Chinese General Practice Journal 1 (2024) 157–165

Contents lists available at ScienceDirect

Chinese General Practice Journal

journal homepage: https://www.keaipublishing.com/en/journals/chinese-general-practice-journal/

Research productivity of primary care and general practice scientific papers in China in 2021☆

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ARTICLE INFO

Key words:
Primary health care
General practice
Research methods
Bibliometrics
Review

ABSTRACT

Background: With the deepening of healthcare reform in China, research in primary care and general practice has rapidly developed in recent years, leading to a significant increase in the number of published papers.
Objective: To summarize and analyze the scientific papers published in the field of primary care and general practice in China in 2021, and to explore their characteristics in terms of publication volume, journals, regions, institutions, research categories, research methods, and number of authors.
Methods: This study employed a scoping review method and bibliometric techniques to systematically retrieve and quantitatively analyze scientific papers in the field of primary care and general practice published in 2021 by Chinese research institutions. The databases used for this study included CNKI, Wanfang, PubMed, and Web of Science.
Results: In 2021, a total of 3,122 original research papers were published in the field of primary care and general practice in China. The number of paper published in primary care facilities accounted for 57.69 %, with most papers authored by single authors. Among these facilities, those located in eastern China contributed 80.12 % of the publications. The main research categories were clinical researches (58.23 %) and health services researches (27.07 %). Co-occurrence analysis of keywords using VOSviewer indicated that research topics focused on “chronic disease management” and “family doctors contracted services.” The predominant research methods were randomized controlled trials (40.87 %) and cross-sectional studies (36.71 %). The majority of these papers were published in non-core and non-SCI/SSCI journals (76.75 %), with only 6.98 % published in SCI/SSCI journals.
Conclusion: The productivity level in the field of primary care and general practice in China has now reached a globally leading position, with primary care facilities in the eastern regions making significant contributions. The research topics are closely aligned with institutional practices and health policies in China. However, there are still several challenges in this field, such as a lack of collaboration among researchers in primary care facilities, potential quality concerns due to the extensive use of randomized controlled trial methods, and low recognition of Chinese research in this field by international SCI/SSCI journals.

Over the past half-century, primary care research has developed rapidly worldwide, especially in Western countries such as the United States, the Netherlands, the United Kingdom, and Canada.[1] The internationally accepted definition currently used for this field of research was proposed by Starfield in 1996, stating that primary care research is “research done in a primary care context.” This concept emphasizes the core characteristics of the field, which are not defined by the identity of the researchers (e.g., researchers must be general practitioners(GPs) and primary care practitioners) or the subject of the research (e.g., research topics must be limited to general practice). Instead, it is defined by the context in which the research is conducted (the focus of the research must be based on primary care facilities and community health centers that provide general practice and primary care services to patients).[2] This highlights the primary demands for research in this field in recent years amid the global progress of healthcare reform that focuses on developing primary health care. Specifically, it inherently plays three

☆ The Chinese version of this paper was published in Chinese General Practice on [2022-10-09] (DOI:10.12114/j.issn.1007-9572.2022.0701). The current English paper is a compliant secondary publication by Chinese General Practice Journal after obtaining copyright permission from both the authors and Chinese General Practice.

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https://doi.org/10.1016/j.cgpj.2024.07.007
Received 30 June 2024; Received in revised form 14 July 2024; Accepted 20 July 2024
Available online 6 August 2024
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functional roles: promoting the development of the modern healthcare system and industry, building a knowledge base in the field of primary care and general practice, and training, attracting, and retaining clinical, research, and teaching personnel in this field.[3,4] In New health reform of China from 2009 to 2020, strengthening primary care facilities and training GPs has consistently been one of the key focuses. During this period, the government invested 965 billion yuan to support the construction of primary care facilities, increasing budget support for urban community health centers and township health centers by 20 %.[5] Simultaneously, the number of scientific papers related to general practice research and those produced by primary care facilities in China showed a significant upward trend.[6-8] This phenomenon closely mirrors the historical development trajectories of many Western countries,[1] highlighting the growing global demand for and emphasis on primary care and general practice research in the context of healthcare system reforms worldwide.

To date, numerous researchers have attempted to explore the development of scientific research in the field of primary care and general practice using various methods such as bibliometric analysis,[1,9-10] longitudinal cross-sectional surveys,[7,11] and qualitative research.[12-13] However, these studies commonly exhibit limitations in their research design, including limited geographical distribution (mainly on Western countries) ,[1,9,13] limited scope in defining the discipline (restricting primary care and general practice research solely to studies conducted by GPs or focusing on general practice) ,[9,14] and limitations in information retrieval methods (deficiencies in the design of the scope, methods, screening, and information extraction of paper retrieval) .[10,14] These limitations negatively impact the comprehensiveness and accuracy of the research results in reflecting the development status of scientific research in this field in China.

