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**Development of research about Primary Care in North America, Europe and Australia  
from 1974 to 2017**

**Authors and affiliations**

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**ABSTRACT**

Research is a factor necessary to the existence of high quality medicine. We carried out a bibliometric analysis of research output on primary care in 21 different countries in the MEDLINE database. Since 1974, the United States and the United Kingdom have stood out in terms of publication volumes; The United Kingdom, Canada and Australia have had the largest share of publications in primary care among all publications. Primary care publications still represented in 2017 a small proportion of publications. The countries with the largest publication productivity have success factors to consider in order to strengthen research in primary care.

**KEYWORDS**

Research report; Primary Care, Family Practice; General Practice; General Practitioners; Physicians, Primary care; Primary Health Care; Physicians, family

## **INTRODUCTION**

In a report in 2008 entitled “primary health care, now more than ever”, the World Health Organization underlined the need to develop the production of knowledge and research work in primary care (PC).<sup>1</sup> Several works were conducted in order to assess the production of research work in PC, such as in Germany, Australia, and in Egypt.<sup>2-4</sup> On an international level, two works were found in the literature. The first one concerned the development of research in PC from 1975 to 2003 in four Nordic countries, seven European countries, and seven countries throughout the rest of the world.<sup>5</sup> The second work concerned the development of research in PC from 2001 to 2007 in six countries: Australia, Canada, Germany, the Netherlands, the United Kingdom, and the United States.<sup>6</sup>

It was our intention to update and expand the field of research of these works. Our objective was to conduct a situational review and an analysis of the publication productivity in PC in North America, Europe and Australia.

## **METHODS**

We performed a quantitative bibliometric study in the MEDLINE database from the first of January 1974 to the 31st of December 2017. MEDLINE database is the National Library of Medicine® journal citation database. The MeSH (Medical Subject Headings) is the reference thesaurus in the biomedical domain. The term “Primary Health Care” was first entered there in 1974. We chose European countries in which the Human Development Index was higher than 0.85. These countries were classified according to the United Nations geoscheme for Europe.

After checking the websites of each national PC and general practice (GP) College for current and past terms related to PC, the bibliographic search strategy included the following MeSH terms: Family Practice; General Practice; General Practitioners; Physicians, Primary care; Primary Health Care;

Physicians, family (Appendix 1). Only research articles were included in this analysis. The bibliographic search was conducted by two authors.

The development of publication volumes for each country was presented in the form of a chart on a semi-logarithmic scale. Then, we divided the volumes of publication by the number of inhabitants for each country or region of Europe (from last available official data). To take into account the natural inflation of publications on MEDLINE, the contribution of publications on PC was compared to the total publications per group of countries in 1974 and 2017. The growth rate of the number of publications in PC was calculated, as well as the growth rate of the total number of publications. Finally, the growth rate of the  $\frac{\text{Number of publications in PC}}{\text{Total number of publications on MEDLINE}}$  ratio was calculated per country or region.

## **RESULTS**

Figure 1 describes the development of publications in PC that appeared between 1974 and the end of 2017 (more information in Appendix 2). Two countries stood out in terms of publication volumes: the United States and the United Kingdom. Canada and Australia also had important volumes of publication. The growth rates were particularly significant for the Southern, Eastern and Western European countries.

Figure 2 describes the share of publications in PC among all publications in the country. Since 1974, the United Kingdom and Australia have had the largest share of publications in PC among all publications that appeared on MEDLINE. The growth rates of this relative share were particularly significant in the Southern, Eastern, and Western European countries.

When compared to the total number of MEDLINE publications, PC publications still represented in 2017 only a small proportion of publications.

## DISCUSSION

There is an important gap in the development of research about PC across United States, Europe and Australia.

Our main objective was to assess one aspect of academic impact, that is, trends in research outputs. The meaning of PC codes varies between countries, and the comparison is limited by different healthcare organisations. Our results may suffer from a degree of error if the publications are coded with disease names or categories of care populations. However, this error may not be significantly different across countries. The bibliography search is specific to the history of MEDLINE changes. At the beginning, there were very few indexed PC/Family Medicine journals, and this was biased against non-American journals. The slow inclusion of PC journals potentially provides an artificial acceleration of the numbers measured. However, similar patterns were found in other databases (Appendix 3).

According to other works, there is a relative deficit of PC research. A study showed that between 1960 and 2003, GP citations in PubMed only amounted to 1/20<sup>th</sup> of the volume of citations in cardiology.<sup>7</sup> This may be due to numerous problems: PC's nosology, classification, lack of theory, lack of data models, lack of research culture etc. Systematic referencing using PC codes (MeSH, Emtree, etc) may help gain a better understanding of health system across countries. The countries with the largest publication productivity have success factors to take into consideration that have strengthened research in PC: the important place of PC in the health care system and universities; training and funding of PC researchers; strong professional or academic colleges; structuring of a national data collection network; structuring of PC research teams; favourable conditions for publishing in English; international research networks and cooperation, etc.<sup>8-10</sup>

Finally, we believe that our results reflect the development of primary care research, in particular the importance of primary care research's visibility according to country. Comparisons of factors associated to better research development may help define priorities.

### **Acknowledgments**

We would like to acknowledge A. Boutet, librarian in the Inter-University Health Library - Medicine-Odontology Center in Paris, for his assistance with the search strategy and to better understand the historical implications and differences across countries.

