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MAPPING LIFE SCIENCES & BIOMEDICINE RESEARCH

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Abstract

Purpose: This study analyzes and highlights the research productivity and the trend in the top fields of *"Life sciences and Biomedicine"*.

Methods: The data were collected from Clarivate Analytic's *"Web of Science"* for a period of 10 years (2006-2016). The search was further refined to the top 10 fields in the field of *"Life Sciences and Biomedicine"*. The data were downloaded on the following parameters: *"author productivity"*, *"country contribution"*, *"organisational involvement"*, *"funding agencies"*, *"publication year"*, *"most preferred document type"* and *"language"*.

Findings: No consistent growth is observed in the research activities pertinent to the fields of *"Life sciences and Biomedicine"*. Among the studied fields, *"Neurosciences and Neurology"* is in lead with *"2016"* as the most productive year. Research in *"Life sciences and Biomedicine"* is quantitatively dominated by the *"USA"*, followed by the *"England"* and *"Japan"*. Authors have mostly reported their findings in the form of *"Research articles"* and **"English"** as a language of publication has remained a dominant medium of communication. Furthermore, it is also observed that *"National Institute of Health (NIH)"* and *"National Natural Science Foundation of China"* are the top funders across all the fields with *"Harvard University"*, *"Chinese Academy of Science" and "University Texas MD Anderson Cancer Centre"* as the leading organizations in terms of contribution.

Limitations: However, more research would have been published across other indexing and abstracting services, but the results of the study are confined to the data indexed by *"Web of Science"*.

Research implications: The study may serve as a summary of global research history on *"Life sciences and Biomedicine"* research and a potential basis for future research.

Keywords: Life science, Biomedicines, Bibliometrics, Research trend.

Introduction

The *"Life sciences or Biological sciences"* comprise the branches of science that involve the scientific study of life and organisms such as microorganisms, plants, and animals including human beings **(Wikipedia, 2018)**. *"Biomedicine"* is the branch of medicine that deals with the application of the *"Biological sciences"*, especially *"Biochemistry"*, *"Molecular Biology"*, and *"Genetics"*, to the understanding, treatment, and prevention of disease. **(New world dictionary, n.d)** Due to the research and developmental activities, the research output in *"Life sciences and Biomedicine"* field is increasing at an alarming rate. To analyze and highlight the research output in *"Life sciences and Biomedicine"*, *"Bibliometrics"* is applied which helps in the quantification and measurement of published literature that can be used to reveal publication trends and patterns

with the research being done in the different fields of *"Life sciences and Biomedicine"*. Fifty years earlier, Alan Pritchard had coined the term *"Bibliometrics"* in his 1969 paper on statistical bibliography. He defines *"Bibliometrics"* "the application of mathematics and statistical methods to books and other media of communication" **(Pritchard,1969)**.According to **(Broadus,1987)** the term "bibliometrics" was first used, so far as can be ascertained, in the Journal of Documentation, December 1969. **Fairthorne (2004)** said that it denoted "quantitative treatment of the properties of recorded discourse and behaviour appertaining to it". Whereas, **Boyce and Kraft (1985)** defined "Bibliometrics" as the quantitative study of written communication through its physical realization". In *"Bibliometrics"* the systematic measurement and analysis of research publications are used to study written communication. The *"Bibliometrics"* is used in synonym with *"Scientometrics"* where it is related to the measuring science related information process using metrics. In *"Bibliometric/Scientometric"* evaluation, information such as the number of publications and the facets in the publications such as author, subject, period and the number of citations received for publications are utilized **(Debackere and Glanzel,2004)**.**Cooper (2015)** is of view that after an article is published, how much influence does it have? How can you measure the article's impact? *"Bibliometrics"* is the answer. *"Bibliometrics"* can be used for Books, Websites, Monographs, Conference proceedings, policy statements, even Patents. In the health field, *"Bibliometrics"* are mostly used to measure the influence or impact of research articles. *"Bibliometric"* methods estimate how much influence or impact a selected research article has on future research.

Purpose of the study

Due to the research and developmental activities, the literature in all subject fields is increasing at an alarming rate. The present study is an endeavour to quantify the world scientific output in the field of *"Life sciences and Biomedicine"*. The purpose of the study is to analyze and highlight the research productivity and the trend with the research being done in the field of *"Life sciences and Biomedicine"* by analyzing various bibliometric parameters in the published literature.

Objectives

This study has been undertaken to identify and describe various bibliometric aspects of the top ten fields of *"Life sciences and Biomedicine"*.

1. Yearly distribution: -To determine annual publication trends.
2. Subject distribution: - To identify the top ten fields.
3. Author productivity: - To find out eminent authors.
4. Document type distribution: - Identification of the most used material i.e. articles, research report, book etc.
5. Language wise distribution of contribution: - To specify the languages in which the researchers communite their work.
6. Year wise distribution :- Identification of most productive year in terms of publication

7. Geographical distribution:- Identification of countries publishing most of the literature

8. Organization contribution:- To find out organizations contribution towards research in the respective field.

9. Agencies contribution: -To study different agencies contributing to research.

Methodology and Scope

The study examined top ten fields of "*Life Sciences and Biomedicine*" selected from the **Web of Science** (WOS) research area categorization. *Articles* published in "*Life Sciences and Biomedicine*" from 2006 to 2016 were retrieved from *SCI-EXPANDED* of WOS database on 08-Aug-2018. The total article count amounted to 6,063,757. Top 10 fields representing "*Life Sciences and Biomedicine*" were selected viz: "*Neurosciences and Neurology*" (947817; 15.6%), "*Biochemistry & Molecular Biology*" (927992; 15.3%), "*Oncology*" (721893; 12%), "*Surgery*" (659939; 11%), "*Cardiovascular system and Cardiology*" (635659; 10.5%) "*Pharmacology and Pharmacy*" (634663; 10.4%) "*General and Internal Medicine*" (610980; 10%) "*Environmental sciences and Ecology*" (564322; 9.3%) "*Microbiology*" (526797; 8.6%) and "*Cell Biology*" (469354; 7.7%) respectively.

The data were analyzed on the following parameters:

- Year wise distribution
- Document type
- Funding agencies
- Author productivity
- Country productivity
- Languages used
- Organizations carrying out research

Search strategy employed for data retrieval

Search strategy employed to retrieve data was: ***"SU= (Neurosciences and Neurology) Databases =SCI-EXPANDED Time span = 2006-2016".*** For other fields Neurosciences and Neurology were replaced by other specific field search term.

Data were downloaded from Web of Science in "*.txt*" format, and later on imported to MS Excel and organized for statistical purpose.

Review of Literature

The review of literature of the study will be discussed under the following sub-headings:

- Languages of publication
- Publication types used in research
- Geographical productivity
- Funding agencies & Organizations contribution.

Languages of publication

Baldauf and Jernudd (1983) analyzed use of language patterns related to communicating research information. They found that English language publications are significantly abstracted more quickly than non-English ones. They also reveal large proportion of English language articles were mainly due to the large number of authors from English speaking countries and by the use of English as a medium of communication by international organizations. **Chiu and Ho (2005)** conducted a bibliometric analysis of all homeopathy-related publications in Science Citation Index (SCI). They found English as a dominant language followed by German. B b.**Uzunboylu and Ozcinar (2009)** examined research and trends in computer-assisted language learning (CALL) published in selected professional documents. The study reveals that English was the most frequently used language**. Wang, Yu and Ho (2010)** presented a chronological survey of papers published in the journal titled Water Research. They found English is the predominant language for articles in Water research, followed by French and German.**Vioque, Ramos, Navarrete-Munoz and Garcia-De-La-Hera (2010)** describe a bibliometric review of the publications on obesity research in Pub Med. The study reveals that the predominant language is English followed by French, German, Spanish and Japanese.**Ma, SU, Yuan and Wu (2012)** analyzed data relating to the language of papers written by winners of Nobel Prizes in physics. They found the main languages used in the papers are English and German. **Gul, Nisa, Shah, Shah and Wani (2015)** evaluated global scientific output and observes the patterns in the scholarly literature published on Lavender and to specify the language priority. They reveal authors have preferred unilingual sources to communicate their work and authors have predominately preferred English over other languages to communicate their findings.**Tahim, Patel, Bridle and Holmes (2016)** analyzed and characterized the 100 most cited articles on oral sub mucous fibrosis (OSF). The study reveals that all the articles in the list are published in English.**Reddy, Irranna, Kumar and Parameshwar (2018)** analyzed the global scientific outputs on eBooks research using the Scopus database by

performing the Bibliometric analysis. Their findings reveal that the majority of the articles were published in English, followed by the Spanish, Chinese, Catalan, Persian, French and German.**Kumar, Amit and Hariprasad (2018)** identified and analyzed different trends in publication over time, with technological additions. They reveal Chinese was the most commonly used language in the publications, followed by Japanese.