Therefore, our team conducted a scoping review based on the definitions of the research concepts, themes, and methods in the field of primary care and general practice in China. We summarized and analyzed scientific papers published in this field in 2021 to explore their characteristics in terms of publication volume, journals, regions, institutions, research categories, research methods, and number of authors. The aim is to present the overall situation of recent scientific paper publications and research outputs in this field in China to relevant researchers, research institutions, and policymakers.

Research methods

This study is based on the scoping review methodological framework recommended by Arksey et al.,[15] combining scoping review methods with bibliometric techniques. The implementation steps include: (1) identifying the research questions; (2) identifying relevant studies; (3) selecting studies; (4) charting the data; (5) analyzing, summarizing, and reporting the results. The reporting of results follows the PRISMA-ScR.[16]

Identifying research questions

Based on the purpose of this study, the research questions were refined into the following seven sub-questions: (1) How many original research papers in the field of primary care and general practice were published in China in 2021? (2) Which regions produced these papers?(3) What types of research institutions produced these papers?(4) What categories do these papers belong to, and what research topics do they focus on?(5) What research methods were used in these papers?(6) Which journals published these papers?(7) What are the characteristics of the number of authors of these papers? Given the focus on the scientific background and the importance of original research for scientific development, this study concentrates on original research papers as defined by the discipline. Additionally, for research categories and methods, this study adopts the internationally accepted standards applicable to the field of primary care research.

Identifying relevant studies

Based on the experience accumulated from previous studies and the development of search strategies,[17] our team used a rigorous search strategy reflecting the concept of “primary care and general practice.” We systematically searched four major databases (CNKI, Wanfang, PubMed, and Web of Science) for scientific papers published by researchers from Chinese research institutions between January 1, 2021, and December 31, 2021.

Study selection

Two trained researchers with experience in literature analysis screened the studies using EndNote 20.4.1 (Clarivate Analytics, Philadelphia, United States, 2020) and Rayyan. After automatic deduplication in EndNote, the two researchers initially performed a preliminary check using 100 randomly selected papers. Once the consistency was confirmed to be robust (set at above 80 %) through a kappa test, the formal independent screening and tagging process was conducted using Rayyan, with bi-weekly checks for consistency. In cases of conflicts or disagreements, a third researcher was involved to assist in resolving potential discrepancies.

The inclusion criteria were: (1)original research studies using the “Introduction-Methods-Results-Discussion” (IMRAD) format; (2)set in the context of primary care and general practice system in China, including general practice departments of general hospitals, community health centers, township health centers, village clinics, and outpatient departments; (3)published in an academic journal between January 1, 2021, and December 31, 2021; (4)no restriction of publication language; (5)abstract and relevant information are complete and without missing data. Correspondingly, the study excluded all non-research papers, including case reports, reviews, and non-systematic reviews.

Charting the data

After completing the literature screening, we used a pre-set information extraction table to extract 18 items of information from each paper. The first 10 items were extracted from bibliometric data. We initially used OpenRefine for data organization and cleaning based on artificial intelligence algorithms, followed by manual re-checking. The remaining 8 items were manually classified, extracted, and checked by two researchers. The classification method for “Research Category" is based on the definitions of primary care research proposed by Beasley et al.[18] The classification of “Research Methods” was derived by the authors from the Research Agenda for General Practice/Family Medicine and Primary Health Care in Europe outlined by European General Practice Research Network, categorized into 8 groups.[19] Regarding institutions and regions, given the current state of research work in China, this study considered the institution of the first author as the author’s institution and used the province where the institution is located to determine the region where the research was conducted. According to the classification method of provinces in the China Health Statistics Yearbook, this study divided the national provinces into three regions: Eastern, Central, and Western. In terms of journal classification, SCI/SSCI journals refer to journals included in the Science Citation Index or Social Sciences Citation Index databases of Web of Science. Core journals refer to those included in the “Chinese Science Citation Database” (CSCD) (2021–2022 edition) by the Documentation and Information Center of the Chinese Academy of Sciences, “Chinese Core Periodicals” (2020 edition) by Peking University Library, or “Chinese Scientific and Technical Papers and Citation Database” (2021 edition) by the Institute of Scientific and Technical Information of China.

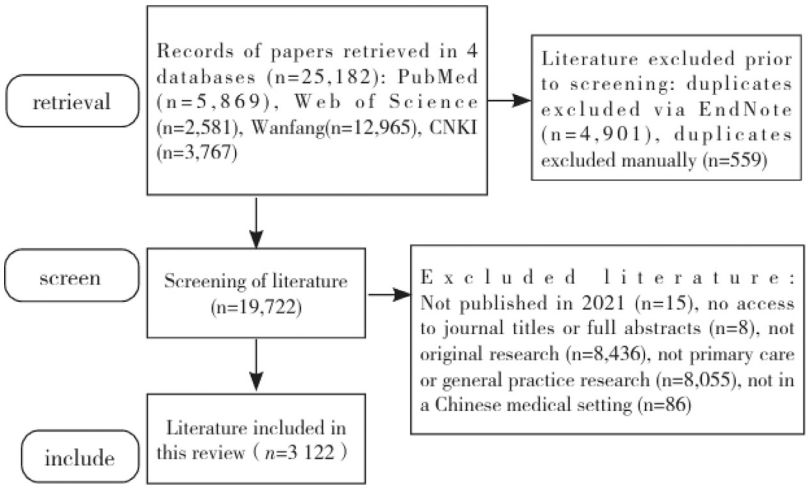

Fig. 1. PRISMA flowchart for study selection.

