to support the policy objectives of strengthening primary care services for the Thai population. By conducting research that explores innovative approaches to medical education, curriculum development, and training methodologies, the field of family medicine can effectively address the evolving healthcare needs of Thai communities. These research efforts will contribute to cultivating a highly skilled and competent healthcare workforce capable of delivering quality primary care services to individuals and families across Thailand.

5. Limitation

There were some limitations to our study. First, the data was retrieved from a single database, limiting the analysis to only articles published in PubMed. However, PubMed is a widely used and comprehensive online database used for bibliometric analysis [39]. Second, we found that some articles may have overlapping research areas. We tried to address the classification issue by using multiple experienced authors to reach a consensus. We acknowledge that this review included studies from Thailand. As different countries may be in various stages of primary care development, understanding the context within a country is also important for identifying knowledge gaps to support evidence-based decision-making. Third, the inclusive nature of bibliometric analysis based on search strategies may gather non-specific articles related to family medicine keywords, and information related to funders cannot be extracted. Finally, while clustering author keywords can illustrate the main topics in family medicine research, its lack of insight into the content still needs further investigation to achieve a more thorough understanding such as co-reference analysis but this was beyond the scope of the paper.

6. Conclusion

Based on our findings, we propose that future research in the family medicine field in Thailand should focus more on implementation at both population and healthcare system levels, with particular attention to improving the quality of healthcare delivery. This should be achieved by influencing policy and addressing population-wide health issues.

Research should further explore core principles of family medicine, such as primary care, continuity of care, and home care, which are fundamental to effective health service delivery. Additionally, there is a need for more research targeting non-communicable diseases (NCDs), child and maternal health, and the dynamics of family health in response to the challenges posed by an aging society and globalization. As changing lifestyles shift the burden of disease from infectious to behavior-related conditions like diet and physical inactivity, these areas become increasingly important.

Moreover, we emphasize the demand for research aimed at promoting and improving medical education to strengthen the healthcare workforce, ensuring that it is well-equipped to meet the evolving health needs of the population.

CRediT authorship contribution statement

Nutchar Wiwatkunupakarn: Writing – original draft, Visualization, Project administration, Methodology, Investigation, Data curation, Conceptualization. **Sasiwimon Moonkayaow:** Writing – original draft, Methodology, Investigation, Formal analysis, Conceptualization. **Abigail Morse:** Writing – original draft, Methodology, Formal analysis, Conceptualization. **Nida Buawangpong:** Writing – review & editing, Methodology, Investigation, Formal analysis. **Suphawita Pliannuom:** Writing – review & editing, Methodology, Investigation, Formal analysis. **Soe Sandi Tint:** Writing – review & editing, Methodology, Investigation. **Apichai Wattanapisit:** Writing – review & editing, Validation, Supervision, Methodology. **Chaisiri Angkurawaranon:** Writing – review & editing, Validation, Supervision, Methodology, Conceptualization.

Ethics approval and consent to participate

Not applicable.

Consent for publication

Not applicable.

Submission declaration and verification

This article is not under consideration or approved for publication elsewhere.

Availability of data and materials

Data included in article/supplementary material is referenced in the article.

Funding

This research was supported by the Thai Health Promotion Foundation through the Family Medicine Academic Center Project. The project was also partially supported by Chiang Mai University. The funders had no role in study design, data collection, data analysis, preparation of the manuscript, or decision to publish.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgment

I would like to thank Mr. Panupong Kiaengkham and Mr. Noratap Muangudom for their contributions to this study. Their expertise in data science and support has been crucial to successfully completing this work.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.heliyon.2024.e40090>.

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