Publication type

Uzunboylu and Ozcinar (2009) examined research and trends in computer-assisted language (CALL) published in selected professional documents. The study reveals that principal documents related to CALL published in the sources were articles**. Vioque, Ramos, Navarrete-Muñoz and García-De-La-Hera (2010)** describe a bibliometric review of the publications on obesity research in Pub Med. The study reveals   journal articles are the most frequently used document types followed by letters, editorials and news.**Wang, Yu and Ho (2010)** presented a chronological survey of papers published in the journal titled Water Research. They reveal articles are the most frequently used document type followed distantly by notes , reviews , editorial materials , letters , meeting abstracts , book reviews, corrections , addition corrections , discussions , proceedings papers , biographical-items , abstracts of published items and items about an individual .**Fu, Long and Ho (2014)** evaluated China's scientific output of chemical engineering in Science Citation Index Expanded in the Web of Science by performing a bibliometric analysis. The study shows that articles are the most used document type followed by proceedings paper review, editorial materials, corrections, letters, notes, biographical items, news items, meeting abstracts, addition correction and book chapter.**Chiu and Ho (2005)** conducted a bibliometric analysis of all homeopathy-related publications in Science Citation Index (SCI).They reveal top 3 ranking countries of publication were the UK, the US, and Germany. **Chiu and Ho (2007)** performed a bibliometric analysis of all tsunami related publications in the Science Citation Index (SCI). The study reveals articles are most frequently used documents followed by reviews, editorial materials, meeting abstracts, biographical items, book reviews and correction additions.**Gul, Nisa, Shah, Shah and Wani (2015**) evaluated the global scientific output and observed the patterns in the scholarly literature published on Lavender and identify different types of sources used and the types of publications. They found authors have mostly reported their findings in the form of research articles.**Tchuifon, Zhen and Shan (2017)** analyzed the document type, language, trend and collaborations, as well as the output of different subject categories and characterize the Cameroon research performance. The study reveals articles were more frequent than other types of publication and they were mostly in English.**Boamah and Ho (2017)** analyzed the Ghanaian

contribution to knowledge captured in the Thomson Reuters Science Citation Index Expanded (SCI-EXPANDED) database. They reveal articles are the most-frequently used document type, followed by meeting abstracts, editorial materials, reviews, proceedings papers and notes. **Heriberto, Alaitz, Ricardo and Eduardo (2018)** identified the global research trends related to pavement management area. Their findings reveal that according to the document-type distribution, articles and conference papers have almost the same contribution.

Geographical productivity

Vioque, Ramos, Navarrete-Muñoz, and García-De-La-Hera (2010) describe a bibliometric review of the publications on obesity research in Pub Med. The study reveals that the USA is most productive country followed by the United Kingdom, Japan, Italy and France.**Ji, Pang and Zhao (2014)** applied bibliometric analysis to evaluate Antarctic research based on the Science Citation Index database. The study shows that the USA is the leading contributor to global Antarctic research with largest quantity of articles and high citations.**Haunschild, Bornmann and Marx (2016)** carried a bibliometric study of a large publication set dealing with research on climate change. The study shows that research on climate change is quantitatively dominated by the USA, followed by the UK, Germany, and Canada.**Liu, Yu, Chen, Hong, Jin and Yang (2018)** analyzed the scientific research progress on human fatigue assessment (HFA) by using a bibliometric method. They reveal the United States produced most publications, followed by England and Canada. **Van, Nunen, Reniers and Ponned (2017)** carried out a bibliometric analysis on the field of safety culture to identify fundamental influences, to obtain a structured overview of the characteristics and the developments in this research domain. The study reveals that the USA, England and China are the countries that dominate the publication production in safety culture. **Chiu and Ho (2007)** performed a bibliometric analysis of all tsunami related publications in the Science Citation Index (SCI). They reveal the USA and Japan produced most of the publications.**Dabi, Darrigues, Katsahian, Azoulay, De Antonio and Lazzati (2016)** carried out Bibliometric analysis of scientific publications in bariatric surgery. The study reveals that the USA produces highest number of publications followed by UK and Italy.**Tahim, Patel, Bridle and Holmes (2016)** identified and characterized the 100 most cited articles on Oral Submucous Fibrosis (OSF). The study reveals India has the largest number of publications, Taiwan and United Kingdom are the second most productive countries, followed by the USA.**Lai, Liu, Xue, He and Qiu (2017)** identified and characterized the most frequently cited articles that have been published on aortic dissection. They found USA is the top contributor of articles, followed by Germany, Japan, France and Italy.**Li, Wu and Wu (2017)** performed a bibliometric analyses to

evaluate global scientific documents of research on haze. The study reveals that the publications on haze research were primarily originated from the USA, China, Germany, and France. **Boamah and Ho (2017)** analyzed the Ghanaian contribution to knowledge captured in the Thomson Reuters Science Citation Index Expanded (SCI-EXPANDED) database. They found most productive countries according to the number of published articles in collaboration with Ghanaian researchers are the USA and the UK. **Heriberto, Alaitz, Ricardo and Eduardo (2018)** identified the global research trends related to pavement management area. They found most productive countries are the United States, followed by Canada and China. **Reddy, Irranna, Kumar and Parameshwar (2018)** analyzed the global scientific outputs on eBooks research using Scopus database by performing the bibliometric analysis. They found that the USA and the UK are the most productive countries.

Funding agencies & Organization contribution

Walentas, Shineman, Horton, Boeve, and Fillit, (2011) analyzed global research funding for the frontotemporal dementias: 1998–2008. The study revealed that majority of the funding (89%) was from the United States while as Foreign entities, including foundations and public agencies from seven countries and the European Union, contributed 11% toward FTD research. Moreover, among funding agencies 83% of total funding came from NIH. **Masoud, Azam, Nader and Jit (2016)** evaluated the trend of RFID technology development based on academic publications from 2001-2014. Both bibliometric and content analyses were applied to examine this topic. They found National Natural Science Foundation of China is ranked as a top funding agency which is followed by National Science Council, Taiwan and European Commission. **Park, Kim, Kim, Kim, Yoon and Bae (2017)** analyzed the top 100 cited articles in Neurology Journals and 100 most influential articles for the Clinical Practices of Neurologists by performing a bibliometric analysis. The study revealed that in Neurology Journals the institutions associated with the largest number of citation classics were from Johns Hopkins University School of Medicine, UCLA School of Medicine, Beth Israel Hospital , and Boston University in the USA while as in Clinical Practices of Neurologists, the institution associated with the largest number of citation classics was from Western General Hospital in the UK, followed by Columbia University in the USA , and University of Heidelberg in Germany. **Hee and Sun (2018)** analyzed the bibliometric characteristics of publications from North Korea indexed in the Web of Science Core Collection. They reveal funding agencies were mostly from China. **Mehmet and Erdal (2018)** conducted a multi-dimensional citation analysis of the top 100 cited articles in traumatology. They found that 70 of the top 100 cited articles were supported

by funding agencies in developed countries. **Anushka, Sachin and Vikram (2015)** described the public health research output in India, its focus and distribution, and the actors involved in the research system. They reveal majority of funders were located in the UK or USA. **Huang and Huang (2018)** analyzed journal articles published by authors from the G9 countries (Canada, China, France, Germany, Italy, Japan, Russia, the United Kingdom, and the United States) to identify the distribution of research funding and funding agencies in these countries. The results suggest core funding agencies in China and Russia are NSFC and Russian Foundation for Basic Research (RFBR) respectively, exhibiting a funded paper ratio of approximately 60% while as the NIH and NSF were both found to be not only the top two funding agencies in the United States, but also one of the primary research funding sources in Canada and Italy; the NSF ranked third among funding agencies in Italy, while the NIH ranked third in Canada. Moreover, the results also suggest the existence of leading funding agencies in the fields of life sciences, engineering, and clinical medicine, the NIH in life sciences and clinical medicine, and the NSFC in engineering; each funding agency accounted for approximately 30% of funded papers in the three fields. In addition, the top three funding agencies in each subject field were mostly agencies located within the United States or China; the exceptions were the EU which ranked third in humanities, and the CIHR which ranked third in clinical medicine.**Dokur and Uysal (2018)** performed bibliometric analysis on top 100 cited articles in traumatology. The study revealed that the most common listed institution or organization was the University of California (USA), and it was listed 34 times in the top 100 cited articles. Moreover, the funding agencies that supported scientific studies are NINDS NIH HHS, NIGMS NIH HHS and PHS HHS.

