



Research Productivity - Year 2019

Health Research Regulation Department

Ministry of Public Health

State of Qatar



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Introduction

Publishing productivity has become an increasingly important topic in the research community, attracting attention not only from academics but international organizations. The status of research productivity allows investigators and funders to observe the determinants for the incline or decline in productivity, enhance local and regional education, training and innovation. The need to better understand the productivity of research reveals the fundamental factors determining the productive output and may lead to incremental advancement of research capacity. Research in general and notably biomedical research consists an integral part of an effective and cost-efficient healthcare system, via evidence-based practices embedded within the system.

Qatar is a rapidly growing, multicultural country that has undergone an outstanding socioeconomic transformation in the past 25 years. The country has experienced an evolution of scientific output in different fields and this progress is one of the most important indicators for community and economic development. Even though Qatar is not a country with a long tradition of research, it has managed to set the appropriate infrastructure, gather a critical mass of investigators, and have the mindset of the importance of new discovery. Given that biomedical research can serve as an engine to economic growth and development, Qatar has prioritize the funds to tackle the most prevalent diseases and research capacity has become an indispensable component of a high quality National public health care system.



Estimates and update of the ongoing research in different scientific areas provide insight of the current and future status, allow researchers to undertake new lines of research and officials to better invest the funds and promote domestic research and development (R&D). In this regard, the training of investigators is also highly important as it is a requisite condition for optimizing the efficiency of sustainable research. While bibliometricians provide numerous useful indicators and ever more accurate and reliable methods to evaluate research capacity and productivity, main bibliometric indicators include the number of publications, the amount of peer-reviewed scientific journal articles, the number of total citations, and the type of publications (1, 2). In a continuous effort to provide information for the national research productivity, the Health Research Regulation Department of the Ministry of Public Health (MOPH) has developed the current report with main aim to give an overview of the research performance of individual researchers and academic departments across different type of institutions, with an emphasis in biomedical sciences, during 2019 for the State of Qatar.

Methodology

A structured search strategy was implemented to identify how best to assess research performance in Qatar for 2019. An extensive research was performed to identify all published peer reviewed health related papers using Medline (National Library of Medicine) dataset via the PubMed interface for the period 1st January 2019 to 31st December 2019. The search term for the defined period used was [Qatar 2019] and it revealed n=2100 publications. Studies were included based on the following criteria: at least one author affiliated with an



institution inside Qatar, studies that received funding by Qatar. The publications were categorized as: a) National, for the studies performed by authors solely affiliated with Institutions located in Qatar and b) International, for collaborative studies between authors affiliated with Institutions located inside and outside Qatar. A team of researchers at the Health Research Regulation Department of the Ministry of Public Health reviewed the related publications and categorized them according to the specified criteria. Each reviewer created a separate library of the publications with the following information for each article:

- Publication title
- PubMed link
- Authors' list
- Journal's title
- Journal's Impact Factor (JIF)
- Article Type (review paper, letter to the editor, commentary, original research, author's correction etc)
- Source of information (via abstract or full text),
- Research area (according to a pre-specified list)



- Type of study (National or International)

The separate libraries were then compiled together and were revised by a senior researcher with emphasis to provide the available information in a unifying way.

Findings

According to the previously described methodology, this PubMed search for all Qatar related original publications for 2019, revealed 2100 publications (Figure 1). Filtering this library we excluded 'authors corrections' (n=26), articles published to a Qatari Journal (Qatar Medical Journal, QMJ) but with no relevant information to our search and articles that were mentioning Qatar as part of the Arab States with no further scientific information (n=44). A total of 2030 publications were finally included in this search that retrieved the top 15 research areas (Animal Research, Basic Sciences, Bioinformatics, Clinical Research, Computer Science, Engineering, Environmental Sciences, Epidemiology, Food Science/ Nutrition, Health Care Quality, Medicine, Pharmaceutical Science, Physical Activity/ Sports, Social Sciences, Sports Medicine) published for this year as shown in Table 1. Most of the identified publications (n=1615) were part of International collaborations (co-authors affiliated with Institutions located inside and outside Qatar). Only for 'Clinical Research', National studies (n=41) exceeded the number of International collaborations (n=18). Figure 2 shows the research output (number of publications) per scientific area. Over this study period, 'Medicine' was the most popular research domain with almost half of the publications (n=1103, 54.4%)



followed by 'Sports Medicine' (n=191, 9.4%), 'Basic Sciences' (Chemistry, Physics, Biology, n=145, 7.1%) and 'Environmental Sciences' (n=104, 5.1%). In general the majority of publications were openly accessible, while in some cases access was available for abstract and in very few cases access was restricted to the title of the publication (Figure 3).