### **Conflicts of Interest Statement**

We declare no competing interests



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Figure 1: Number of publications in primary care (1974 to 2017)

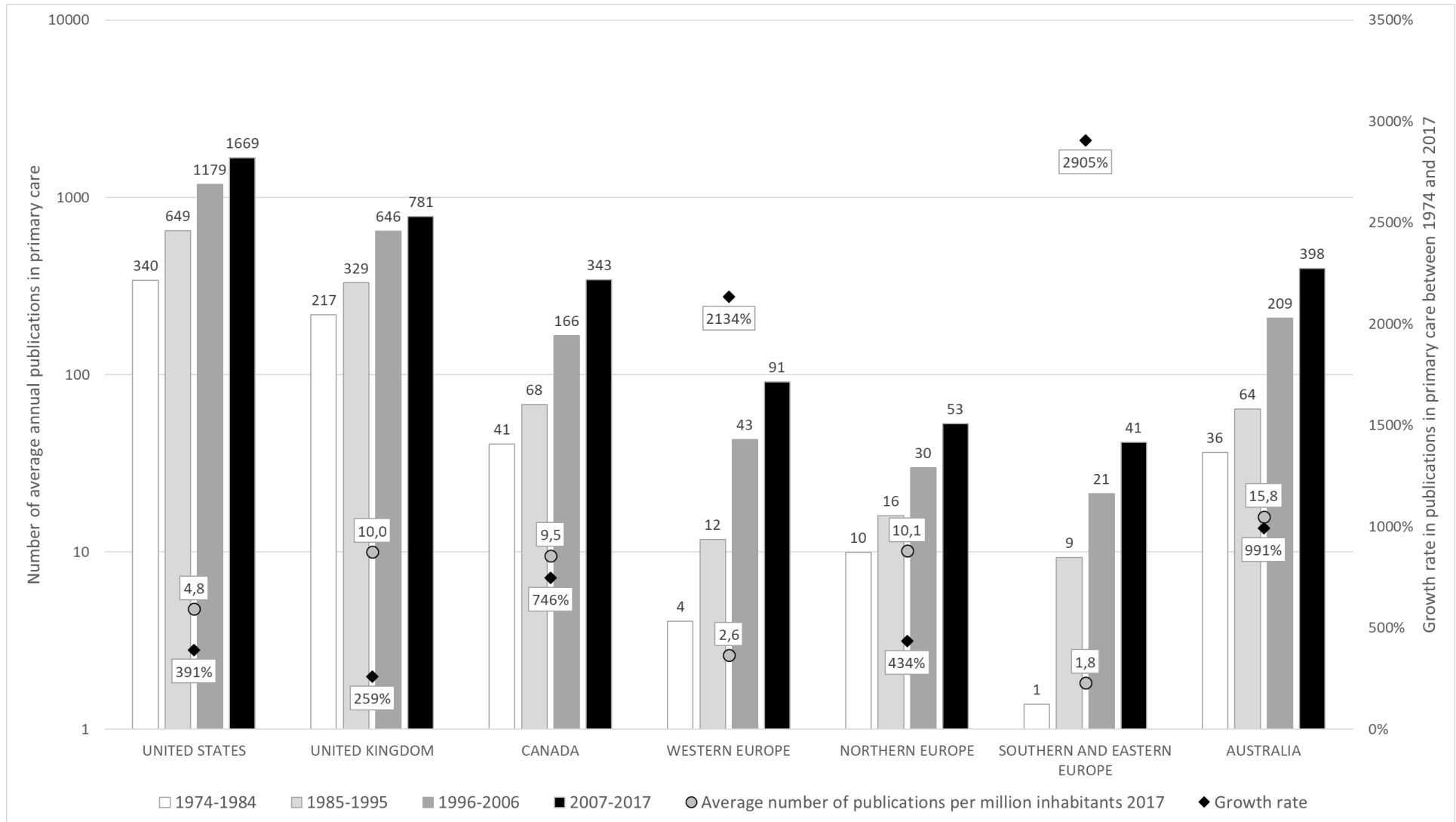
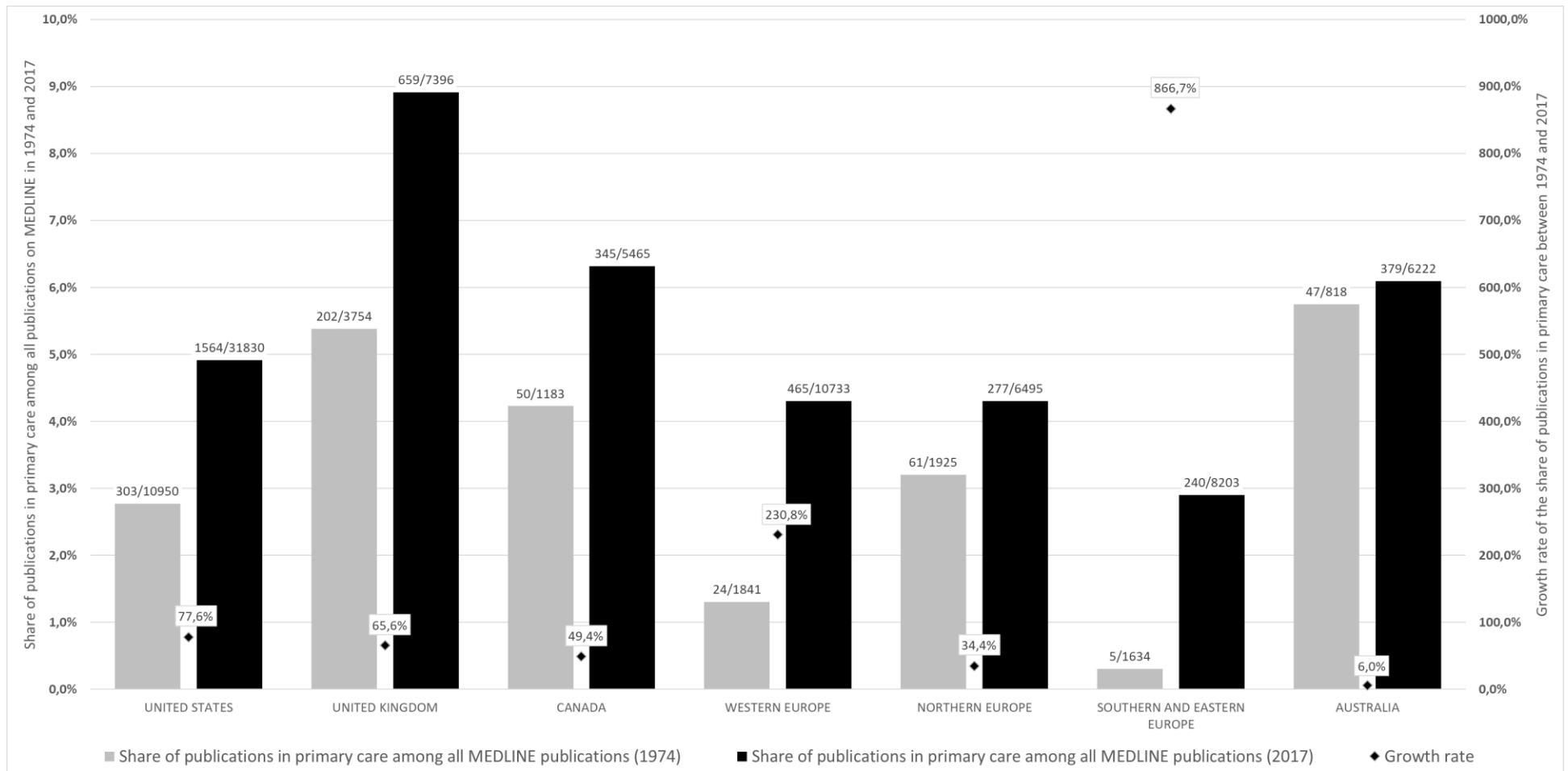
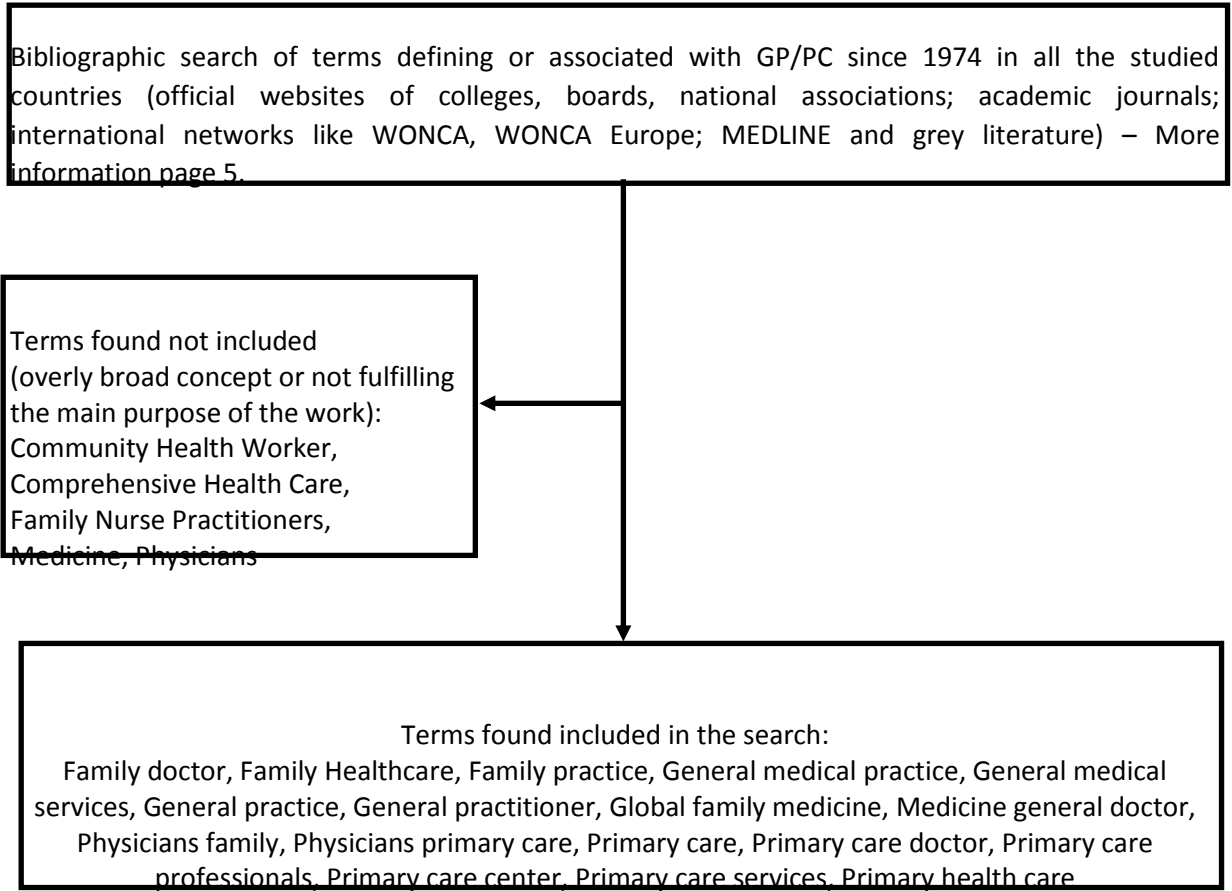