Data analysis and interpretation

Top ten fields of Life science and Biomedicine

"Life sciences and Biomedicine" consists of 75 fields. Among the top 10 fields *"Neurosciences and Neurology"* leads with 947817 contributions followed by *"Molecular Biology"* (927992) and *"Oncology"* (721893). However, a good number of contributions are in the field of *"Surgery","Cardiovascular system and Cardiology","Pharmacology and Pharmacy"* and *"General and Internal Medicine",* while as a meager score of contributions are from *"Environmental Science and Ecology","Microbiology"* and *"Cell Biology"***(Fig1**)

Fig 1:Shows the top ten fields of Life science and Biomedicine.
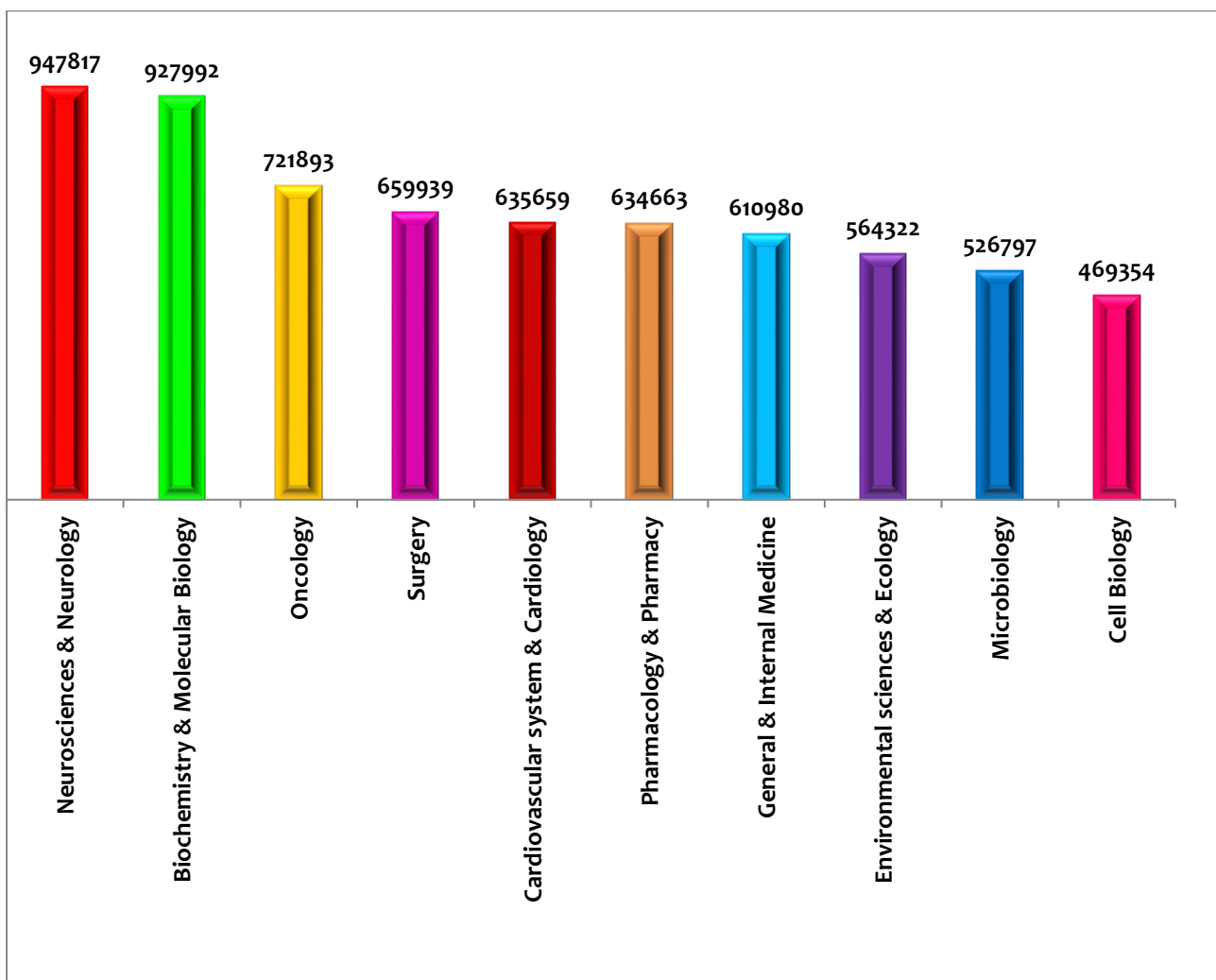
Authors Productivity

"*Wang y*" leads in the field of"*Neurosciences and Neurology*" (2059; 0.22%) followed by "*ComiG*" (1845;0.20%) and "*Zhang Y*"(1653;0.17%). "*Zhang Y*" leads in the field of "*Biochemistry and Molecular Biology*" (3868;0.42%) followed by "*Wang Y*"(3566;0.38%)and "*Li Y*"(3057;0.33%).In the field of "*Oncology*", "*Wang Y*"(2963;41%) is in lead followed by "*Zhang Y*"(2858;0.40%) and "*Wang J*"(2766; 0.38%). In "*Surgery*," largest number of records are published by "*Lee JH*" (1176;0.18%) followed by "*Kim JH*"(1107;0.17%) and "*Wang Y*" (1053;0.16%).In "*Cardiovascular system and Cardiology*","*Stefanadis C*" (2442;0.38%) leads the list followed by "*Tousoulis D*"(1952;0.23%) and "*Zhang Y*" (1442;0.23%). "*Wang Y*"(2209;0.35%) is in lead in the field of "*Pharmacology and Pharmacy*" followed by "*Li J*" (2193;0.35%) and "*Zhang Y*" (2188;0.35%). In the field of "*General and Internal Medicine*", "Dyer C" (1230;0.20%) is in lead followed by "*Kmietowicz Z*"(957;0.16%) and "*Wang Y*"(953;0.16%).In the field of "*Environmental Sciences and Ecology*", "*Zhang Y*"(1472;0.26%) is the most productive author followed by "*Wang Y*" (1329;0.24%) and "*Li Y*"(1219;0.22%). In the field of "*Microbiology*", "*Zhang Y*" (1903; 0.36%) leads the list followed by "*Wang Y*" (1877; 0.36%) and "*Li Y*" (1673; 0.32%) while as in the field of "*Cell Biology*""*Zhang Y*" (2232; 0.48%) is in lead followed by "*Wang Y* (*1976; 0.42%) and "*Liu Y*" (1657; .35%) respectively.

Table 1: Shows the top five authors of the disciplines.

Serial No.	Field	Author	Record	Serial No.	Field	Author	Record
1.	**Neurosciences And Neurology**	WANG Y	2059 (0.22%)	6.	**Pharmacology and Pharmacy**	WANG Y	2209 (0.35%)
		COMI G	1845 (0.20%)			LI J	2193 (0.35%)
		ZHANG Y	1653 (0.17%)			ZHANG Y	2188 (0.35%)
		WANG J	1599 (0.16%))			LI Y	1906 (0.3%)
		LI J	1359 (0.14%)			LIU Y	1820 (0.29%)
2.	**Biochemistry And Molecular Biology**	ZHANG Y	3868 (0.42%)	7.	**General And Internal Medicine**	DYER C	1230 (0.20%)
		WANG Y	3566 (0.38%)			KMIETOWICZ Z	957 (0.16%)
		LI Y	3057 (0.33%))			WANG Y	953 (0.16%)
		LIU Y	2933 (0.32%)			ZHANG Y	791 (0.13%)
		WANG J	2829 (0.31%)			MCCARTHY M	788 (0.13%)

No.	Field	Author	Citations	No.	Field	Author	Citations
3.	**Oncology**	WANG Y	2963 (0.41%)	8.	**Environmental Sciences & Ecology**	ZHANG Y	1472 (0.26%)
		ZHANG Y	2858 (0.40%)			WANG Y	1329 (0.24%)
		WANG J	2766 (0.38%)			LI Y	1219 (0.22%)
		LI J	2467 (0.34%)			LIU Y	1174 (0.21%)
		WANG L	2404 (0.33%)			LI J	1173 (0.21%)
4.	**Surgery**	LEE JH	1176 (0.18%)	9.	**Microbiology**	ZHANG Y	1903 (0.36%)
		KIM JH	1107 (0.17%)			WANG Y	1877 (0.36%)
		WANG Y	1053 (0.16%)			LI Y	1673 (0.32%)
		KIM SH	1025 (0.16%)			LIU Y	1486 (0.28%)
		KIM J	973 (0.15%)			LI J	1468 (0.28%)
5.	**Cardiovascular system and Cardiology**	STEFANADIS C	2442 (0.38%)	10.	**Cell Biology**	ZHANG Y	2232 (0.48%)
		TOUSOULIS D	1952 (0.23%)			WANG Y	1976 (0.42%)
		ZHANG Y	1442 (0.23%)			LIU Y	1657 (0.35%)
		SERRUYS PW	1414 (0.22%)			LI Y	1601 (0.34%)
		PARK SJ	1305 (0.21%)			WANG J	1541 (0.33%)