The journal impact factor (JIF) is commonly used an indicator of the research output, the relative importance of a journal within its field and to measure the frequency with which the "average article" in a journal has been cited in a particular time period (3, 4). IFs are calculated each year by Thomson scientific for those journals that it indexes, and are published in Journal Citation Reports (http://www.thomsonreuters.com/products_services/science/science_products/a-z/journal_citation_reports/). IFs are available in the SCI (Science Citation Index) Journal Citation Reports and on the Web of Knowledge for more than 8000 selected scientific journals. For the current study average IF (Table 2) ranged from 2.9 for 'Social Sciences' to 4.7 for 'Engineering' and 'Sports Medicine'. As clearly shown in Figure 4 the average IF above 4 was observed for 'Basic Sciences', 'Bioinformatics', 'Engineering', 'Environmental Sciences', 'Medicine' and 'Sports Medicine'. To aid the graphical representation of our findings, two categories were created for the JIFs >3 and ≤ 3 per research area (Figure 5). For 'Basic Sciences', 'Computer Sciences', 'Engineering', 'Environmental Sciences', 'Medicine' and 'Sports Medicine' most of articles were published in journals with IF >3 . On the contrary, more publications with JIF ≤ 3 were observed for 'Clinical Research', 'Epidemiology', 'Health Care Quality' and 'Social Sciences'. With regard to the article type, the last two tables include the different types



identified in the time period surveyed and research areas assessed. Original research articles (n=1515) and review papers (n=336) were the two type of articles scoring higher in the list, predominantly derived from International collaborations (Table 3). Detailed information for the article type per research area is summarized in Table 4.

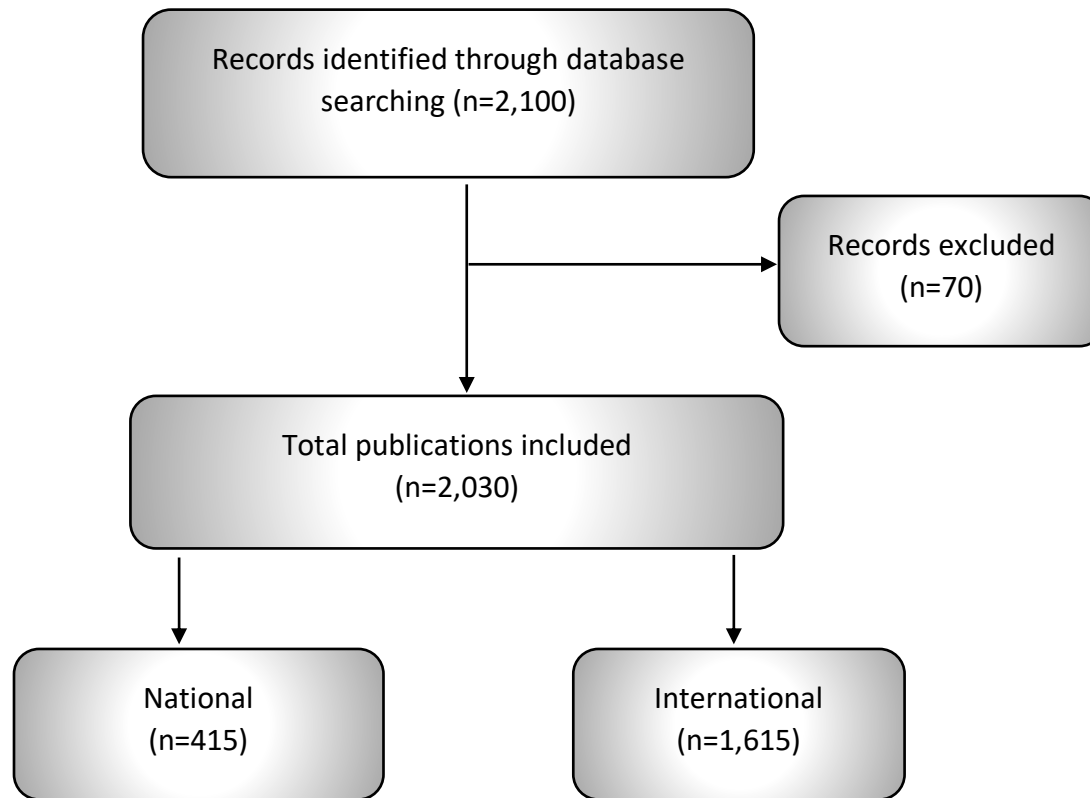


Figure 1. Flow chart for the publication selection via PubMed search



Table 1. Main Research Areas identified for the published articles via the PubMed Search