Figure 2: Share of publications in primary care among all publications on MEDLINE in 1974 and 2017



Step 1

**Bibliographic search of terms defining or associated with PC/GP**



Selected terms were then classified into MeSH terms, entry terms, terms associated with a MeSH term, and terms not recognised in the MESH classification (= term not included)

Step 2

**Terms included and not included among those pre-selected during step 1**

All MeSH terms, entry terms and terms associated with a MeSH word were included in the bibliographic search (except those with a ∞)

Terms found with the bibliographic search	MeSH terms	Entry terms	Terms associated with a MeSH term	Year of introduction in the MeSH tree	Terms not included
Family Doctor			X Physicians, family		
Family Healthcare					X
Family Medicine			Family Practice		
Family Practice	Family Practice	Family Practices Practice, Family Practices, Family		1978	
General Medical Practice			General practice Insurance, Health∞		
General Medical Services					X
General Medicine			General practice		
General Practice	General practice	Practice, General		2011 Previous indexing : Family Practice (1978-2010)	
General Practitioner	General practitioners			2011 Previous indexing : Family Practice (1978-2010)	
Global Family Medicine					X
Medicine general doctor					X
Physicians Family	Physicians, family	Family Physician Family Physicians Physician, Family		1974	
Physicians Primary Care	Physicians, primary care	Physician, Primary Care Primary Care Physician Primary Care Physicians		2011 Previous indexing : Physicians, family (1980-2010)	
Primary Care			Primary Health Care Primary Care Nursing∞ Physicians, Primary Care Patient health Questionnaire∞		
Primary Care Doctor					X
Primary Care Professionals					X
Primary Care Center					X
Primary Care Services			Primary Health Care		
Primary Health Care	Primary Health Care	Care, Primary Health Health Care, Primary Primary Healthcare Healthcare, Primary Primary Care Care, Primary		1974	