Document Types

"Articles" (3924849) lead other types of documents followed by *"Meeting abstract"* (1560620), *"Review"* (430120), *"Editorial material"* (414092) and *"Letter"* (232102) respectively. However, the *"Proceedings paper"* (123175), *"News item"* (60791), *"Correction"* (55772), *"Book chapter"* (19147) and "*Bibliographical item*" (15934) also constitute an adequate number of records, while as "*Book Review", "Reprint"* and other document   types constitute a minimal amount **(Table 2)**. **Chiu and Ho (2007)** also reveal articles are most frequently used documents followed by reviews, editorial materials, meeting abstracts, biographical items, book reviews and correction additions in tsunami research. **Wang, Yu and Ho (2010)** highlight articles are the most frequently used document type followed distantly by notes , reviews , editorial materials , letters , meeting abstracts , book reviews, corrections , addition corrections , discussions , proceedings papers , biographical-items , abstracts of published items and items about an individual in Water research. **Fu, Long and Ho (2014)** show that articles are the most used document type followed by proceedings paper review, editorial materials, corrections, letters, notes, biographical items, news items, meeting abstracts, addition correction and book chapter in China's scientific output of chemical engineering in Science Citation Index Expanded.

Table 2 shows document types used for communicating research

DOCUMENT TYPE	NEURO-SCIENCE AND NEUROLOGY	BIO-CHEM AND MOL-BIOLOGY	ONCOLOGY	SURGERY	CARDIO-VASCULAR SYSTEM & CARDIOLOGY	PHARMA-COLOGY & PHARMACY	GENERAL AND INTERNAL MEDICINE	ENVIRONMENT SCIENCE & ECOLOGY	MICRO-BIOLOGY	CELL BIOLOGY	Total
ARTICLE	504567 (12.86%)	643049 (16.38%)	321871 (8.2%)	406453 (10.36%)	246888 (6.29%)	396946 (10.11%)	239269 (6.10%)	508675 (12.96%)	408069 (10.40%)	249062 (6.35%)	3924849
MEETING ABSTRACT	284190 (18.21%)	164378 (10.53%)	298856 (19.15%)	107806 (6.91%)	260516 (16.69%)	123772 (7.93%)	132217 (8.47%)	3422 (0.22%)	44617 (2.86%)	140846 (9.03%)	1560620
REVIEW	61450 (14.29%)	72291 (16.80%)	41596 (9.67%)	28013 (6.15%)	25744 (5.99%)	69659 (16.20%)	38725 (9.00%)	18637 (4.33%)	35736 (8.30%)	38269 (8.90%)	430120
EDITORIAL MATERIAL	55245 (13.34%)	28919 (6.98%)	27180 (6.56%)	64090 (15.48%)	59925 (14.47%)	21901 (5.29%)	93362 (22.55%)	18224 (4.40%)	17384 (4.20%)	27862 (6.73%)	414092
LETTER	30348 (13.08%)	3928 (1.69%)	20060 (8.64%)	45137 (19.45%)	35978 (15.50%)	10983 (4.73%)	68557 (29.54%)	4151 (1.79%)	8916 (3.84%)	4044 (1.74%)	232102
PROCEEDINGS PAPER	11358 (9.22%)	18462 (14.99%)	7796 (6.33%)	32016 (25.99%)	10391 (8.44%)	7005 (5.69%)	5855 (4.75%)	16455 (13.36%)	10216 (8.29%)	3621 (2.94%)	123175
CORRECTION	6888 (12.35%)	8607 (15.43%)	5240 (9.39%)	4788 (8.58%)	4254 (7.62%)	4871 (8.73%)	7448 (13.35%)	4152 (7.44%)	4839 (8.68%)	4685 (8.40%)	55772
BOOK CHAPTER	2552 (13.33%)	7624 (39.82%)	1072 (5.60%)	12 (0.06%)	42 (0.22%)	960 (5.01%)	280 (1.46%)	1145 (5.98%)	2353 (12.29%)	3107 (6.23%)	19147
BIOGRAPHICAL ITEM	2169 (13.61%)	1166 (7.31%)	595 (3.73%)	1936 (12.15%)	1078 (6.77%)	669 (4.20%)	6332 (39.74%)	797 (5.00%)	545 (3.42%)	647 (4.06%)	15934
NEWS ITEM	1946 (3.20%)	5406 (8.89%)	6105 (10.04%)	1197 (1.97%)	1151 (1.89%)	5589 (9.19%)	23706 (38.99%)	5285 (8.69%)	6593 (10.85%)	3813 (6.27%)	60791

BOOK REVIEW	674 (30.20%)	15 (0.67%)	237 (10.62%)	42 (1.88%)	10 (0.44%)	35 (1.57%)	275 (12.32)	861 (38.58%)	78 (3.49%)	5 (0.22%)	2232
REPRINT	260 (11.64%)	108 (4.83%)	42 (1.88%)	416 (18.63%)	86 (3.85%)	132 (5.91%)	1046 (46.84%)	46 (2.06%)	54 (2.82%)	43 (1.93%)	2233
RETRACTED PUBLICATION	179 (9.74%)	350 (19.05%)	395 (21.50%)	136 (7.40%)	86 (4.68%)	161 (8.76%)	87 (4.74%)	106 (5.77%)	108 (5.87%)	229 (12.47%)	1837
RETRACTION	47 (11.90%)	72 (18.23%)	93 (23.54%)	20 (5.06%)	5 (1.27%)	41 (10.38%)	19 (4.81%)	31 (7.85%)	22 (5.57%)	45 (11.39%)	395
BIBLIOGRAPHY	20 (13.60%)	7 (4.76%)	9 (6.12%)	29 (19.73%)	12 (8.16%)	14 (9.52%)	18 (12.24%)	6 (4.08%)	4 (2.72%)	28 (19.04%)	147
HARDWARE REVIEW	6 (28.57%)	3 (14.29%)	3 (14.29%)	1 (4.76%)	0 (0%)	3 (14.29%)	1 (4.76%)	1 (4.76%)	2 (9.52%)	1 (4.76%)	21
MAIN CITE	3 (50%)	1 (16.67%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (16.67%)	1 (16.67%)	0 (0%)	6
SOFTWARE REVIEW	3 (3.53%)	15 (17.65%)	4 (4.70%)	8 (9.41%)	1 (1.18%)	17 (20%)	1 (1.18%)	32 (37.65%)	4 (4.70%)	0 (0%)	85
EARLY ACCESS	1 (50%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (50%)	0 (0%)	0 (0%)	0 (0%)	2
MUSIC SCORE	1 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1
DATABASE REVIEW	0 (0%)	25 (32.89%)	1 (1.32%)	0 (0%)	8 (10.53%)	1 (1.32%)	1 (1.32%)	2 (2.63%)	38 (50%)	0 (0%)	76
DATA PAPER	0 (0%)	2 (6.06%)	16 (48.48%)	0 (0%)	1 (3.03%)	0 (0%)	0 (0%)	6 (18.18%)	8 (24.24)	0 (0%)	33
MEETING SUMMARY	0 (0%)	1 (9.09%)	1 (9.09%)	3 (27.27%)	2 (18.18%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	4 (36.36%)	11
EXCERPT	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1
ABSTRACT OF PUBLISHED ITEMS	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (100%)	0 (0%)	0 (0%)	1
BOOK	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (50%)	1 (50%)	0 (0%)	0 (0%)	2
FICTION CREATIVE PROSE	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (100%)	0 (0%)	0 (0%)	0 (0%)	1
TV REVIEW RADIO REVIEW	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (100%)	0 (0%)	0 (0%)	0 (0%)	1
POETRY	0 (0%)	1 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1

Yearly Distribution

2016 is the dominating year in the field of *"Neurosciences & Neurology"* (102547), "Oncology"(90490), *"General & Internal Medicine"* (70172), *"Pharmacology and Pharmacy"* (63389) *"Environmental Sciences & Ecology"* (69760), and *"Cell Biology" (*54036) respectively. However, the year 2015 leads in *"Microbiology"* (55498) while as 2014 in *"Surgery" (*68813), 2013 in *"Cardiovascular & Cardiology"* (68098) and 2012 in *"Biochemistry & Molecular Biology"* (88743).