Number	Main Research Area	International	National	N
1	Animal Research	18	1	19
2	Basic Sciences	104	41	145
3	Bioinformatics	21	5	26
4	Clinical Research	18	41	59
5	Computer Science	24	6	30
6	Engineering	54	8	62
7	Environmental Sciences	80	24	104
8	Epidemiology	26	18	44
9	Food Science/ Nutrition	20	3	23
10	Health Care Quality	52	24	76
11	Medicine	897	211	1108
12	Pharmaceutical Science	56	8	64
13	Physical Activity/ Sports	14	2	16
14	Social Sciences	43	19	62
15	Sports Medicine	188	4	192
Total		1615	415	2030

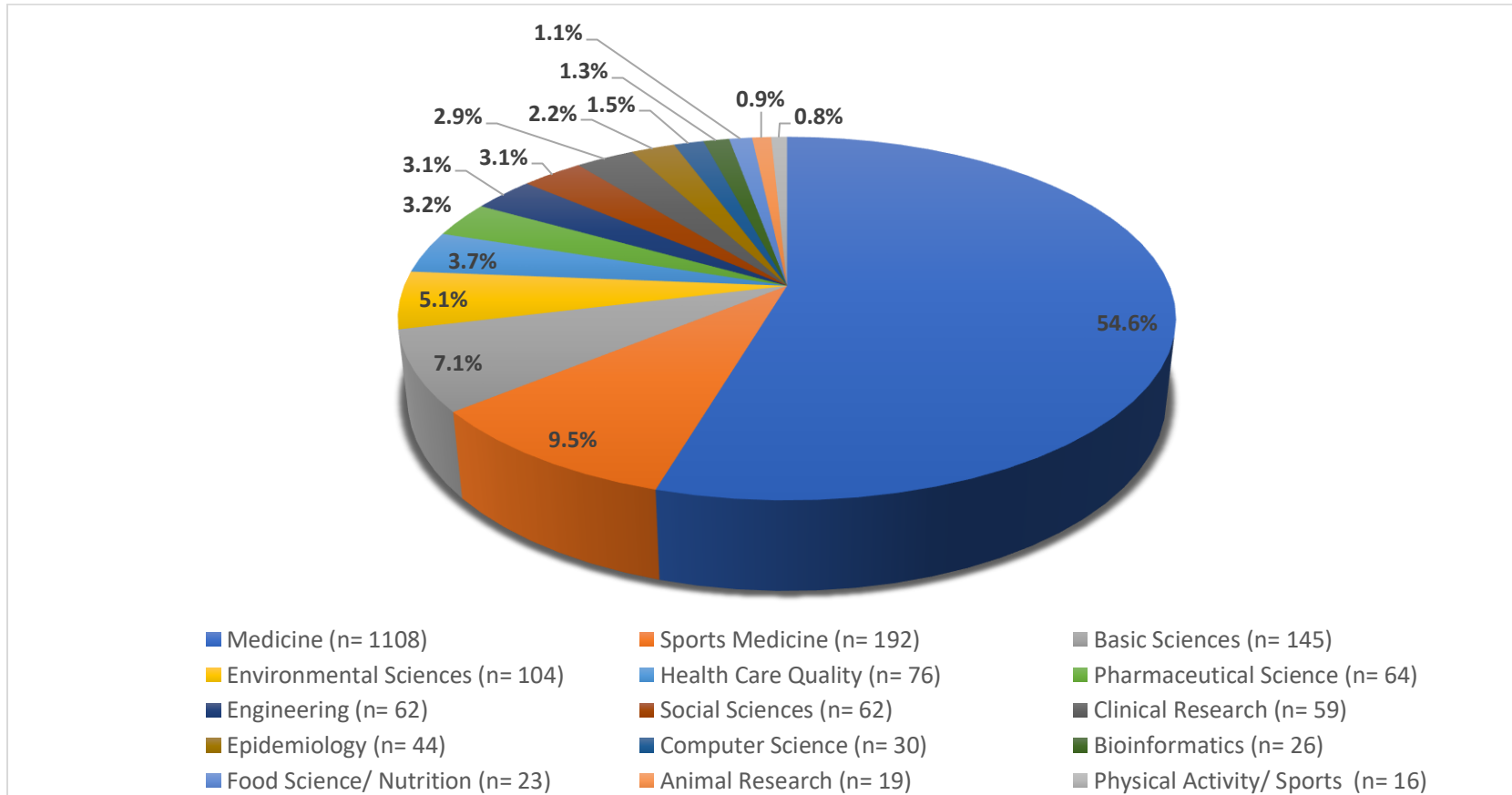


Figure 2. Counts & percentage distribution of the publications by research area.

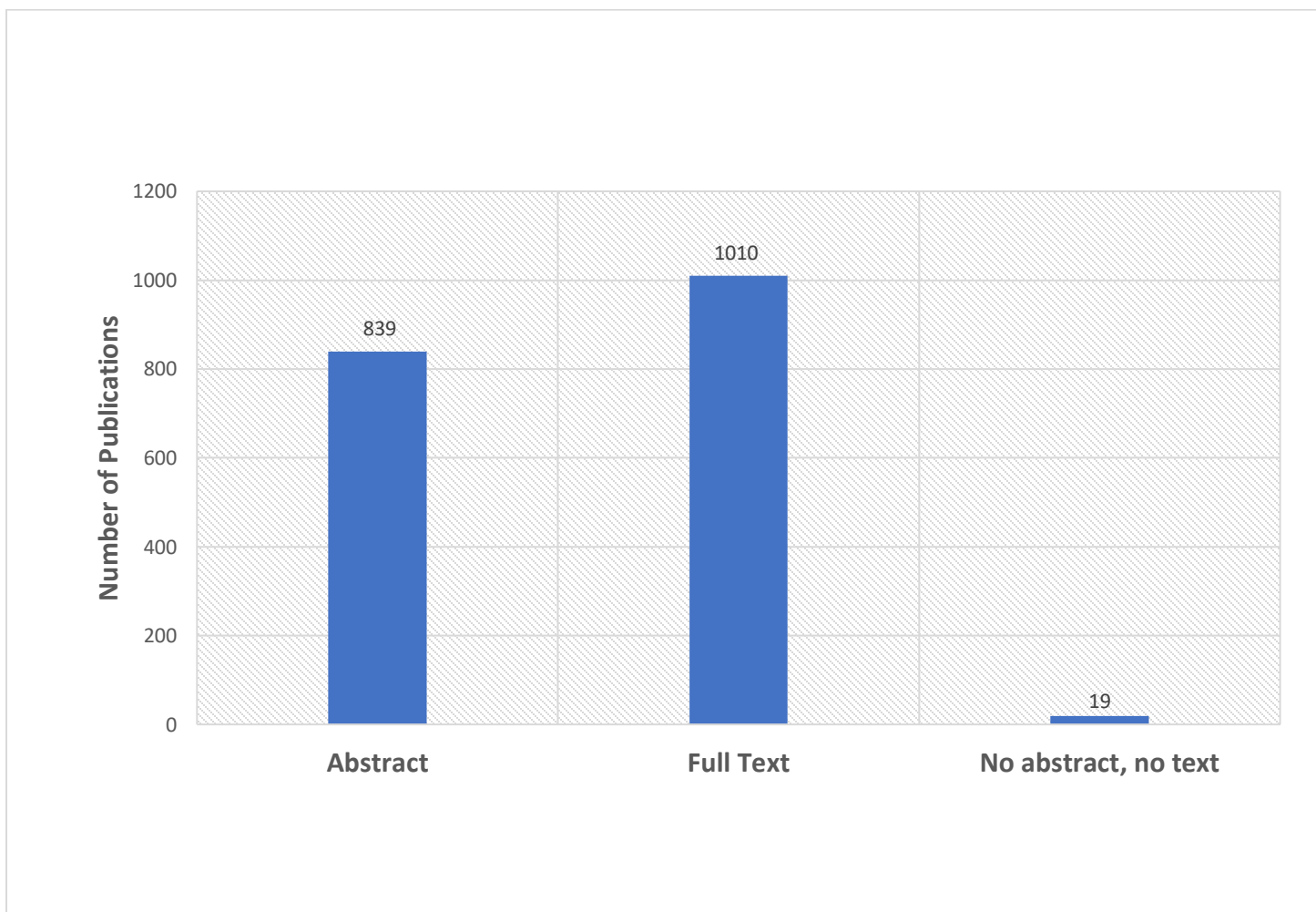


Figure 3. Access to the published articles.