Statistical methods

Statistical analysis was performed using SPSS 26.0 software. The count data were presented as frequency and percentage. Non-normally distributed quantitative data were presented as the median (first quartile, third quartile). For the analysis of keywords reflecting research themes, the studies were first divided into five specific research categories (basic, clinical, health services, health systems, and education). Then, VOSviewer 1.6.18 was used to perform co-occurrence analysis of keywords within the same research category, reporting the keyword density. Based on the software's automatic calculations, further refinement was conducted using the PICOS framework (Participants, Intervention, Control, Outcome, Study design) as the basic screening framework. This involved manual English-Chinese translation, merging of similar and synonymous terms, and removal of meaningless words to clarify co-occurrence of keywords clearer.

Results

Literature search results

Initially, 25,182 papers were included in this study. After removing duplicates, 19,722 papers were subjected to screening. Following the review of abstracts and full texts, 16,600 papers that did not meet the inclusion criteria were excluded. Ultimately, 3122 original research papers in the field of general practice and primary care were included. The literature screening process is illustrated in Fig. 1.

Publication volume and characteristics of general practice and primary care research papers in China in 2021

Among the 3122 included papers, the first authors' institutions were predominantly located in the eastern region of China. The institutions were mainly community health centers (1214 papers, 38.89 %) and street/township health centers (587 papers, 18.80 %). The research categories were primarily clinical research (1818 papers, 58.23 %) and health services research (845 papers, 27.07 %), with randomized controlled trials (RCTs, 1276 papers, 40.87 %) and cross-sectional studies (1146 papers, 36.71 %) being the most commonly used research methods. Detailed characteristics are shown in Table 1. The included studies were published in 480 journals, with 76.75 % of the papers published in non-core and non-SCI/SSCI journals, and only 6.98 % of the papers published in SCI/SSCI journals. The average number of authors per paper was 2.00 (1.00, 3.00).

Publication characteristics by region, institution, research category, research method, and journal

Characteristics of research papers published by different regions

As shown in Table 2, the institutions publishing papers in the eastern region of China were primarily community health centers (46.71 %), while in the western region, they were mainly street/township health centers (32.89 %). The central region displayed a relatively balanced distribution of institutions. The primary category of papers published across all regions was clinical research (ranging from 54.22 % to 69.23 %). The main research methods used were cross-sectional studies and RCTs. Papers from Hong Kong, Macau, Taiwan, and non-Chinese institutions were predominantly published in SCI/SSCI journals (96.67 % to 100.00 %). In contrast, papers from mainland China were mostly published in non-core journals (73.51 % to 79.11 %). Among mainland regions of China, the proportion of papers published in SCI/SSCI journals was higher in the central region (9.82 %) compared to the eastern (5.28 %) and western regions (4.89 %).

Characteristics of research papers from different institutions

General practice departments at universities or general hospitals predominantly published education research (34.62 % and 31.58 %, respectively) and clinical research (30.77 % and 39.47 %, respectively). Departments of public health at universities primarily published health services research (40.00 %). Other institution predominantly published clinical research, followed by health services research. Across all types of institutions, methods other than intervention studies (RCTs or non-RCTs) and cross-sectional studies were rarely used. However, departments of public health at universities showed a higher proportion of longitudinal research methods (prospective longitudinal studies 4.00 %, retrospective longitudinal studies 10.00 %). General practice departments at universities used qualitative and mixed methods research more frequently (qualitative research: 3.19 %~7.69 %, mixed methods research: 0.29 %~3.85 %). The proportion of papers published in SCI/SSCI journals and core journals was higher in general practice departments at universities(84.62 %), general practice departments at general hospitals(59.65 %), departments of public health at universities (86.00 %), compared to other departments at universities(59.13 %) and general hospitals (29.74 %). Most papers from community health centers and street/township health centers were published in non-core journals (92.42 % and 100.00 %, respectively), as shown in Table 3.

Themes and research methods characteristics of different research categories

In 2021, the research papers in the field of primary care and general practice in China exhibited the following characteristics: (1)The themes

Table 1
Published characteristics of general practice and primary care research papers of China in 2021.

