

Measurement of Global Nursing Research Output: A Bibliometric Study (1996-2015)

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ABSTRACT

Purpose: This study aims to examine the research output in the field of nursing at the global level during the last two decades, viz., for the period 1996-2015, with special reference to India. Some of the aspects examined include the research growth in nursing literature during the period of study, leading nursing research countries at the regional and global level, and citation analysis.

Scope and Methodology: This study is global in nature, but emphasis has also been laid on India's research contribution in nursing at the global level. Aspects like regional contribution to the nursing research output have also been assessed. This study is purely based on secondary data retrieved from SCImago Journal and Country Rankings. The figures in the study are based on one particular database and are not exhaustive; hence they simply reflect a trend in nursing research at the global level.

Findings: During the period 1996 through 2015, a total of 550,490 research articles were published across the world by 212 nation states at an average of 2,596 articles from each individual country. On average, during the period of study, the number of nursing research publications grew at the rate of 7.36% each year. North America has emerged as one of the leading nursing research continents of the world by publishing 218,614 research articles, constituting 39.71% of the global nursing research output. The U.S. and U.K. are the world's two leading nursing research countries, which contributed 193,819 and 61,730 research articles respectively, comprising a 35.21% and 11.21% share of global nursing research output. India and China, apart from being the two fastest growing nursing research countries, have the potential to meet the global human resource demand in the field of nursing, given the skilled and trained human resource both these countries possess in nursing.

Social Implication: There is always a need to share working knowledge in some professions and nursing is one of them. There cannot be a better medium than linking practice with theory through the research medium. Metric studies in turn help to get a better idea about the amount of work done in any given field at the national and international level, thus identifying the need thereof to improve upon those areas where there is research lag.

Keywords: nursing research, SCImago, continents, research output, research growth, India, world

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1. INTRODUCTION

Research in nursing over a period of time has turned out to be one of the mainstays of biomedical research, of which it is an integral part. Advances in nursing not only supplement the application and practice of the medical profession, but also help in the treatment of ailing patients and their recovery. Nursing practice and nursing research move hand in hand with overall biomedical education and research. Dependence of the former on the latter can be gauged from the fact that the treatment part of patients is incomplete without the recovery or nursing part of patients.

Although nursing has matured as an independent subject field, still researchers see research in nursing as part of biomedical research. Research in the biomedical sciences, including nursing, is one of the foremost endeavors, pre-eminent for having a sustainable health sector all across the world. People should pay attention towards both aspects of knowledge, viz., the rate at which new knowledge is created and the rate at which knowledge becomes obsolete (Bosworth, 1978). The rate of obsolescence of knowledge is greater in the sciences than in social sciences and the humanities. The rate of obsolescence of research results in the field of biomedical sciences is much faster than for any other sciences. The half-life of journals in the field of health sciences is shorter than for journals in the field of mathematics, physics, and humanities (Davis, 2013). People should undertake constant and continuous research in all the branches of biomedical sciences almost in unison, so as to supplement the allied research findings in its other areas.

It has been observed that previously people were not aware of the treatment part of the disease, but were well aware of the fact that an ailing person needs to be nursed so as to recover from ill health. But as time has changed, so has the course of nursing changed, and today we can see nursing has grown into a full-fledged independent research subject. Nursing professionals all over the world are actively involved in seeking out newer and better means of post treatment. Even the modern day nursing profession has gone a step further, whereby nursing interns specialize in recovery from certain kind of diseases. All these developments in the nursing profession are because of the constant and continuous research being conducted in nursing all across the world.

The present study has been undertaken with a view to examine research growth in the field of nursing in the world with special reference to India during the period 1996-2015. Some of the main aspects examined in the present study include research output and research growth during the period of study at the global level. Similar aspects have been explored at the regional and continental level, along with some leading nursing research countries across the world.

2. OBJECTIVES OF THE STUDY

- To examine research output and research growth in the field of nursing across the world during the period 1996-2015.
- To identify the leading nursing research countries across the world and India's contribution to nursing research during the period of study.
- To reflect research distribution in the field of nursing across different regions of the world made during the period of study.