Table 3: shows the yearly productivity of disciplines

Publication Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Total records
Neuroscience & Neurology	77262 (8.16%)	75385 (7.96%)	78970 (8.34%)	84190 (8.89%)	81797 (8.63%)	83645 (8.83%)	88267 (9.32%)	91252 (9.63%)	92929 (9.81%)	91563 (9.66%)	102547 (10.82%)	947807
Biochemistry & Molecular Biology	79469 (8.57%)	80198 (8.65%)	82119 (8.85%)	82828 (8.93%)	82923 (8.94%)	85693 (9.24%)	88743 (9.57%)	88132 (9.50%)	86398 (9.32%)	86170 (9.29%)	85319 (9.20%)	927992
Oncology	44417 (6.16%)	46181 (6.40%)	52768 (7.31%)	60947 (8.45%)	60537 (8.39%)	64048 (8.8%)	69866 (9.68%)	70034 (9.71%)	77682 (10.77%)	84910 (11.77%)	90490 (12.54%)	721880
Surgery	42973 (6.52%)	50939 (7.72%)	52707 (7.99%)	56155 (8.51%)	59328 (8.99%)	61578 (9.34%)	64632 (9.80%)	66874 (10.14%)	68813 (10.43%)	68321 (10.36%)	67569 (10.24%)	659889
Cardiovascular system & Cardiology	48407 (7.62%)	48975 (7.71%)	51544 (8.11%)	53299 (8.39%)	55644 (8.76%)	57692 (9.08%)	55342 (8.71%)	68098 (10.72%)	63518 (9.99%)	65689 (10.34%)	67443 (10.62%)	635651
Pharmacology & Pharmacy	49009 (7.73%)	50148 (7.91%)	54072 (8.53%)	54394 (8.58%)	55637 (8.77%)	59926 (9.45%)	60400 (9.52%)	63092 (9.95%)	61619 (9.71%)	62925 (9.92%)	63389 (9.99%)	634611
General & Internal Medicine	39394 (6.45%)	43313 (7.09%)	44517 (7.29%)	54134 (8.87%)	55128 (9.02%)	57996 (9.50%)	55887 (9.15%)	63712 (10.43%)	62782 (10.28%)	63929 (10.47%)	70172 (11.49%)	610964
Environmental Science & Ecology	37286 (6.61%)	40172 (7.12%)	42327 (7.50%)	45648 (8.08%)	46117 (8.18%)	50854 (9.01%)	52565 (9.32%)	56505 (10.02%)	59229 (10.50%)	63861 (11.32%)	69760 (12.37%)	564324
Microbiology	36464 (6.93%)	40640 (7.72%)	42604 (8.09%)	45507 (8.64%)	46088 (8.75%)	49027 (9.31%)	50697 (9.63%)	51947 (9.86%)	54680 (10.38%)	55498 (10.54%)	53734 (10.20%)	526886
Cell Biology	37625 (8.01%)	37918 (8.08%)	41404 (8.83%)	35947 (7.66%)	39104 (8.34%)	40959 (8.73%)	45203 (9.64%)	43666 (9.31%)	43901 (9.36%)	49583 (10.57%)	54036 (11.52%)	469346

Geographical distribution

"*USA*" is the leading country in all fields followed by the " *Peoples of China*" in the fields of *"Biochemistry* and *Molecular Biology"*(105912; 11.413%), "*Oncology*"(69825; 9.672%),*"Pharmacology and Pharmacy*"(68196; 10.746%), "*Environmental Sciences* and *Ecology"(71472; 12.665%)*, "*Microbiology*" (63635; 12.075%),and "*Cell Biology*" (44027; 9.38%) while as *"England"* in the field of " *Surgery*"(52063; 7.889%),*"General and Internal Medicine*"(54632;8.942%), and "*Japan"* in the field of "*Cardiovascular system and Cardiology*"(51374; 8.082%).**Haunschild, Bornmann and Marx (2016)** show that research on climate change is quantitatively dominated by the USA, followed by the UK, Germany, and Canada**. Liu, Yu, Chen, Hong, Jin and Yang (2018)** also reveal that the United States produced most publications, followed by England and Canada in scientific research progress on human fatigue assessment. **Van, Nunen, Reniers and Ponned (2017)** reveal that the USA, England and China are the countries that dominate the publication production in safety culture.

Table 4 shows geographical distribution of publications

S.NO	FIELDS &TOTAL RECORDS RETRIEVED	Countries	RECORDS & %	S.NO	FIELDS & TOTAL RECORDS RETRIEVED	COUNTRIES	RECORDS & %
01	NEUROSCIENCES & NEUROLOGY (947817)	U.S.A	329456; 34.76%	O6	PHARMACOLOGY & PHARAMACY (634633)	U.S.A	170083; 26.8%
		Germany	82059; 8.658%			P.R.C	68196; 10.746%
		England	70891; 7.479%			Japan	51074; 8.048%
		Japan	60626; 6.396%			Germany	40472; 6.377%
		Canada	54963; 5.799%			England	38346; 6.402%
02	BIOCHEMISTRY & MOLECULAR BIOLOGY (927992)	U.S.A	331504; 35.723%	07	GENERAL AND INTERNAL MEDICINE (610980)	U.S.A	193847; 31.727%
		P.R.C	105912; 11.413%			England	54632; 8.942%
		Germany	70942; 7.645%			Australia	28719; 4.7%

		Japan	65983; 7.11%			Germany	28405; 4.649%
		England	54936; 5.92%			Canada	25829; 4.227%
03	ONCOLOGY (721893)	U.S.A	262990; 36.431%	O8	ENVIRONMENTAL SCIENCES AND ECOLOGY (564324)	U.S.A	162635; 28.819%
		P.R.C	69825; 9.672%			P.R.C	71472; 12.665%
		Germany	55164; 7.642%			England	38501; 6.822%
		Japan	49520; 6.86%			Canada	36410; 6.452%
		Italy	47798; 6.621%			Germany	35729; 6.331%
04	SURGERY (659939)	U.S.A	212043; 32.131%	09	MICROBIOLOGY (526902)	U.S.A	138100; 26.205%
		England	52063; 7.889%			P.R.C	63635; 12.075%
		Japan	44370; 6.723%			Germany	39620; 7.518%
		Germany	43363; 6.571%			Japan	33164; 6.293%
		Italy	31133; 4.718%			England	30315; 5.752%
05	CARDIOVASC-ULAR SYSTEM & CARDIOLOGY (635659)	U.S.A	203731; 32.05%	10	CELL BIOLOGY (469354)	U.S.A	210868; 44.927%
		Japan	51374; 8.082%			P.R.C	44027; 9.38%
		Germany	49466; 7.782%			Germany	35806; 7.629%
		Italy	43919; 6.909%			Japan	31282; 6.665%
		England	43338; 6.818%			England	29015; 6.182%

Organizational contribution.

"Harvard University" leads in *"Neurosciences and Neurology"* (17087;1.803%),*"Surgery"* (8728; 1.323%), *"Cardiovascular system & Cardiology"* (11050; 1.738%),*"General & Internal Medicine"* (10386; 1.7%) and *"Cell Biology"* (10682;2.276%) respectively. However, *"Chinese Academy of Science"* leads in field of *"Biochemistry & Molecular Biology"* (14302; 1.5415%), *"Pharmacy & Pharmacology"* (6364; 1.003%) ,*"Environmental Sciences & Ecology"* (19783; 3.506%) and *"Microbiology"* (8418; 1.598%) while as *"University Texas MD Anderson Cancer Centre"* (19463; 2.696%) leads in *"Oncology"*.

Table 5: shows the contribution of top five organizations in the disciplines.

S.NO	Fields & Records Retrieved	Organisations	Records	%age	S.NO	Fields & Records Retrieved	Organisations	Records	%age
01	Neurosciences & Neurology (947817)	HARVARD UNIV	17087	1.803%	06	Pharmacology & Pharmacy (634663)	CHINESE ACAD SCI	6364	1.003%
		UNIV TORONTO	11827	1.248%			HARVARD UNIV	4759	0.75%
		UNIVERSITY COLLEGE LONDON	10339	1.091%			UNIV SAO PAULO	3716	0.586%
		UNIV CALIF LOS ANGELES	10183	1.074%			UNIV N CAROLINA	3636	0.573%
		UNIV CALIF SAN FRANCISCO	10104	1.803%			SEOUL NATL UNIV	3590	0.566%
02	Biochemistry & Molecular Biology (927992)	CHINESE ACAD SCI	14302	1.5415%	07	General & Internal Medicine (610980)	HARVARD UNIV	10386	1.7%
		HARVARD UNIV	13132	1.415%			UNIV CALIF SAN FRANCISCO	6663	1.091%
		RUSSIAN ACAD SCI	9014	0.971%			UNIV TORONTO	6501	1.064%
		CENTRE NATIONAL DE LA RECHER RCHE SCIENTIFIQUE	7603	0.819%			UNIV WASHINGTON	6448	1.055%
		UNIV TOKYO	7444	0.802%			UNIV PITTSBURGH	5950	0.974%
03	Oncology (721893)	UNIV TEXAS MD ANDERSON CANC CTR	19463	2.696%	08	Environmental Sciences & Ecology (564322)	CHINESE ACAD SCI	19783	3.506%
		MEM SLOAN KETTERING CANC CTR	13701	1.898%			US GEOL SURVEY	5884	1.043%
		NIH NATIONAL CANCER INSTITUTE	11974	1.658%			CONSEJO SUPERIOR DE INVESTIGACIOUS CIENTIFICAS	5154	0.913%
		HARVARD UNIV	11664	1.615%			UNITED STATES ENVIRONMENTAL PROTECTION AGENCY	4830	0.856%
		DANA FARBER CANC INST	9352	1.295%			UNIV CALIF DAVIS	4790	0.849%
04	Surgery (659939)	HARVARD UNIV	8728	1.323%	09	Microbiology (526902)	CHINESE ACAD SCI	8418	1.598%
		UNIV PITTSBURGH	6765	1.025%			HARVARD UNIV	4961	0.942%