Subgroup	Number of Papers	Composition ratio (%)
Region		
Eastern region	2 293	73.45
Central region	336	10.76
Western region	450	14.41
Hong Kong, Macao and Taiwan	30	0.96
Abroad	13	0.42
Institutions		
Departments of general practice at universities	26	0.83
Departments of general practice at hospitals	114	3.65
Departments of public health at universities	150	4.80
Other faculties in universities	345	11.05
Other departments in hospitals	454	14.54
Specialized public health institutions	144	4.61
Community health centers	1 214	38.89
Street/township health centers	587	18.80
Others	88	2.82
Research methods		
Cross-sectional survey	53	1.70
Prospective longitudinal study	1 818	58.23
Retrospective longitudinal study	845	27.07
Intervention studies (non-RCTs)	157	5.03
RCTs	249	7.98
Qualitative study		
Mixed methods study	1 146	36.71
Other study categories	20	0.64
Research categories	47	1.51
Basic research	497	15.92
Clinical research	1 276	40.87
Health services research	40	1.28
Health system research	7	0.22
Education research	89	2.85
Published journals		
Non-core and non-SCI/SSCI journals	2 396	76.75
Core journals	508	16.27
SCI/SSCI journals	218	6.98

Table 2
Paper institution categories, research categories and published journals between different regional groups.

Research categories	Number of Papers	Research methods								
		Cross-sectional survey	Prospective longitudinal study	Retrospective longitudinal study	Intervention studies (non-RCTs)		RCTs	Qualitative study	Mixed methods study	Other study categories
Basic research	2 293	10 (0.43)	87 (3.79)	91 (3.97)	194 (8.46)	297 (12.95)	112 (4.88)	1 071 (46.71)	372 (16.22)	59 (2.58)
Clinical research	336	1 (0.30)	8 (2.38)	23 (6.85)	84 (25.00)	66 (19.64)	11 (3.27)	62 (18.45)	67 (19.94)	14 (4.17)
Health services research	450	5 (1.11)	13 (2.89)	28 (6.22)	53 (11.78)	87 (19.33)	20 (4.44)	81 (18.00)	148 (32.89)	15 (3.33)
Health system research	30	10 (33.33)	6 (20.00)	2 (6.67)	8 (26.67)	3 (10.00)	1 (3.33)	0	0	0
Education research	13	0	0	6 (46.15)	6 (46.15)	1 (7.69)	0	0	0	0

Region	Research categories					Published journals		
	Basic research	Clinical research	Health services research	Health system research	Education research	Non-core and non-SCI/SSCI journals	Core Journals	SCI/SSCI Journals
Eastern region	39 (1.70)	1 349 (58.83)	648 (28.26)	104 (4.54)	153 (6.67)	1 792 (78.15)	380 (16.57)	121 (5.28)
Central region	8 (2.38)	196 (58.33)	68 (20.24)	18 (5.36)	46 (13.69)	247 (73.51)	56 (16.67)	33 (9.82)
Western region	5 (1.11)	244 (54.22)	122 (27.21)	31 (6.89)	48 (10.67)	356 (79.11)	72 (16.00)	22 (4.89)
Hong Kong, Macao and Taiwan	1 (3.33)	20 (66.67)	4 (13.33)	4 (13.33)	1 (3.33)	1 (3.33)	0	29 (96.67)
Abroad	0	9 (69.23)	3 (23.08)	0	1 (7.69)	0	0	13 (100.00)

Table 3
Paper research categories, research methods and published journals among different institution category groups.

Institutions	Number of Papers	Research categories				
		Basic research	Clinical research	Health services research	Health system research	Education research
Departments of general practice at universities	26	2 (7.69)	8 (30.77)	5 (19.23)	2 (7.69)	9 (34.62)
Departments of general practice at hospitals	114	6 (5.26)	45 (39.47)	23 (20.18)	4 (3.51)	36 (31.58)
Departments of public health at universities	150	5 (3.33)	36 (24.00)	60 (40.00)	30 (20.00)	19 (12.67)
Other faculties in universities	345	12 (3.48)	126 (36.52)	97 (28.12)	44 (12.75)	66 (19.13)
Other departments in hospitals	454	13 (2.86)	241 (53.08)	105 (23.13)	24 (5.29)	71 (15.64)
Specialized public health institutions	144	2 (1.39)	68 (47.22)	45 (31.25)	18 (12.50)	11 (7.64)
Community health centers	1 214	11 (0.91)	778 (64.09)	373 (30.72)	24 (1.98)	28 (2.31)
Street/township health centers	587	2 (0.34)	453 (77.17)	117 (19.93)	8 (1.36)	7 (1.19)
Others	88	0	63 (71.59)	20 (22.73)	3 (3.41)	2 (2.27)