3. METHODOLOGY AND SCOPE

The data for the present study were retrieved from the official website of SCImago on March 19, 2015 (accessible at <http://www.scimagojr.com>) (Scimago Lab, 2015). However, the study was updated up to 2015 and accordingly the revised data were retrieved from the website on May 4, 2017. The database is open access and can be accessed and downloaded by anybody all across the world. To retrieve the data, the main field was selected as nursing against 23 sub-nursing fields, against different regions and countries in a particular year. The process was repeated for each individual year. Accordingly, the data were retrieved against different regions for different years. The data upon retrieval were in semi-structured form, and given the objectives of the study the data were structured so as to meet the requirements of the study. The study reflects the year-wise publication distribution of nursing research both at the global level and India's contribution thereof during the period of study. In the study an attempt has also been made to examine the corresponding research growth of nursing publications. The distribution of

nursing publications has also been assessed at the continental and other regional levels along with citation distribution and h-index. To perform expressions like addition, subtraction, division, and drawing percentage, MS Excel has been used.

The study is primarily global in nature, but equal emphasis has been given to the research contribution of India to global nursing research output during the period of study.

4. REVIEW OF LITERATURE

A growing trend has evolved to undertake bibliometric studies in different subject fields, including nursing, evaluating both the qualitative and quantitative aspects of the research undertaking (Smith & Hazelton, 2008). The researchers discussed the evidence based practices in nursing, the journal performance indicators, and international publishing trends.

There is no denial of the fact that nursing is more a psychological aspect of recovery, whereby patients during recovery are supposedly more encouraged to be in a positive frame of mind, so as to speed up their recovery. Psychology, physiology, and sociology are some of the prime concepts around which nursing research revolves because of the fact that nursing involves all three aspects in rehabilitating a person back to one's social setup (Moody et al., 1988). While assessing nursing research aspects, the researchers studied 720 research articles published from 1977-1986. The most interesting aspect of this study revealed that nearly 95% of research publications were undertaken by nurses as first author. Active involvement of nurses in nursing research is very important for the fact that these researchers are in a better position to reflect the weak and finer aspects of nursing. There is a growing trend towards nursing research in critical care observed (VanCott, Tittle, Moody, & Wilson, 1991). The researchers analyzed the articles published in the area of critical care nursing practices during the period 1979-1988 and found a high percentage of intervention-oriented studies identifying a research based practice.

Neuroscience nursing research is one of the most specialized nursing research areas. In a study Dilorio et al. (2004) investigated the research output in neuroscience from the period 1989-2000 by evaluating the

articles published in nursing research journals, which include neuroscience nursing, nursing research, research in nursing and health, and western journals of nursing, and found a substantial increase in research output during the 1990's. The authors further observed that scientific methods over the period have grown more complex than what they used to be previously. The study of nursing neuroscience research was carried forward by Dilorio et al. (2004) and Palese, Basone, and Mestroni (2014) to investigate the research articles published in similar areas as investigated by Dilorio et al. in 2004 and found a significant increase in scientific research productivity.

Paediatric nursing research is equally a very widely studied subject field, as more than 16.6% of the total nursing intervention research studies pertain to child care, uphold Beal and Betz (1992) while analyzing the 319 nursing research articles published in seven refereed nursing research journals of paediatrics. To assess nursing research undertaken in the field of cancer, Molassiotis et al. (2006) reviewed 619 research articles published from 1994 to 2003. Of the total research articles published, 49.1% were alone published from the United States and the other half of the literature was produced from the rest of the world. In a similar study Mendoza-Parra, Paravic-Klijn, Muñoz-Muñoz, Barriga, and Jiménez-Contreras (2009) analyzed 13,208 research articles published in 119 Latin American nursing journals and found the majority (31.9%) were published in the nursing research journals in Brazil alone. The researchers found 11.3 years an average longevity of nursing journals, with less than 45% of journals enjoying international readership. The researchers further found that nursing research output doubles almost every 7.3 years at an annual growth rate of 10%.

In order to map research utilization and identify a network of researchers in the field of nursing, Estabrooks, Winther, and Derksen (2004) analyzed 630 research articles published in 194 different nursing journals during the period 1992-2001. The authors found a steady increase in the research output of nursing since the 1990s, with most articles authored as single author with a lesser tendency towards collaborative research. It was further observed that most of the references quoted by the authors pertained to nursing research with minimum references from other fields. The researchers found that despite substantial increases in nursing

research publications the field is still at an under-developed stage, with lesser emphasis on collaborative research. Biomedical practice and nursing go hand in hand, but when it comes to research in both fields there is a significant difference between the two. While studying 1,845 research articles published from the period 1988-1995 from the Research Output Database (ROD) of U.K. biomedical research, Traynor, Rafferty, and Lewison (2001) found that less than 1% of the total publications pertain to nursing. The authors made their analysis by segregating articles on the endogenous and exogenous nature of each one. The research techniques in the nursing field, like other specialised sciences, varies considerably from country to country, observed Polit and Beck (2009) while studying 1,072 research articles published in the eight different English nursing research journals of different countries during the year 2005-06.