### Step 3

#### Terms included in the analysis

The terms included in the analysis are as follows:

Family doctor; Family Medicine; Family practice[MESH]; Family Practices; Practice, Family; Practices, Family; General Medical Practice; General Practice[MESH]; General Medicine; Practice, General; General practitioner; General practitioners[MESH]; Physicians family; Physicians, Family[MESH]; Family Physician; Family Physicians; Physician, Family; Physicians primary care; Physician, Primary Care; Physicians, Primary Care[MESH]; Primary Care Physician; Primary Care Physicians; Primary care; Primary Health Care[MESH]; Physicians, Primary Care; Primary Care Services; Care, Primary Health; Health Care, Primary; Primary Healthcare; Healthcare, Primary; Primary Care; Care, Primary.

The following results were excluded from the search:

Addresses, Autobiography, Bibliography, Biography, Books And Documents, Clinical Conference, Comment, Congresses, Corrected And Republished Article, Dataset, Dictionary, Directory, Duplicate Publication, Editorial, Electronic Supplementary Materials, English Abstracts, Festschrift, Government Publications, Historical Article, Interactive Tutorial, Interview, Introductory Journal Article, Lectures, Legal Cases, Legislation, Letter, News, Newspaper Article, Overall, Patient Education Handout, Periodical Index, Personal Narratives, Portraits, Published Erratum, Research Support, American Recovery And Reinvestment Act, Research Support, N.I.H., Extramural, Research Support, N.I.H., Intramural, Research Support, Non-U.S. Gov't, Research Support, U.S. Gov't, Non-P.H.S., Research Support, U.S. Gov't, P.H.S., Research Support, U.S. Government, Retracted Publication, Retraction Of Publication, Technical Report, Video-Audio Media, Webcasts

Please note:

The current Czech Republic benefited from the two MeSH terms in the search "Czech Republic" and "Czechoslovakia" (its name before the separation of the country as of the first of January 1993).

The United Kingdom benefited from five MeSH terms in the search "United Kingdom", "England", "Scotland", "Wales", and "Northern Ireland".

**Additional information 1: Classification in the MeSH tree of the selected MeSH terms**

MeSH headings are organised in a "tree" with 16 main branches: A. Anatomy; B. Organisms; C. Diseases; D. Chemicals and Drugs; E. Analytical, Diagnostic and Therapeutic Techniques and Equipment; F. Psychiatry and Psychology; G. Phenomena and Processes; H. Disciplines and Occupations; I. Anthropology, Education, Sociology and Social Phenomena; J. Technology, Industry, Agriculture; K. Humanities; L. Information Science; M. Named Groups; N. Health Care; V. Publication Characteristics; Z. Geographicals

All MeSH Categories		
H- Disciplines and Occupations	M- Named groups	N- Health care
Discipline and occupations category	Persons category	Health care category
Health occupations	Health personnel	Health personnel
Medicine	Physicians	Physicians
<b>General practice*</b>	<b>Physicians, Family*</b> <b>Physicians, Primary Care*</b>	<b>General practitioners*</b> <b>Physicians, Family*</b> <b>Physicians, Primary Care*</b>
<b>Family practice*</b>		

\* MESH terms in black and bold character were included in the search

## **Additional information 2: Choice of resources used to list the terms associated or defining GP/PC**

<b>Country</b>	<b>Organisation</b>	<b>Website</b>
<b>Austria</b>	The Austrian Society of General Practice/Family Medicine	<a href="https://oegam.at/">https://oegam.at/</a>
<b>Australie</b>	Royal Australian College of General Practitioners Formerly Australian Family Physician (AFP)	<a href="https://www.racgp.org.au/home">https://www.racgp.org.au/home</a>
<b>Belgium</b>	Belgian Society for General Practitioners/Family Physicians	<a href="http://www.ssmg.be">www.ssmg.be</a>
<b>Canada</b>	College of Family Physicians of Canada (CFPC)	<a href="http://www.cfpc.ca">www.cfpc.ca</a>
<b>Cyprus</b>	Cyprus Medical Association Training of Family Practitioners for NHIS	
<b>Czech Republic</b>	The Czech Society of General Practice	<a href="https://www.svl.cz/en/czech-society-of-general-practice/">https://www.svl.cz/en/czech-society-of-general-practice/</a>
<b>Denmark</b>	The Danish College of General Practitioners	<a href="http://www.dsam.dk/flx/english/">http://www.dsam.dk/flx/english/</a>
<b>Estonia</b>	The Estonian Society of Family Doctors Family Physicians Association of Estonia	<a href="http://www.perearstiselts.ee/">http://www.perearstiselts.ee/</a>
<b>Finland</b>	The Finnish Association for General Practice Nordic Federation of General Practice	<a href="http://www.syly.fi/">http://www.syly.fi/</a>
<b>France</b>	Collège de la Médecine Générale Société française de médecine générale	<a href="http://www.lecmg.fr/internet/index.php">http://www.lecmg.fr/internet/index.php</a> <a href="http://www.sfm.org/accueil/">http://www.sfm.org/accueil/</a>
<b>Germany</b>	The German Society of General Practice/Family Medicine	<a href="https://www.degam.de/">https://www.degam.de/</a>
<b>Greece</b>	The Greek Association of General Practitioners Greek association of general practice/family medicine Greek Company of General Medicine Doctors Greek Union of Medicine General Doctors	<a href="https://elegeia.gr/">https://elegeia.gr/</a>
<b>Ireland</b>	The Irish College of General Practitioners	<a href="https://www.icgp.ie/">https://www.icgp.ie/</a>
<b>Italy</b>	Center for Studies and Research in General Practice Italian Scientific Society for General Practice	<a href="http://www.csermeg.it/">http://www.csermeg.it/</a>
<b>Luxembourg</b>	Luxemburgish Scientific Society for General Practice	<a href="http://www.alformec.lu/sslmg.html">http://www.alformec.lu/sslmg.html</a>
<b>Netherlands</b>	Dutch College of General Practitioners	<a href="http://www.nhg.org">www.nhg.org</a>
<b>Scotland</b>	RCGP Scotland	<a href="http://www.rcgp.org.uk/rcgp-near-you/rcgp-nations/rcgp-scotland.aspx">http://www.rcgp.org.uk/rcgp-near-you/rcgp-nations/rcgp-scotland.aspx</a>
<b>Slovenia</b>	The Slovenian Medical Association Section for General Practice	<a href="http://www.drmed.org">www.drmed.org</a>
<b>Spain</b>	The Spanish Society of Family and Community Medicine	<a href="https://www.semfyc.es/la-semfyc/estructura/organos-de-gobierno/">https://www.semfyc.es/la-semfyc/estructura/organos-de-gobierno/</a>
<b>Sweden</b>	The Swedish Association of General Practice	<a href="http://www.sfam.se/">http://www.sfam.se/</a>
<b>United Kingdom</b>	Royal College Of General Practitioners	<a href="http://www.rcgp.org.uk/">http://www.rcgp.org.uk/</a>
<b>USA</b>	American Academy of Family Physicians American Board of Family Medicine	<a href="http://www.aafp.org">www.aafp.org</a> <a href="http://www.theabfm.org">www.theabfm.org</a>