Institutions	Research methods								Published journals		
	Cross-sectional survey	Prospective longitudinal study	Retrospective longitudinal study	Intervention studies (non-RCTs)	RCTs	Qualitative study	Mixed methods study	Other study categories	Non-core and non-SCI/SSCI journals	Core Journals	SCI/SSCI Journals
Departments of general practice at universities	10 (38.46)	2 (7.69)	1 (3.85)	1 (3.85)	3 (11.54)	2 (7.69)	1 (3.85)	6 (23.08)	4 (15.38)	9 (34.62)	13 (50.00)
Departments of general practice at hospitals	63 (55.26)	1 (0.88)	4 (3.51)	17 (14.91)	19 (16.67)	3 (2.63)	0	7 (6.14)	46 (40.35)	48 (42.11)	20 (17.54)
Departments of public health at universities	99 (66.00)	6 (4.00)	15 (10.00)	0	8 (5.33)	7 (4.67)	2 (1.33)	13 (8.67)	21 (14.00)	65 (43.33)	64 (42.67)
Other faculties in universities	235 (68.12)	5 (1.45)	8 (2.32)	18 (5.22)	43 (12.46)	11 (3.19)	1 (0.29)	24 (6.96)	141 (40.87)	139 (40.29)	65 (18.84)
Other departments in hospitals	190 (41.85)	3 (0.66)	3 (0.66)	74 (16.30)	161 (35.46)	6 (1.32)	0	17 (3.74)	319 (70.26)	99 (21.81)	36 (7.93)
Specialized public health institutions	100 (69.44)	1 (0.69)	3 (2.08)	10 (6.94)	24 (16.67)	2 (1.39)	0	4 (2.78)	76 (52.78)	56 (38.89)	12 (8.33)
Community health centers	305 (25.12)	1 (0.08)	12 (0.99)	223 (18.37)	645 (53.13)	8 (0.66)	3 (0.25)	17 (1.40)	1 122 (92.42)	88 (7.25)	4 (0.33)
Street/township health centers	122 (20.78)	0	1 (0.17)	136 (23.17)	326 (55.54)	1 (0.17)	0	1 (0.17)	587 (100.00)	0	0
Others	22 (25.00)	1 (1.14)	0	18 (20.45)	47 (53.41)	0	0	0	80 (90.91)	4 (4.55)	4 (4.55)

of basic research were relatively dispersed, with some concentration on constructing indicators, scales, and questionnaires related to family doctors contracted services; (2)The themes of clinical research focused on the clinical diagnosis, treatment, and health management of chronic diseases such as diabetes and hypertension in community; (3)The themes of health services research centered on family doctors contracted services and target populations, such as the elderly and chronic disease patients in the community; (4)Health systems research primarily analyzed indicators such as services, costs, expenses, efficiency, and quality from a macro perspective, based on primary care facilities; (5)Education research focused on the training and retention of GPs in primary care facilities and the standardized training with general practice characteristics.

Regarding research methods, basic research predominantly used other research methods (75.47 %), clinical research and health services research mainly employed cross-sectional studies (34.05 % and 28.99 %, respectively) and RCTs (46.37 % and 46.04 %, respectively). Health systems research and education research commonly used cross-sectional studies, health systems research and education research commonly used cross-sectional studies (66.88 % and 66.67 %, respectively), as shown in Table 4.

Journal publication characteristics of research papers using different methods

Regarding the journal publication characteristics of research papers using different methods, as shown in Table 5, papers employing prospective longitudinal research, retrospective longitudinal research, and mixed methods research were predominantly published in SCI/SSCI journals (55.00 %, 57.45 %, 57.14 %) and core journals (30.00 %, 17.02 %, 42.86 %), although the total number of such publications was low. Intervention studies, regardless of whether they used randomized controlled designs, were primarily published in non-core journals (94.91 %, 92.96 %). Papers using cross-sectional studies had a higher publication volume (1146 papers) and a relatively notable proportion published in core journals (31.59 %) and SCI/SSCI journals (9.86 %).

Characteristics of author numbers in different subgroups

Regarding the characteristics of author numbers in different subgroups, papers published in mainland China typically had few authors,

Table 4
Paper research methods among different research category groups.

Research categories	Number of Papers	Cross-sectional survey	Prospective longitudinal study	Retrospective longitudinal study	Intervention studies (non-RCTs)	RCTs	Qualitative study	Mixed methods study	Other study categories
Basic research	53	11 (20.75)	0	0	0	2 (3.77)	0	0	40 (75.47)
Clinical research	1 818	619 (34.05)	16 (0.88)	18 (0.99)	295 (16.23)	843 (46.37)	12 (0.66)	1 (0.06)	14 (0.77)
Health services research	845	245 (28.99)	3 (0.36)	14 (1.66)	162 (19.17)	389 (46.04)	17 (2.01)	5 (0.59)	10 (1.18)
Health system research	157	105 (66.88)	0	14 (8.92)	6 (3.82)	5 (3.18)	6 (3.82)	1 (0.64)	20 (12.74)
Education research	249	166 (66.67)	1 (0.40)	1 (0.40)	34 (13.65)	37 (14.86)	5 (2.01)	0	5 (2.01)

Table 5
Published journals among different research method groups.