Table 2. Average Journal Impact Factor (JIF) per research area.

Research Areas	Average JIF	Count
Animal Research	3.0	19
Basic Sciences	4.6	137
Bioinformatics	4.3	26
Clinical Research	3.6	53
Computer Science	3.9	28
Engineering	4.7	60
Environmental Sciences	4.4	102
Epidemiology	3.0	41
Food Science/ Nutrition	2.9	22
Health Care Quality	3.3	48
Medicine	4.3	1003
Pharmaceutical Science	3.4	58
Physical Activity/ Sports	3.5	14
Social Sciences	2.5	48
Sports Medicine	4.7	183

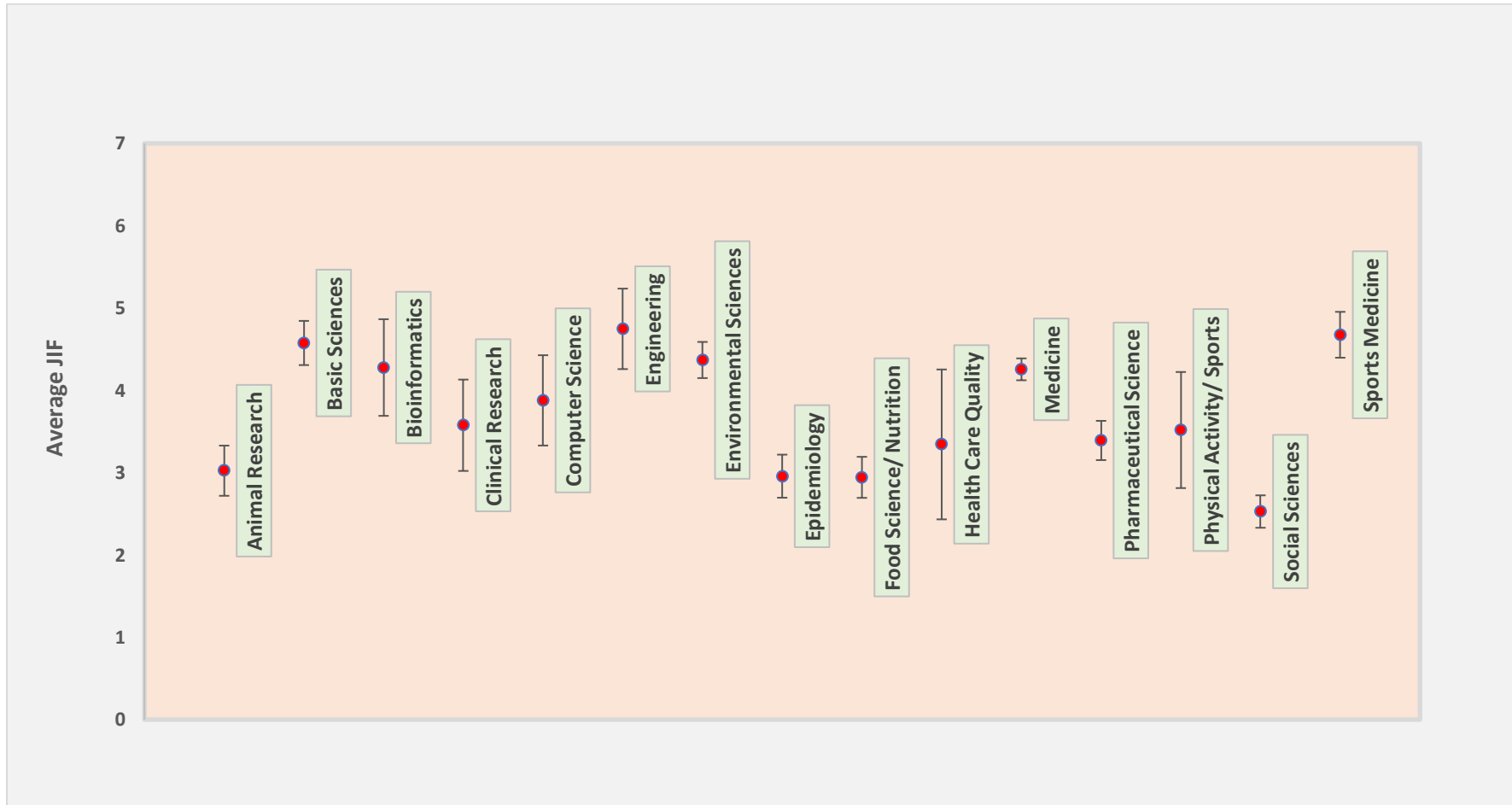


Figure 4. Average JIF with 95% confidence interval per research area.

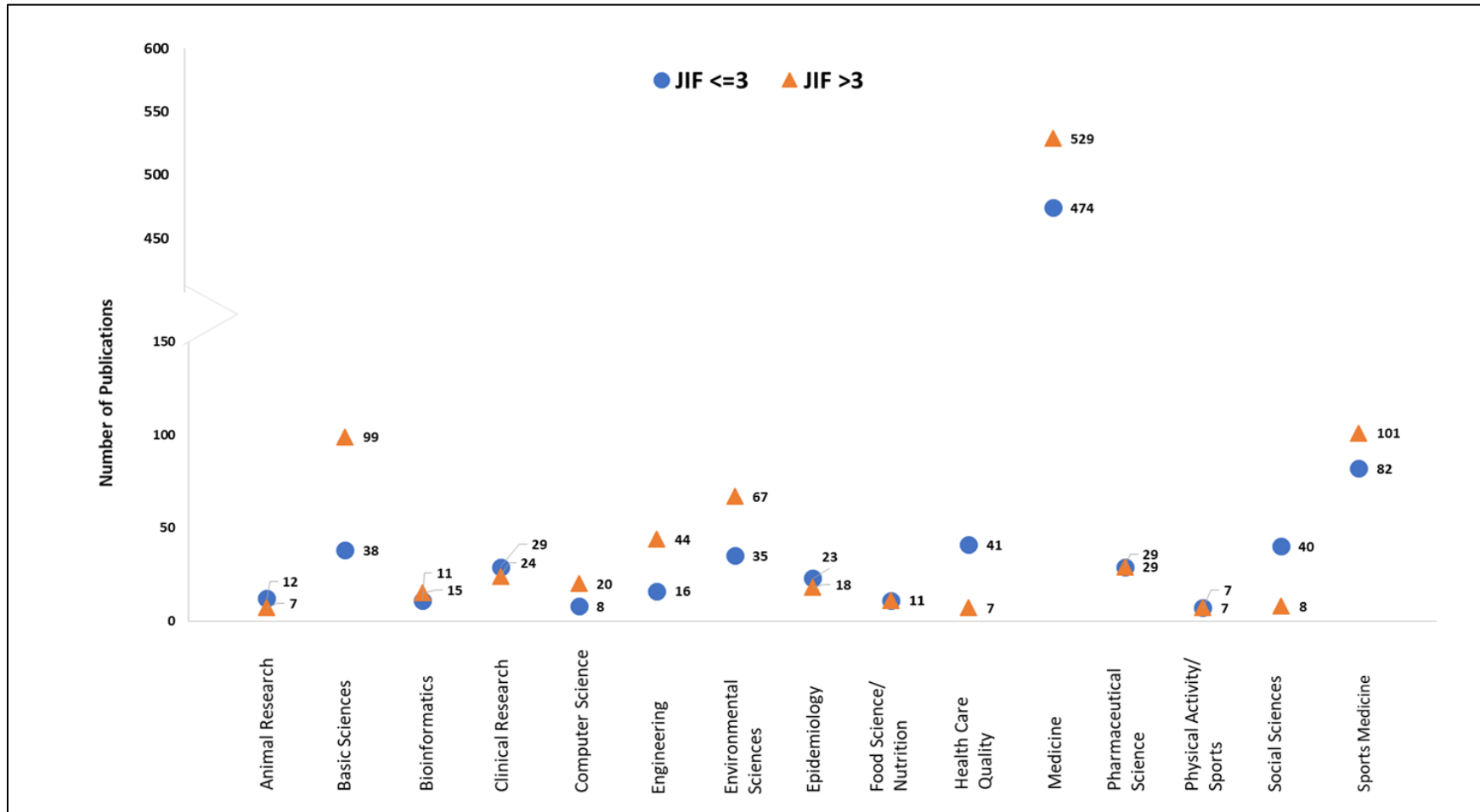


Figure 5. Number of publications per research area for JIF>3 and ≤ 3 .