For Europe - More references in:

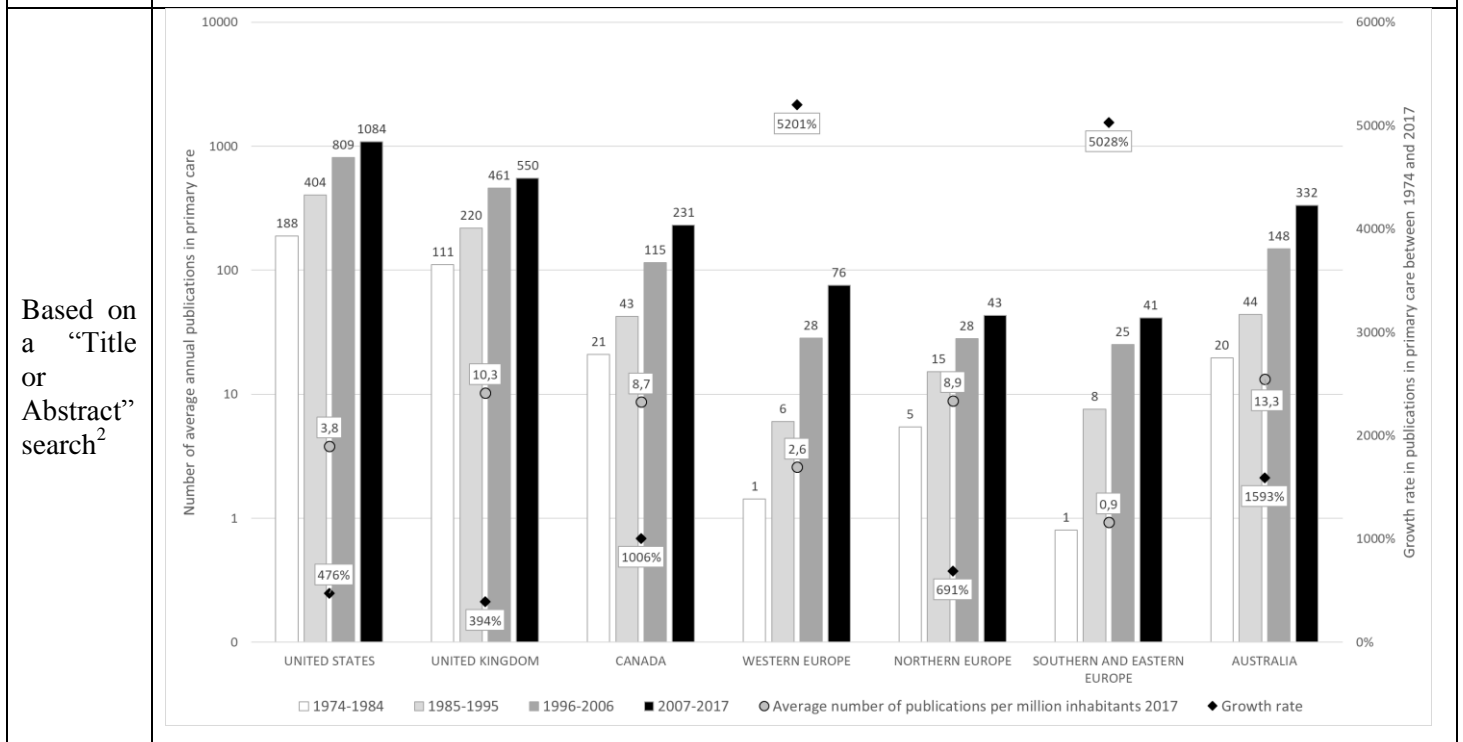
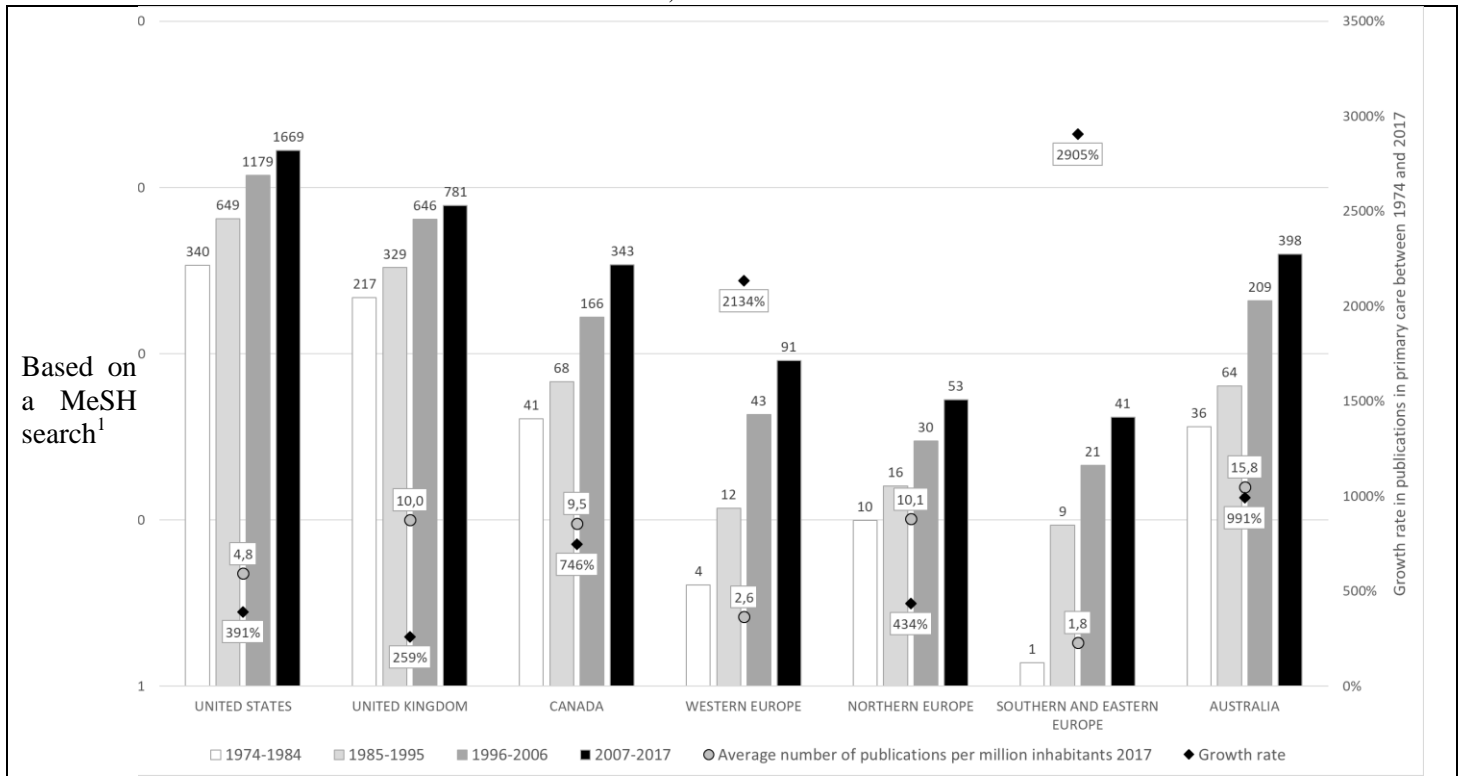
Kringos DS, Boerma WGW, Hutchinson A, et al., editors. Building primary care in a changing Europe: Case studies [Internet]. Observatory Studies Series, No. 40. Copenhagen (Denmark): European Observatory on Health Systems and Policies; 2015.