Research Methods	Number of Papers	Non-core and non-SCI/SSCI journals	Core Journals	SCI/SSCI Journals
Cross-sectional survey	1 146	671 (58.55)	362 (31.59)	113 (9.86)
Prospective longitudinal study	20	3 (15.00)	6 (30.00)	11 (55.00)
Retrospective longitudinal study	47	12 (25.53)	8 (17.02)	27 (57.45)
Intervention studies (non-RCTs)	497	462 (92.96)	30 (6.04)	5 (1.01)
RCTs	1 276	1 211 (94.91)	44 (3.45)	21 (1.65)
Qualitative study	40	12 (30.00)	18 (45.00)	10 (25.00)
Mixed methods study	7	0	3 (42.86)	4 (57.14)
Other study categories	89	25 (28.09)	37 (41.57)	27 (30.34)

with a median of 1.00 to 2.00 authors. In terms of research methods, prospective longitudinal research, retrospective longitudinal research, and mixed methods research had a higher number of authors per paper (median of 7.50, 6.00, and 6.00 authors, respectively), whereas intervention studies had the fewest authors per paper, with a median of 1.00 author. For institutions, papers from primary care facilities were often authored by a single author (median of 1.00 author). In research categories, clinical research and health services research papers had the fewest authors per paper (median of 1.00 and 2.00 authors, respectively). Regarding journal types, papers published in SCI/SSCI journals, core journals, and non-core and non-SCI/SSCI journals had a median of 7.00, 5.00, and 1.00 authors per paper, respectively (Table 6).

Table 6
Comparison of author numbers among papers of different regions, institutions, research categories, research methods and published journals.

Subgroup	Number of authors
Region	
Eastern region	2.00 (1.00, 4.00)
Central region	2.00 (1.00, 5.00)
Western region	1.00 (1.00, 4.00)
Hong Kong, Macao and Taiwan	5.50 (4.00, 8.25)
Abroad	7.00 (5.00, 10.00)
Institutions	
Departments of general practice at universities	6.00 (5.00, 8.25)
Departments of general practice at hospitals	5.00 (3.00, 6.00)
Departments of public health at universities	6.00 (4.00, 8.00)
Other faculties in universities	5.00 (3.00, 6.00)
Other departments in hospitals	3.00 (1.00, 5.25)
Specialized public health institutions	4.00 (2.00, 6.00)
Community health centers	1.00 (1.00, 3.00)
Street/township health centers	1.00 (1.00, 1.00)
Others	1.00 (1.00, 300)
Research methods	
Cross-sectional survey	4.00 (2.00, 6.00)
Prospective longitudinal study	7.50 (5.25, 9.75)
Retrospective longitudinal study	6.00 (3.00, 8.00)
Intervention studies (non-RCTs)	1.00 (1.00, 2.00)
RCTs	1.00 (1.00, 2.00)
Qualitative study	5.00 (3.25, 6.75)
Mixed methods study	6.00 (5.00, 12.00)
Other study categories	5.00 (3.00, 7.75)
Research categories	
Basic research	6.00 (4.00, 8.00)
Clinical research	1.00 (1.00, 3.00)
Health services research	2.00 (1.00, 4.00)
Health system research	4.00 (3.00, 6.00)
Education research	4.00 (3.00, 6.00)
Published journals	
Non-core and non-SCI/SSCI journals	1.00 (1.00, 3.00)
Core journals	5.00 (4.00, 6.75)
SCI/SSCI journals	7.00 (5.00, 9.00)

Discussion

This study aims to collect and analyze information on research papers in the field of primary care and general practice published in 2021, to describe the current state of productivity, research regions, institutions, fields, methods, and journal publications from a disciplinary perspective. Through the collection, analysis, and organization of data, our team has identified five main findings regarding productivity, research regions and institutions, research themes, research methods, and journal publications.

China's research productivity in primary care and general practice has reached world-leading levels

The results of this study show that in 2021, 3122 research papers were published in the field of primary care and general practice in China. Compared to the analysis by Hajjar et al.[1] on the trends in research productivity in Western countries, it is evident that after 2010, the peak annual research productivity in this field for the five leading countries globally—namely the United States, the United Kingdom, Australia, Canada, and the Netherlands—was 1999, 936, 515, 417, and 237 papers, respectively. This indicates that China's current annual research productivity in this field is conservatively estimated to be at least 1.5 times that of the United States, 3 times that of the United Kingdom, 6 times that of Australia, 7 times that of Canada, and 10 times that of the Netherlands. Considering that this study included only original research papers and excluded a substantial number of non-original research papers, the actual difference in research productivity levels is likely even more pronounced.