Oncology or cancer nursing research is equally one of the most widely studied subject fields in nursing research. From the period 2001-2011, Zhang, Huang, and Li (2011) analyzed 2,933 publications concerning cancer research in nursing in PubMed published across 264 biomedical journals across the world. The authors found the U.S., the U.K., and Canada to be the largest oncology nursing research countries and found a substantial growth in oncology nursing research across the globe during the period. The authors found that the amount of research undertaken in the field of oncology nursing research in developed countries is far ahead when compared to the developing and under-developed countries of the world. While studying 622 nursing research publications published between the period 1985-1994 in four Spanish nursing journals, Pardo, Relid, Delicado, Mallebrera, and Garcia-Meseguer (2001) found that on average each nursing research publication in Spain has 10.64 ± 10.42 references. The authors further observed that 60.3% of the references quoted are in the Spanish language, while there were 36.1% in English with a slight growing tendency towards English language references.

It is preminent that nursing practitioners should come up with good and evidence based research techniques in nursing profession so as to extend their knowledge base among practitioners across the world (Wilkes, Borbasi, Hawes, Stewart, & May, 2002). These researchers analyzed 509 research articles published

from 1995 to 2000 in the 11 nursing journals across Australia, the U.K., and the U.S. Theory research linkage is a very popular and widely studied subject field in the nursing research, observed Murphy and Freston (1991). These authors, while investigating 142 gerontology nursing studies, found that 46% of the studies were related to a specific degree while other studies were mostly conceptual or empirical in nature and found interpretive studies the most difficult to link to between theory and practice.

In order to map knowledge utilization literature in nursing, Scott et al. (2010) reviewed 433 research articles to undertake bibliometric analysis of the research articles published from 1945 through 2004. The researchers found significant growth in the nursing research, which has helped to evolve the scientific knowledge community. The researchers also found that very few nursing journals were indexed by Web of Science. The nursing literature and their citation analysis were mapped by Allen, Jacobs, and Levy (2006) for the research articles published for a three-year period during 1996-2000. The researchers found that compared to books, journals were more frequently cited. The researchers further found that CINAHL and PubMed are the two databases which provide better access to nursing journals.

The quality comparison of research articles published in nursing by Chinese authors from mainland China, Taiwan, and Hong Kong in science citation indexed journals from 1999 to 2008 were analyzed by Peng and Hui (2011). These authors retrieved 1,015 articles and found the 500 articles published from the Taiwan region received the maximum 1,755 citations, followed by 1,316 of 347 articles from the Hong Kong region, with the lowest 157 citations from 55 articles from mainland China. The authors discussed the quality difference of the research articles as the main reason. A study about nursing research in adverse drug reactions was discussed by Jordan, Knight, and Pointon (2004).

Most of the studies reviewed above have limited scope and have as such evaluated the research growth in nursing within territorial confines, while the scope of the present study is global in nature and has evaluated research growth in the subject discipline of nursing for almost two decades, which enhances and substantiates the reliability of the research findings. Besides, no major study has been conducted in India which may

have evaluated the bibliometric contributions of India in nursing at the global level for such an extended period, viz., two decades (1996-2015).

5. RESULTS

The percentages in the expressions performed have been drawn up to two decimal places and have not been rounded off, and as such may reflect variations while drawing figures for 100%. Nursing research growth has been assessed by using the below-mentioned computational formula so as to draw the corresponding research growth and average annual research growth.

Annual corresponding growth reflects the growth recorded in number of research articles published in the subsequent year from the previous year. This growth can be recorded either in terms of numbers or in terms of percentage, depending upon the requirement and type of analysis a researcher is doing. In the present study we have computed the corresponding growth in terms of percentage, viz. growth of research articles published in present year to that of previous year, but in terms of percentage. Accordingly, the annual corresponding growth percentage can be computed by applying the following mathematical expression.