Appendix 2: Number of publications in primary care in 21 countries (1974 to 2017) – Detailed data

DATES	GERMANY	AUSTRIA	BELGIUM	CANADA	CYPRUS	DENMARK	SPAIN	ESTONIA	NITED STATES	FINLAND	FRANCE	GREECE	IRELAND	ITALY	LUXEMBOURG	NETHERLANDS	CZECH REPUBLIC	UNITED KINGDOM	SLOVENIA	SWEDEN	AUSTRALIA
1974	2	6	2	50	0	19	0	0	303	3	7	0	9	1	0	7	4	202	0	30	47
1975	3	0	0	55	0	17	0	0	352	4	4	0	7	2	0	3	2	171	0	23	39
1976	1	3	1	51	0	42	0	0	307	2	10	0	5	1	0	6	1	170	0	18	76
1977	5	2	1	40	0	19	0	0	368	7	14	2	7	2	0	3	4	163	0	13	44
1978	7	1	2	40	0	13	4	0	419	7	13	0	4	4	0	8	2	189	0	16	33
1979	3	1	1	43	0	29	1	1	423	3	13	1	1	0	0	10	4	188	0	14	27
1980	3	0	3	40	0	31	5	0	385	1	9	1	4	2	0	14	5	206	0	21	33
1981	3	2	2	14	0	19	3	0	291	1	6	0	4	3	0	14	3	273	0	6	36
1982	4	1	3	25	0	14	5	0	283	2	6	0	8	2	0	11	2	256	0	11	28
1983	0	1	2	36	0	25	2	0	306	8	2	0	2	1	0	12	3	271	0	12	8
1984	0	1	4	52	0	26	11	0	301	8	13	0	8	2	0	14	6	302	0	21	30
1985	1	3	2	37	0	16	6	0	350	4	10	0	0	5	0	14	4	258	0	17	19
1986	4	3	4	34	0	37	15	0	403	3	4	1	5	8	0	17	5	249	0	15	33
1987	1	3	4	44	0	20	8	0	382	12	7	0	4	10	0	23	7	254	0	21	29
1988	2	3	1	46	1	29	17	0	414	7	11	1	4	5	0	21	1	255	0	23	37
1989	4	3	7	52	0	37	25	0	500	7	12	1	6	13	0	23	2	308	0	28	47
1990	15	1	7	57	2	36	50	1	565	10	10	1	7	11	0	39	3	338	0	32	60
1991	15	0	2	55	0	34	41	0	612	6	11	3	4	14	0	41	3	332	0	53	75
1992	15	2	3	77	0	40	60	1	729	7	14	3	12	20	0	51	0	353	0	37	85
1993	25	5	5	119	0	38	73	0	874	21	14	1	11	4	0	46	3	381	1	38	85
1994	33	1	6	96	0	22	72	0	1109	9	36	5	9	15	0	54	0	461	1	44	123
1995	42	5	5	130	0	25	74	0	1204	17	28	1	16	14	0	61	0	433	3	55	109
1996	62	4	4	109	0	22	94	1	1066	18	21	2	10	9	2	75	1	490	1	47	142
1997	51	2	5	140	1	33	85	1	1252	20	27	1	12	22	0	67	6	494	2	44	132
1998	47	3	7	144	0	39	68	1	1228	23	42	5	9	21	0	77	0	520	4	52	148
1999	58	3	6	146	0	32	85	1	1158	18	34	4	8	22	0	89	2	584	4	56	164
2000	74	5	10	137	1	37	74	2	1023	17	37	5	16	27	0	82	2	604	3	65	157
2001	66	10	19	157	0	40	73	3	1124	28	49	4	19	27	0	89	2	594	2	75	227
2002	61	14	19	157	0	67	65	3	1111	22	55	6	10	42	0	79	0	651	2	80	205
2003	98	9	16	180	0	40	57	4	1208	29	79	4	13	51	0	88	3	713	5	76	251
2004	106	6	29	202	0	46	73	10	1288	20	88	5	22	56	0	116	5	760	2	62	281
2005	133	9	21	220	0	66	83	3	1293	28	97	9	19	75	0	156	3	825	2	65	297
2006	134	6	32	235	2	50	112	4	1281	30	80	16	38	63	0	185	2	871	3	91	290
2007	149	10	25	305	2	45	100	2	1358	28	103	13	47	72	0	195	0	806	2	88	335
2008	149	8	15	260	2	65	94	2	1343	28	99	13	39	49	1	189	2	725	7	98	347
2009	147	17	27	289	1	48	110	2	1322	31	124	11	57	64	1	170	3	643	9	85	281
2010	166	10	39	322	2	72	125	4	1533	35	92	14	41	83	2	167	4	745	8	101	374
2011	183	17	31	325	1	69	182	4	1668	26	112	11	49	59	0	183	2	795	10	80	396
2012	224	11	40	376	1	95	167	4	1941	35	126	15	51	87	1	214	1	825	7	92	389
2013	238	15	43	376	3	96	174	2	1969	44	112	11	60	96	0	201	4	828	8	113	470
2014	230	22	37	417	2	92	197	4	1992	27	137	12	70	85	1	230	3	847	7	124	515
2015	262	11	27	415	0	87	186	4	1999	30	147	6	55	112	1	237	3	936	4	138	492
2016	131	10	25	345	1	88	135	3	1564	21	105	11	53	86	1	193	4	659	3	112	379
2017	78	8	11	193	0	42	62	0	1003	9	70	4	32	46	1	104	4	516	0	70	242
<b>Total 2017</b>	<b>3035</b>	<b>257</b>	<b>555</b>	<b>6643</b>	<b>22</b>	<b>1859</b>	<b>2873</b>	<b>67</b>	<b>41544</b>	<b>716</b>	<b>2090</b>	<b>203</b>	<b>867</b>	<b>1393</b>	<b>11</b>	<b>3678</b>	<b>120</b>	<b>21444</b>	<b>100</b>	<b>2362</b>	<b>7617</b>
<b>ALL PUBLICATIONS MEDLINE 1974</b>	<b>424</b>	<b>278</b>	<b>152</b>	<b>1183</b>	<b>11</b>	<b>653</b>	<b>236</b>	<b>13</b>	<b>10950</b>	<b>350</b>	<b>749</b>	<b>108</b>	<b>164</b>	<b>499</b>	<b>1</b>	<b>237</b>	<b>780</b>	<b>3754</b>	<b>0</b>	<b>745</b>	<b>818</b>
<b>ALL PUBLICATIONS MEDLINE 2017</b>	<b>3800</b>	<b>432</b>	<b>664</b>	<b>5465</b>	<b>69</b>	<b>1887</b>	<b>3166</b>	<b>102</b>	<b>31830</b>	<b>1180</b>	<b>3004</b>	<b>660</b>	<b>673</b>	<b>3784</b>	<b>22</b>	<b>2811</b>	<b>397</b>	<b>7396</b>	<b>127</b>	<b>2653</b>	<b>6222</b>
<b>TOTAL POPULATION</b>	<b>82521653</b>	<b>8772865</b>	<b>11351727</b>	<b>36155487</b>	<b>854802</b>	<b>5748569</b>	<b>6528024</b>	<b>1315944</b>	<b>328286400</b>	<b>5503297</b>	<b>67595000</b>	<b>10768193</b>	<b>4 784 383</b>	<b>60 589 445</b>	<b>576 249</b>	<b>17 081 507</b>	<b>10578820</b>	<b>65808573</b>	<b>2064188</b>	<b>9995153</b>	<b>24 000 300</b>

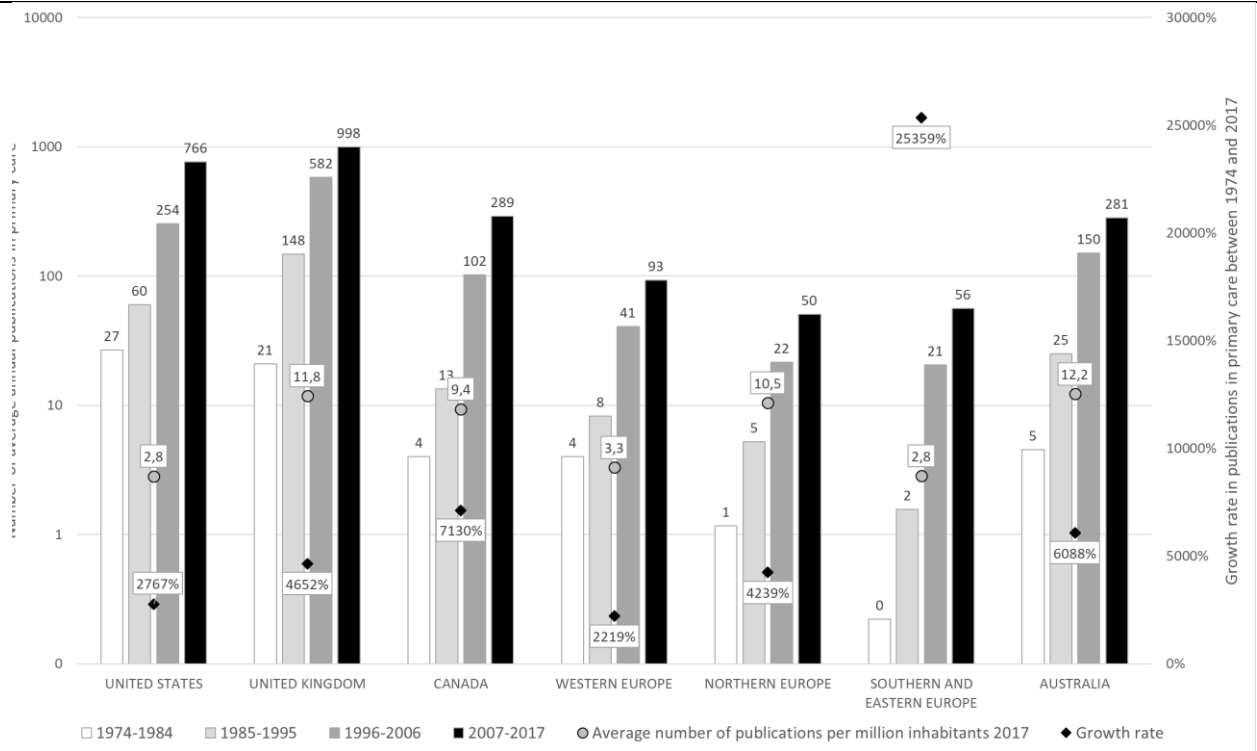
Appendix 3: Bibliographic search – MEDLINE (MeSH terms; Title or Abstract terms);  
EMBASE; WEB OF SCIENCE