The research institutions in primary care and general practice in China are mainly primary care facilities in the eastern region, but the level of cooperation among researchers is low

The subgroup analysis of institution types and regional categories shows that approximately 60 % of the 3122 papers were produced by primary care facilities, with 80 % of these papers originating from pri-

mary care facilities in the eastern region. This finding validates the results of surveys conducted by Yu et al.[8] and Shi et al.[20] from 2017 to 2019 on the research output of community health centers in China, indicating that the number of papers published by these facilities has been substantial and growing rapidly in recent years. In other words, primary care facilities, especially those in the eastern coastal provinces, have now become the main force in producing research papers in the field of primary care and general practice in China.

However, the analysis of the number of authors per paper reveals that, despite the high volume of papers from these institutions, each paper typically has very few authors, often completed by a single author. This indicates a low level of academic collaboration among researchers in these institutions. This finding is consistent with Shi et al.'s[20] analysis of academic papers published by community health centers in China from 2017 to 2018, which found that 67.8 % of the 5499 papers were independently completed by a single community health center. Additionally, Jin et al.'s[21] 2016 survey on the current state of research work among GPs in China showed that 77 % of GPs felt their research capabilities were limited, 60 % reported a lack of time for research, and 64.3 % engaged in research primarily for promotion purposes. Combining these findings with the low level of academic collaboration suggests that the current research model in these institutions may limit the quality of their research output.

The research themes in the field of primary care and general practice in China are aligned with institutional practice and relevant policies, but basic research is limited

In 2021, clinical research and health services research accounted for the majority of published papers. The prominent focus suggests that the most frequently chosen research themes in the 1–3 years prior to 2021 were "chronic disease management" and "family doctor contracted services." Additionally, the subgroup analysis of institution types and research categories shows that the categories of papers published by different institutions are generally aligned with their routine practices. For instance, educational and clinical research had a higher proportion in general practice departments at universities and general hospitals. Health services research was more prevalent in general practice departments at universities, while clinical and health services research had higher proportions in primary care facilities.

This phenomenon indicates that research in this field in China shares similar disciplinary characteristics with North America and Europe, where such research needs to be conducted in primary care facilities, focusing on primary care teams, patients, and the community.[19] It also reflects the influence of a series of national health policies under China's broader healthcare reform, such as the "Healthy China" initiative[22] and the promotion of family doctor contracted services,[23] guiding research efforts in this field.

One key difference between research in this field in China and Western countries is the potential insufficient emphasis on "basic research." "Basic research" is defined as research that aids in developing tools for primary care and general practice research. In the history of primary care and general practice research in Western countries, many significant "basic research" studies have laid the foundation for the discipline's development and rise. For example, in the 1980s, Green[24] developed the "weekly return card," which enabled the aggregation of multi-center data from general practice clinics nationwide during the era of paper medical records. This also led to the creation of the "card study," a unique method for conducting multi-center clinical and health services research in primary care and general practice. Recently, Phillips et al.[25] have attempted to develop Consensus Reporting Items for Studies in Primary Care(CRISP) to establish discipline-specific standards for reporting research outcomes, facilitating the translation of research results within the disciplinary context. In China, although some researchers have attempted to develop basic tools for the discipline in recent years, such as scales for family doctor contracted services,[26] standards for evaluating the professional competence of primary health care workers,[27] and scales for patients' experiences with general practice,[28] the number of such studies remains relatively small, and their topics are quite dispersed.

The simple "Evidence-Based Medicine Pyramid" standard is not applicable in the field of primary care and general practice in China

One of the most straightforward and intuitive concepts in the field of evidence-based medicine is the "Evidence-Based Medicine Pyramid," proposed by the Medical Center of the State University of New York in 2001.[29] In this framework, results from RCTs are placed at the top of the pyramid for original research and are typically regarded as the "gold standard" for clinical research evidence, followed by cohort studies, case-control studies, etc. However, the results of this study indicate that although the usage rate of RCTs in 2021 research papers in this field in China was as high as 40.87 %, papers using RCTs had a median author number of only one, and 94.91 % of these papers were published in non-core journals.

Logically, RCTs should require more researchers and resources and have higher demands for research design, implementation, and ethics compared to other types of quantitative research under similar conditions.[30] The findings of this study, however, reveal a clear contradiction to this expectation. This phenomenon subtly exposes the potential quality risks in a considerable portion of the papers using RCT methods currently published in this field in China, necessitating further methodological research for evaluation. Therefore, under the current circumstances, using the simple "Evidence-Based Medicine Pyramid" standard—judging the quality of evidence solely based on whether the researchers used the RCT method—may be overly simplistic and potentially risky in the field of primary care and general practice in China.