S.NO	Field	Institution	Records	%	S.NO	Field	Institution	Records	%
		MAYO CLIN	6621	1.003%			UNIV WASHINGTON	3451	0.655%
		UNIV SAO PAULO	6144	0.931%			ZHEJIANG UNIV	3358	0.637%
		UNIV MICHIGAN	5644	0.855%			CENTRE NATIONAL DE LA RECHE RCHE SCIENTIFIQUE	3316	0.629%
05	Cardiovascular System & Cardiology (635659)	HARVARD UNIV	11050	1.738%	10	Cell Biology (469354)	HARVARD UNIV	10682	2.276%
		MAYO CLIN	8919	1.403%			UNIV CALIF SAN DIEGO	4973	1.06%
		BRIGHAM WOMENS HOSP	6795	1.069%			UNIV PENN	4375	0.932%
		DUKE UNIV	6596	1.038%			UNIV CALIF SAN FRANCISCO	4340	0.925%
		COLUMBIA UNIV	6556	1.031%			CHINESE ACAD SCI	4245	0.904%

Funding Agencies.

"National Institute of Health (NIH)" is the leading funding agency in *"Neurosciences and Neurology"* (38673; (4.08%)), *"Biochemistry and Molecular Biology"* (63665; 6.86%), *"Surgery"* (5135; 0.778%), *"Cardiovascular System and Cardiology"* (13587; 2.137%), *"General and Internal Medicine"* (5574; 0.912%) and *"Cell Biology"* (34802; 7.415%) respectively. However, *"National Natural Science Foundation of China"* leads *"Pharmacology and Pharmacy"* (17441; 2.748%), *"Environmental Sciences and Ecology"* (24571; 4.354%) and *"Microbiology"* (19392; 3.68%) while as *"National Cancer Institute"*, *"National Institute of Health"* and *"Human & Health Services"* collaboratively leads in *"Oncology"* (18173; 2.158%). **Masoud, Azam, Nader and Jit (2016)** reveal that National Natural Science Foundation of China is ranked as a top funding agency followed by National Science Council, Taiwan and European Commission. **Walentas, Shineman, Horton, Boeve, and Fillit, (2011)** revealed that among funding agencies 83% of total funding came from NIH in global research for the frontotemporal dementias.

Table 6 provides a vivid picture of Top 5 Research funders across the disciplines.

S.NO	FIELDS &TOTAL RECORDS RETRIEVED	FUNDING AGENCIES	RECORDS & %	S.NO	FIELDS & TOTAL RECORDS RETRIEVED	FUNDING AGENCIES	RECORDS & %
01	NEUROSCIENCES & NEUROLOGY (947817)	NATIONAL INSTITUTE OF HEALTH	38673 (4.08%)	O6	PHARMACOLOGY & PHARAMACY (634633)	NATIONAL NATURAL SCIENCE FOUNDATION OF CHINA	17441(2.748%)
		MEDICAL	13188(1.391%)			NATIONAL	15585(2.546%)

		RESEARCH COUNCIL				INSTITUTE OF HEALTH	
		NINDS NIH HHS	12984 (1.37%)			MEDICAL RESEARCH COUNCIL	3183 (0.502%)
		NATIONAL NATURAL SCIENCE FOUNDATION OF CHINA	11239(1.186%)			PFIZER	3071 (0.484%)
		WELLCOME TRUST	7759 (0.819%)			CNPQ	2776 (0.37%)
02	BIOCHEMISTRY & MOLECULAR BIOLOGY (927992)	NATIONAL INSTITUTES OF HEALTH	63665 (6.86%)	07	GENERAL AND INTERNAL MEDICINE (610980)	NATIONAL INSTITUTES OF HEALTH	5574 (0.912%)
		NATIONAL NATURAL SCIENCE FOUNDATION OF CHINA	32248(3.475%)			MEDICAL RESEARCH COUNCIL	4466 (0.731%)
		NIGMS NIH HHS	15329(1.652%)			NATIONAL INSTITUTE FOR HEALTH RESEARCH	40830(0.668%)
		NATIONAL SCIENCE FOUNDATION	11655(1.256%)			NATIONAL NATURAL SCIENCE FOUNDATION OF CHINA	3005 (0.492%)
		MEDICAL RESEARCH COUNCIL	10719(1.115%)			NHLBI NIH HHS	2668 (0.437%)
03	ONCOLOGY (721893)	NCI NIH HHS	18173(2.158%)	O8	ENVIRONMENTAL SCIENCES AND ECOLOGY (564324)	NATIONAL NATURAL SCIENCE FOUNDATION OF CHINA	24571(4.354%)
		NATIONAL NATURAL	16162(2.239%)			NATIONAL SCIENCE	18991(3.365%)

No.	Category	Funder	Count	No.	Category	Funder	Count
		SCIENCE FOUNDATION OF CHINA				FOUNDATION	
		NATIONAL CANCER INSTITUTE	7544 (1.045%)			NATURAL ENVIRONMENT RESEARCH COUNCIL	8747 (1.55%)
		NATIONAL INSTITUTES OF HEALTH	17115(0.828%)			AUSTRALIAN RESEARCH COUNCIL	3664 (0.649%)
		CANCER RESEARCH UK	4916 (0.681%)			EUROPEAN UNION	3083 (0.546%)
04	SURGERY (659939)	NATIONAL INSTITUTES OF HEALTH	5135 (0.778%)	09	MICROBIOLOGY (526902)	NATIONAL NATURAL SCIENCE FOUNDATION OF CHINA	19392 (3.68%)
		NATIONAL NATURAL SCIENCE FOUNDATION OF CHINA	3383 (0.513%)			NATIONAL INSTITUTES OF HEALTH	18221(3.548%)
		NCI NIH HHS	2293 (0.347%)			NATIONAL SCIENCE FOUNDATION	7290 (1.383%)
		NATIONAL INSTITUTE FOR HEALTH RESEARCH	1751 (0.265%)			NIAID NIH HHS	5332 (1.012%)
		NATIONAL HEART, LUNG, AND BLOOD INSTITUTE (NHLBI) - NIH HHS	1664 (0.52%)			WELLCOME TRUST	4208 (0.799%)
05	CARDIOVASC-ULAR SYSTEM & CARDIOLOGY (635659)	NATIONAL INSTITUTES OF HEALTH	13587(2.137%)	10	CELL BIOLOGY (469354)	NATIONAL INSTITUTE OF HEALTH	34802(7.415%)
		NHLBI NIH HHS	10652(1.676%)			NATIONAL	14277(3.042%)

						NATURAL SCIENCE FOUNDATION OF CHINA	
		BRITISH HEART FOUNDATION	4188 (0.659%)			NIGMS NIH HHS	7154(1.524%)
		NATIONAL HEART LUNG AND BLOOD INSTITUTE	4036 (0.635%)			MEDICAL RESEARCH COUNCIL	7117(1.516%)
		AMERICAN HEART ASSOCIATION	3856 (0.607%)			NCI NIH HHS	6342(1.351%)

Language Productivity

Authors have predominately preferred *"English"* over other languages to communicate their findings as 6559980 of publications are available in *"English"* followed by *"German*" (41713)*, "French"* (30423) and "*Spanish"* (29286) A very less score of publications are published in *"Latin"," Finish", "Gaelic", "Dutch", "Swedish"* etc. **(Table 6)**.**Grab and Kaplan (2002)** also highlight *'English"* as a dominant language in scientific information. **Wang, Yu and Ho (2010)** found English is the predominant language for articles in Water research, followed by French and German. **Gul, Nisa, Shah, Shah and Wani (2015)** reveal authors have predominately preferred English over other languages to communicate their findings in the scholarly literature published on Lavender.

Table 7: shows language wise distribution of publications.