Table 3. Article types for International and National collaborations.

Type of Articles	International	National	Total
Book Chapter	5	1	6
Case Studies	21	24	45
Commentaries	11	4	15
Conference	2	0	2
Consensus	8	3	11
Editorials	25	7	32
Guidelines	3	0	3
Infographic	4	0	4
Letter to the Editor	11	8	19
Original Research	1238	277	1515
Proceedings	1	0	1
Reports	5	2	7
Research Letter	2	0	2
Response	4	3	7
Review	261	75	336
Short communication	3	1	4
Viewpoint	1	1	2



Table 4. Article types per research area.

Research Area	Number of Articles
Animal Research	
Letter to the Editor	1
Original Research	17
Review Paper	1
Basic Sciences	
Original Research	134
Review Paper	11
Bioinformatics	
Book Chapter	1
Original Research	23
Review Paper	2
Clinical Research	
Case Studies	6
Editorials	1
Letter to the Editor	1
Original Research	47



Review Paper	3
Computer Science	
Original Research	27
Review Paper	3
Engineering	
Original Research	56
Review Paper	6
Environmental Sciences	
Case Studies	2
Conference	1
Original Research	92
Short communication	1
Review Paper	7
Epidemiology	
Editorials	1
Letter to the Editor	1
Original Research	33
Response	1



Review Paper	8
Food Science/ Nutrition	
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Editorials	1
Original Research	17
Review Paper	5
Health Care Quality	
<hr/>	
Case Studies	1
Commentaries	1
Consensus	2
Editorials	2
Original Research	57
Reports	2
Review Paper	8
Medicine	
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Book Chapter	5
Case Studies	35
Commentaries	14
Consensus	6



Editorials	15
Guidelines	3
Letter to the Editor	13
Original Research	755
Proceedings	1
Reports	5
Research Letter	2
Response	5
Short communication	3
Viewpoint	1
Review Paper	233
Pharmaceutical Science	
Case Studies	1
Original Research	43
Review Paper	20
Physical Activity/ Sports	
Original Research	12
Response	1



Review Paper	2
Social Sciences	
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Consensus	1
Letter to the Editor	1
Original Research	51
Viewpoint	1
Review Paper	7
Sports Medicine	
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Conference	1
Consensus	2
Editorials	12
Infographic	4
Letter to the Editor	2
Original Research	151
Review Paper	20
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Conclusion

Findings from the current report provide an overview of the research performance for the state of Qatar with main focus on the publication quality, quantity, and collaborations, but with no further stratification to population size and gross domestic product (GDP). For this report the comparison of research productivity with other GCC countries is challenging mainly due to the heterogeneity of available studies with respect to the study design, performance indicators, databases searched, time period covered and scientific domains. One possible conclusion that can be drawn from the findings is that resources invested on R&D have impacted on both quality and quantity of publications. Qatar has shown a steadily growth in research output despite the recent sociopolitical pressures due to the blockade in 2017. The diversity of the research portfolio and the internationalization through established and productive partnerships with foreign institutions is another outcome of this report. The latter could be interpreted either as a loss of ownership by the Qatari research institutions or simply as a transition period to a publishing culture driven by the available international networks and multinational consortia. In any case, when this transition is accompanied by a more impactful research and international visibility of the country, then this is more than welcomed. Current findings also suggest a high research interest focusing on Medicine, a reflection of the efforts made by the country for the past years to improve the health care system and prioritize projects, grants and fellowships to tackle



emerging diseases. This is also fostered by Medical Schools in the country, which provide guidance for the hottest topics on health related research and mentor future health care professionals.

Given the sociopolitical challenges the country has recently faced, research productivity is following a steadily growth accompanied by a phase of adaption to new publishing culture through International collaborations. The well established strategic plan and solid infrastructure are the main explanatory factors for the advancements over the last years in research capacity for Qatar. Resilience towards changing trends in funding will continue to allow flexibility of the National research strategy with main aim to improve domestic R&D.

Acknowledgments

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