Research in the field of primary care and general practice in China is difficult to publish in SCI/SSCI journals, especially society-led SCI/SSCI journals

The results of this study indicate that in 2021, only 6.98 % of research in this field in China was published in SCI/SSCI-indexed journals. These 218 papers were highly dispersed across 121 journals, with 91 of these journals publishing only one paper each. The top five journals with the highest number of publications were all well-known open-access journals in the discipline, including *Frontiers in Public Health, BMC Family Practice, BMC Health Services Research, BMJ Open*, and the *International Journal of Environmental Research and Public Health*. These results highlight a significant gap between the primary research output in this field in China and the research evaluation system dominated by international academic journals. This gap may involve differences in research topics, methodological quality, and English expression between Chinese research and the criteria of international journals, as well as researchers' insufficient knowledge of international journals. These aspects warrant further investigation.

Strengths, limitations, and future research plans

The strengths of this study compared to similar research lie in its foundation on concepts of discipline, clearly defining the field of study as "research conducted within the context of general practice and primary care in China." Additionally, it employed a scoping review approach for collecting and retrieving literature data. Consequently, despite only including original research, it managed to gather and analyze information from over 3000 original papers, providing a comprehensive analysis of recent research conditions in this field in China.

However, the study has several limitations, mainly including four points: (1) Due to the large volume of data and the researchers' limited analytical capacity, this study only included and analyzed original research from 2021, making it difficult to observe changes in the publication trends of research papers in this field over time. (2) This study only analyzed the bibliometric and taxonomic information of the included papers and did not assess their methodological quality, making it challenging to confirm hypothesis such as "the potential methodological quality issues in the large number of RCTs conducted in China." (3) The study used VOSviewer to analyze the keyword frequency density of

five research categories. However, tools like VOSviewer and Citespace can only perform retrospective analyses based on historical data. Additionally, “a large number of published papers on a research topic” does not necessarily equate to “high research value in that field.” Therefore, this part of the study’s results can only serve as retrospective summaries and speculations and should not be used to guide future research topic selection. (4) The study subjects were published papers, but in reality, research is conducted by researchers. Thus, the study’s results may be limited by publication bias and unable to explore deeper issues related to the social background and research work of researchers, such as the reasons and impacts behind the phenomenon of isolated paper publications by researchers in primary care facilities.

To address these four issues, future research plans include using consensus methods and cross-sectional surveys targeting researchers to explore and verify deeper information. This work will gradually develop into continuous longitudinal studies, enabling more in-depth and sustained observation and research on the development of the discipline and research capacity building in this field in China over time.

Conclusion and recommendations

Through the implementation and data analysis of this study, it has been found that the productivity level in the field of primary care and general practice in China has currently reached a global leading position. The primary care facilities in the eastern regions have made significant contributions to this achievement. The research themes are closely aligned with institutional practices and health policies in china. However, there are still a series of issues and challenges in this field, such as the lack of collaboration among researchers in primary care facilities, potential quality concerns in the extensive use of RCT methods, and low recognition of China’s research in this field by international SCI/SSCI journals.

Based on the results of this study, the following four policy recommendations are proposed for research policymakers and administrators: (1) In the coming period, the evaluation standards for research papers in the field of primary care and general practice in China should gradually shift from a focus on the quantity of papers published to an emphasis on the quality and value of the research. (2) At the current stage, rather than simply encouraging primary health care workers to publish papers as first or corresponding authors, more emphasis should be placed on encouraging them to engage in collaborative research and participate in large-scale, high-quality studies. This approach aims to bring together and organize individual researchers into a cohesive, organized research force. (3) Researchers from various institutions and backgrounds who are engaged in this field should be encouraged to collaborate actively. This cooperation should aim to build a consensus on the development of the discipline and create a cross-disciplinary collaboration framework that suits China’s primary care and general practice research. Such efforts would enhance the foundation of the field and improve research efficiency. (4) The current evaluation of research results in this field should avoid the simplistic “only SCI/SSCI counts” and “only RCTs count” approaches. Instead, more detailed and nuanced evaluation methods should be used, focusing on the rigor of the research work and the practical value of the results. This approach should align with the overall goals of developing and building China’s health system and promoting healthcare reform.

Declarations

Not applicable.

Ethics approval and consent to participate

Not applicable.

Consent for publication

Not applicable.

Availability of data and materials

Not applicable.

Declaration of competing interest

C.X. and X.Y. are editors of Chinese General Practice, but they did nor participate in review of the manuscript.

Authors’ contributions

Conceptualization, W.Y., X.Z. and X.Y.; Methodology, W.Y., and X.Z.; Data curation, C.X. and W.Y.; Formal analysis, C.X. and W.Y.; Funding acquisition, not applicable; Project administration, X.Y.; Resources, not applicable; Supervision, W.Y. and X.Y. ; Validation, W.Y. and X.Y. ; Writingoriginal draft, C.X.; Writingreview and editing, W.Y. and X.Y. All authors have read and agreed to the published version of the manuscript.

Funding

Not applicable.

Acknowledgements

Not applicable.

Authors’ other information

Not applicable.

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