LANGUAGES	Neurosciences and Neurology	Biochemistry & Molecular Biology	Oncology	Surgery	Cardiovascular System & Cardiology	Pharmacology & Pharmacy	General & Internal Medicine	Environmental Sciences & Ecology	Microbiology	Cell Biology	Total
ENGLISH	923500 (97.434%)	925894 (99.774%)	709651 (98.304%)	640844 (97.107%)	622119 (97.87%)	626930 (98.786%)	563776 (92.274%)	559110 (99.076%)	520094 (98.708%)	468062 (99.725%)	6559980
GERMAN	9119 (0.962%)	0	6058 (0.839%)	7309 (1.108%)	2474 (0.389%)	1174 (0.185%)	14004 (2.292%)	1569 (0.278%)	5 (0.001%)	1 (0%)	41713
SPANISH	4851 (0.512%)	0	17 (0.002%)	2942 (0.446%)	1600 (0.252%)	1305 (0.206%)	14551 (2.382%)	1655 (0.293%)	2365 (0.449%)	0	29286
FRENCH	4383 (0.462%)	14 (0.002%)	5668 (0.785%)	4466 (0.677%)	2159 (0.34%)	2105 (0.332%)	7913 (1.295%)	723 (0.128%)	2991 (0.568%)	2 (0%)	30424
RUSSIAN	3012 (0.318%)	62 (0.007%)	0	0	3501 (0.552%)	10 (0.002%)	2480 (0.406%)	2 (0%)	10 (0.002%)	566 (0.121%)	9643
CZECH	1127 (0.119%)	0	0	1127 (0.171%)	0	0	0	0	239 (0.045%)	0	2493
JAPANESE	484 (0.051%)	247 (0.027%)	0	484 (0.07%)	0	2159 (0.34%)	0	0	6 (0.001%)	0	3380
TURKISH	440 (0.046%)	134 (0.014%)	44 (0.006%)	632 (0.096%)	361 (0.057)	238 (0.038%)	1115 (0.182%)	170 (0.03%)	813 (0.154%)	1 (0%)	3948
HUNGARIAN	385 (0.041%)	0	0	1 (0%)	0	0	1215 (0.199%)	0	0	0	1601
PORTUGUESE	212 (0.022%)	0	1 (0%)	556 (0.084%)	1818 (0.286%)	455 (0.072%)	1752 (0.287%)	266 (0.047%)	0	0	5060
POLISH	174 (0.018%)	0	267 (0.037%)	506 (0.077%)	1594 (0.251%)	0	11 (0.002%)	779 (0.138%)	357 (0.068%)	380 (0.081)	4068
CROATIAN	45 (0.005%)	0	0	0	0	0	31 (0.005%)	0	0	0	76

CATALAN	39 (0.004%)	0	0	0	0	1 (0%)	0	0	0	0	40
SLOVAK	23 (0.002%)	0	0	23 (0.003)	0	0	3 (0%)	0	7 (0.001%)	0	56
ESTONIAN	19 (0.002%)	1 (0%)	6 (0.001%)	7 (0.001%)	6 (0.001%)	6 (0.001%)	6 (0.001%)	8 (0.001%)	6 (0.001%)	3 (0.001%)	68
ROMANIAN	7 (0.001%)	8 (0.001%)	5 (0.001%)	356 (0.054%)	6 (0.001%)	8 (0.001%)	0	3 (0.001%)	8 (0.002%)	5 (0.001%)	406
ITALIAN	4 (0%)	0	40 (0.006%)	299 (0.045%)	8 (0.001%)	228 (0.036%)	577 (0.094%)	19 (0.003%)	0	0	1175
SERBIAN	3 (0%)	2 (0%)	1 (0%)	0	1 (0%)	1 (0%)	1219 (0.2%)	0	0	0	1227
DANISH	2 (0%)	3 (0%)	3 (0%)	1 (0%)	3 (0%)	0	4 (0.001%)	0	0	1 (0%)	17
WELSH	2 (0%)	5 (0.001%)	3 (0%)	9 (0.001%)	2 (0%)	3 (0%)	5 (0.001%)	1 (0%)	0	4 (0.001%)	30
CHINESE	1 (0%)	1624 (0.175%)	3 (0%)	1 (0%)	0	20 (0.003%)	2 (0%)	2 (0%)	0	0	1653
GALICIAN	1 (0%)	0	0	5 (0.001%)	6 (0.001%)	0	0	1 (0%)	0	0	13
GEORGIAN	1 (0%)	0	1 (0%)	5 (0.001%)	0	0	0	1 (0%)	0	0	8
LATVIAN	1 (0%)	0	0	1 (0%)	0	0	0	0	0	0	2
SWEDISH	1 (0%)	0	0	0	0	0	0	0	0	0	1
LITHUANIAN	0	0	0	0	0	0	229 (0.037%)	18 (0.003%)	0	0	247
DUTCH	0	0	3 (0%)	1 (0%)	0	0	20 (0.003%)	5 (0.001%)	0	0	29
KOREAN	0	0	136 (0.019%)	377 (0.057%)	0	0	794 (0.13%)	0	0	5 (0.001%)	1312
LATIN	0	0	1 (0%)	3 (0%)	0	1 (0%)	8 (0.001%)	0	0	1 (0%)	13

FINNISH	0	0	0	1 (0%)	0	0	0	0	0	0	1
GAELIC	0	0	0	1 (0%)	0	0	0	0	0	0	1
SOLVENIAN	0	0	0	0	0	0	728 (0.119%)	0	0	0	728
ICELANDIC	0	0	0	0	0	0	515 (0.084%)	0	0	0	515
SERBOCROTIAN	0	0	0	0	0	0	37 (0.006%)	0	0	0	37
AFRIKAANS	0	0	0	0	0	0	6 (0.001%)	0	0	0	6

Findings and conclusion

Authors

1. In *"Neurosciences And Neurology"*, "Wang Y" has contributed most of the research as the researcher is a professor at Nanchang University China (NCU). NCU promotes international exchange and cooperation through the years. It has maintained stable exchange and cooperative relationships with about 60 universities and institutes in more than 30 countries and regions **(Nanchang University China, 2018).**

2. In *"Biochemistry & Molecular Biology"*, "Zhang Y" has contributed most of the research as the researcher is affiliated with the Chinese Academy of Sciences (CAS) China. The CAS offers a packages of international fellowships, collectively called the "CAS Presidents International Fellowship Initiative (PIFI)", to support highly-qualified international scientists and postgraduate students to work and study at CAS institutions and strengthen their scientific collaboration with CAS researchers. It is open to scientific research personal from around the globe. **(Chinese Academy of Sciences , 2018a).**

3. "Wang Y" has contributed most of the research in the field of *"Oncology"* as the researcher is the professor at Kangda College of Nanjing Medical University, Jiangsu Province, China. The researcher effort to promote the development of disaster medicine in China. In recent years, Nanjing Medical University has formed extensive international cooperation and exchange programs to establish partnerships with higher institutions at home and abroad. Nanjing Medical University is committed to become one of the highest grade medical universities, with distinctive features and international fame **(Nanjing Medical University , 2018a).**

4. In *"Surgery"*, "Zhang Y" has contributed most of the research as the researcher is affiliated with Wonkwang University which is fully equipped with the R&D infrastructure to successfully complete their signature programs. Various institutes conduct extensive researches on diverse subjects, such as politics, economy, social issues, culture, medicine and science, and with their achievements, they promise a bright future their signature programs. These institutes never sleep to help Wonkwang University take flight as the number one university in humanities convergence with an emphasis on life. **(Wonkwang University, 2018).**

5. "Stefanadis C" has contributed most of the research output in the field of *"Cardiovascular system and Cardiology"* as the researcher is affiliated with the Athens Medical Group which focuses on the continuous improvement of its services through the constant development of quality management systems, the implementation of advanced medical treatments and process optimization, the modernization of its facilities. The Athens Medical Group cooperates with international Insurance Funds and private Insurance Companies. It also cooperates on a medical level with all the countries of southeastern Europe and especially with FYROM, Albania and Romania, has concluded to partnerships with international organizations for the hospitalization of employees that reside in the Balkans (British, Americans, etc.) and collaborates with governments for the treatment of war victims (Libya) **(Athens Medical Group, 2018).**

 6. In *"Pharmacology and Pharmacy"*, "Wang Y" has contributed most of the research as the researcher is affiliated with the School of Chemistry and Materials Sciences Nanjing Normal University (NNU), China. The School of Chemistry and Materials Science of Nanjing Normal University is amongst the oldest institutions of higher education on Chemistry in China. This School has brought together and introduced a number of outstanding talents from well-known universities and research institutes in the United States, Germany, Britain, Japan, South Korea and Singapore in recent years **(Nanjing Normal University, 2018).**