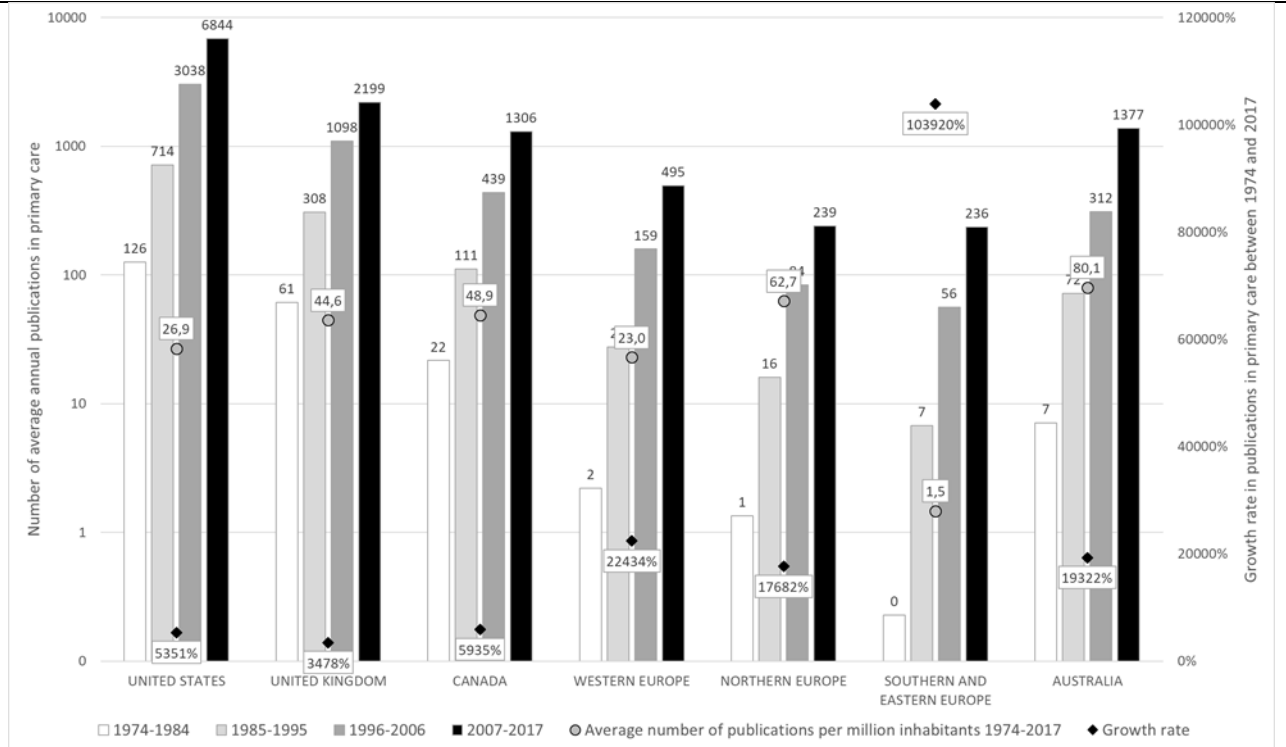
<sup>1</sup> Search strategy : (((("General Practice"[Mesh] OR "General Practitioners"[Mesh]) OR "Physicians, Primary Care"[Mesh]) OR "Primary Health Care"[Mesh]) OR "Family Practice"[Mesh]) OR "Physicians, Family"[Mesh]) AND (((("United Kingdom"[Mesh]) OR "England"[Mesh]) OR "Scotland"[Mesh]) OR "Wales"[Mesh]) OR "Northern Ireland"[Mesh]) AND ("1974/01/01"[PDAT]: "2017/12/31"[PDAT])

<sup>2</sup> Search strategy : (((((((((((("General Practice"[Tiab] OR "General Practitioners"[Tiab]) OR "Physicians, Primary Care"[Tiab]) OR "Primary Health Care"[Tiab]) OR "Family Practice"[Tiab]) OR "Physicians, Family"[Tiab]) OR "Family doctor"[Tiab]) OR "Family healthcare"[Tiab]) OR "Family health care"[Tiab]) OR "Family medicine"[Tiab]) OR "General medical practice"[Tiab]) OR "General medical services"[Tiab]) OR "General medicine"[Tiab]) OR "Medicine general doctor"[Tiab]) OR "Family physicians"[Tiab]) OR "Primary care"[Tiab]) AND "France"[Mesh] AND ("2017/01/01"[PDAT]: "2017/12/31"[PDAT])

EMBASE  
database<sup>3</sup>



WEB OF  
SCIENCE  
database<sup>4</sup>



<sup>3</sup> Search query, ("general practice'/exp OR 'general practitioner'/exp OR 'primary health care'/exp OR 'primary medical care'/exp OR 'family physician'/exp) AND 'denmark'/exp AND [1974-2017]/py AND [embase]/lim"

<sup>4</sup> Search strategy: (TS=(Primary Care OR Primary Health Care OR Family Practice OR General Practice OR General Practitioners OR family physicians) AND CU=Germany)