7. "Dyer C" has contributed most of the research in the field of *"General and Internal Medicine"* as the researcher is affiliated with the British Medical Journal (BMJ) which is an international peer reviewed medical journal. The main aim is to lead the debate on health and to engage, inform, and stimulate doctors, researchers, and other health professionals in the way that will improve outcome for patients. The BMJ group has editors throughout the world, including Europe, North America, South Asia, and China **(The BMJ, 2018).**

8. In *"Environmental Sciences & Ecology"*, "Zhang Y" has contributed most of the research as the researcher is affiliated with University of Nebraska, Lincoln, USA. The university is dedicated to the pursuit of an active research agenda producing both direct and indirect benefits to the state. The special importance of agriculture, environment, and natural resources is addressed in its research priorities. In addition, the University of Nebraska–Lincoln conducts a high level of research and creative activities that address in specific ways the issues and problems that confront Nebraska. Through their research and creative activities, faculty at the university interact with colleagues around the world and are part of the network of knowledge and information that so influences our society. As a consequence, the university serves as the gateway through which Nebraska participates in and shares the gains from technological and cultural developments **(University of Nebraska, 2018).**

9. "Zhang Y" has contributed most of the research output in the field of *"Microbiology"* as the researcher is affiliated with the Chinese Centre For Disease Control and Prevention and Division of Infectious Disease Prevention and Control (DID) is one of the technical departments of Chinese Center for Disease Control and Prevention. Furthermore, along with the National Institute for Communicable Disease Control and Prevention, National Institute for Viral Diseases Control and Prevention and National Institute for Parasitic Diseases Control and Prevention, DID provides infectious disease control & prevention consultations for National Health and Family Planning Commission (NHFPC) and provides technical services for diseases control institutions and health facilities nationwide **(Chinese Center For Disease Control And Prevention, 2018).**

10. "Zhang Y" has contributed most of the research in the field of *"Cell Biology"* as the researcher is affiliated with the Nanjing Medical University. In recent years, the university has extensively carried out exchange activities and has actively developed multi-model relationships and cooperation with other colleges and universities. It has established cooperation and academic exchange with medical colleges and universities in the U.S., Canada, Australia, Sweden, Japan, Taiwan Province, Hong Kong SAR, etc. All the faculty members and staff of the university will spare no effort to unite as a whole, making overall plans, launching innovation and reform and try the best to achieve the goal of making NMU grow into a world renowned high-level research medical university with distinctive features **(Nanjing Medical University , 2018b).**

Publication Trends

- In the field of *"Oncology"* slight growth of publication productivity is observed from 2006-2016.

- In *"Biochemistry and Molecular Biology"* steady growth of publications is observed from 2006-2012 showing positive growth, while a dip is observed from 2013-2016.

- In the field of *"Surgery"* steady growth is recorded from 2006-2014. From 2014-2016 a slight drop is seen in the publication trend.

- In the field of *"Cardiovascular and Cardiology"* fluctuated growth is observed in publication trend.

- In the field of *"Environmental Sciences and Ecology"* slight increase is observed in publication from 2006-2016.

- In the field of *"Pharmacology and Pharmacy"* fluctuated growth in publication trends is listed from 2006-2016.

- In the field of *"Microbiology"* slight growth is inscribed from the year 2006-2015 while as slight decrease is observed in the year 2016.

- In the field of *"General and Internal medicine"* the publication has shown fluctuated growth is recorded from the year 2006-2016.

- In the field of *"Cell Biology"* fluctuated growth is observed from the year 2006-2016.

Document type

It is evident from analyzed data that authors have mostly reported their findings in the form of **"research articles".** Articles from journals are preferred for research purposes because they are generally written by scholars in a particular field. Unlike magazines or newspapers, where journalists are being paid to write articles, or opinion based pieces, journals are often based on original research being done by professionals **(Libguides, 2018a)**. Articles tend to be brief and often report on developments and news within a field and might summarize current research being done in a particular area **(Libguides, 2018b)**.

Languages

The study reveals that authors have predominately preferred *"English"* over other languages to communicate their findings. In academic publishing the use of English has a longer history especially in Sciences. In 1980 only 36% of publications were in English. It had risen to 50% in 1940-1950, 75% in 1980 and 91% in 1996 with the numbers for Social Sciences and Humanities slightly lower **(OpenLearn, 2018)**. English is nowadays the official language of USA, UK, Ireland, Canada, Australia, and News land, Bangladesh, Ghana, India, Jamaica, Kenya, Malaysia, Nigeria, Pakistan, Philippines, Singapore, South Africa, Srilanka, Tanzania and Zambia. The first five countries have English as their official

language by choice; the rest by way of imperialism. For political reasons, as well as reasons of convenience, English is also the main medium of communication for International organizations **(Klimczak-Pawlak, 2014)**.

Countries

Findings related to geographical distribution reveal that the **USA** is the leading country. The USA has large number of institutions related with research and development with good technologies and equipments and invests more funds on research and development, since 2000 gross domestic expenditure on research and development (GERD) In USA has been increased by 31.2%. Finance and resources available in USA universities and institutions enables them to hire and retain the best researchers and provide proper equipments and other resources to them **(Economy of the United States,2018).**

Organizations

From analyzed data, it is evident that *"Harvard university", "Chinese Acadamy of Science" and "University Texas MD Anderson Cancer"* are leading organisations. **Harvard University** is a large, highly residential research university. It is a founding member of the Association of American Universities and remains a research university with very high research activity and a comprehensive doctoral program across the arts, sciences, engineering, and medicine **(Harvard University, 2018a)**. The range of research activities at Harvard is broad and deep. Research is supported by more than $800 million of sponsored research funds each year, and it is carried out both in the departments of the Schools and the Radcliffe Institute for Advanced Study, and at more than 100 research centers, on campus and around the world **(Harvard University 2018b).**

The **Chinese Academy of Sciences (CAS)** is the linchpin of China's drive to explore and harness high technology and the natural sciences for the benefit of China and the world **(Chinese Academy of Sciences, 2018b)**.Chinese Academy of Science ranked 1st among research institutions in the world according to the *Nature Publishing Index* elaborated by NPG in 2014 and 2015. CAS comprises 104 research institutes, 12 branch academies, three universities and 11 supporting organizations in 23 provincial-level areas throughout the country. It is the world's largest research organisation, comprising around 60,000 researchers working in 114 institutes, and has been consistently ranked among the top research organisations around the world **(Chinese Academy of Sciences , 2018c)**.

Moreover the study reveals that the **University of Texas MD Anderson Cancer Center** is completely dedicated to the field of *"Oncology".* It is one of the world's most respected centers devoted exclusively to cancer patient care, research, education and prevention**(MD Anderson Cancer Center, 2018a).**. The types of research performed at the institution focus on four key areas: basic science, translational research, clinical research, and prevention and personalized risk assessment **(MD Anderson Cancer Center, 2018b).** it is one of 49 Comprehensive Cancer Centers designated by the National Cancer Institute. The cancer center provided care for about 127,000 patients in Fiscal Year 2014 and employs more than 20,000 people. It is affiliated with The University of Texas Health Science Center at Houston and Baylor College of Medicine. MD Anderson has an endowment of $486 million as of November 30, 2014. In 2017, it has been ranked for cancer care in USA by the U.S. News and World Report **(University of Texas MD Anderson Cancer Center, 2018).**

Funding agencies

The study reveals that *"National institute of Health"* (NIH) and *"National Natural science foundation of China"*, are the leading funders across the disciplines. NIH is one of the world's foremost medical research centers. NIH is the largest source of funding for medical research in the world and also the largest public funder of bio medical research in the world investing more than $32 billion a year. Its institutes and centers award more than 80% of the NIH budget each year to support investigators at more than 2500 universities, medical schools and other research organizations around the world **(National Institutes of Health, 2018).**

National Natural science foundation of China (NFSC) is responsible for directing, coordinating and making effective use of the national natural science fund to support basic research and stimulate free exploration, identify and foster scientific talents, as well as to promote progress in science and technology and the harmonious socioeconomic development for the nation. NSFC provides research fund for international young scientists supports foreign young scientists to conduct basic research in mainland china in all areas of science, engineering and health research which are covered by NSFC with the aim to promote sustainable academic collaboration and exchanges between Chinese and foreign young scientists **(National Natural science foundation of China, 2018)**.It funds more than 2,200 universities and research institutes. Over the past 30 years, the National Natural Science Fund has increased from 80 million renminbi (RMB) in 1986 to 24.87 billion RMB in 2016, an increase of 310 times. From 1986 to 2015, NSFC has used 161.4 billion RMB from the National Natural Science Fund to support a total of about 390,000 projects of various kinds. Meanwhile, NSFC also actively expanded its financing channels. Taking the 12th Five-Year Plan period (2011–2015) as an example, it attracted a total of 1.745 billion RMB of funds from other sources. **Yang w.(n.d).**

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