ACG- Annual Corresponding Growth,

$$ACG = \frac{\text{End Value} - \text{First Value}}{\text{First Value}} \times 100$$

End Value: Represents the number of research articles published during the year (suppose 1997) for which we are to calculate the Annual Corresponding Growth (ACG) of research articles to that of research articles published during the previous year or a year before, viz., 1996.

First Value: Represents the number of research articles published in a year against which we are to calculate the Annual Corresponding Growth (ACG) viz., 1996 of research articles published in the second year of the subsequent year (1997) of the article published in first year.

e.g. ACG of Documents for the year

$$1997 = \frac{12292 - 11410}{11410} \times 100 = (7.73)$$

Accordingly, ACG % has been computed under each column against each year under each head.

The nursing research output during the last two decades has recorded an average annual growth of 7.36%, which is almost a fair amount of growth given the research growth in other subject fields of study. A maximum of 32.77% annual corresponding growth was observed in the year 2006 and a minimum of -4.62% ACG was observed in the year 2015. During the period of study, on average more than 27,000 research articles were published each year in nursing at a global level (Table 1).

Nursing research publications over the period of time have shown substantial growth. During the last two decades, over 297.95% research growth was observed in nursing research output, as the number of research articles published in 1996 was 11,410 and this number grew to 45,407 in 2015. More than 11.29% of the total publications under study are not citable documents (Figure 1). There has been proportionate distribution of citations received by nursing publications during the period of study.

A maximum of 7.38% of the total citations share was received by the research articles during the year 2004, while a minimum of 0.26% share was received during the year 2015. It is quite obvious to observe a steady decline in the citations share percentage with the increase in the number of years from the date of publication, whereby in a way a sort of saturation level occurs in the citations received. In the same way one may find only a few citations in the early years of publication of a research article, which over a period of time start showing a significant growth. On average, 5% of citations have been received by research articles published during each individual year. The time lag is one of the foremost and important factors which affect citation distribution. Besides, delay in publication of issues and inclusion or exclusion of journals in an index affect citation distribution and its analysis in its own way.

The practice of self-citation is equally prevalent among nursing researchers across the globe. A total

Table 1. Global Research Output of Nursing Research

Year	Documents (ACG %)	Citable Documents (ACG %)	Citations (Share %)	Self-Citations (Share %)	Avg. Citations per Document	Avg. Self-Citations per Document
1996	11410 (-)	11116 (-)	276643 (3.50)	88912 (3.61)	24.25	7.79
1997	12292 (7.73)	11921 (7.24)	332013 (4.19)	107228 (4.36)	27.01	8.72
1998	12634 (2.78)	11990 (0.57)	357528 (4.52)	113485 (4.61)	28.30	8.98
1999	13273 (5.05)	12294 (2.53)	383558 (4.85)	121576 (4.94)	28.90	9.16
2000	14643 (10.32)	13682 (11.29)	469516 (5.93)	137541 (5.59)	32.06	9.39
2001	15202 (3.81)	14081 (2.91)	443620 (5.61)	133837 (5.44)	29.18	8.80
2002	16084 (5.80)	14835 (5.35)	482162 (6.09)	152909 (6.21)	29.98	9.51
2003	17317 (7.66)	15596 (5.12)	506192 (6.40)	152188 (6.18)	29.23	8.79
2004	19391 (11.97)	17434 (11.78)	583800 (7.38)	167165 (6.79)	30.11	8.62
2005	21805 (12.44)	19309 (10.75)	529706 (6.69)	159438 (6.48)	24.29	7.31
2006	28952 (32.77)	25494 (32.03)	548421 (6.93)	166475 (6.76)	18.94	5.75
2007	32057 (10.72)	28429 (11.51)	550512 (6.96)	169323 (6.88)	17.17	5.28
2008	33231 (3.66)	29735 (4.59)	520375 (6.57)	167954 (6.82)	15.66	5.05
2009	36710 (10.46)	33030 (11.08)	508097 (6.42)	159216 (6.47)	13.84	4.34
2010	39573 (7.79)	35438 (7.29)	461445 (5.83)	141325 (5.74)	11.66	3.57
2011	41793 (5.60)	37201 (4.97)	359806 (4.55)	119299 (4.85)	8.61	2.85
2012	43748 (4.67)	39143 (5.22)	283381 (2.58)	93737 (3.81)	6.48	2.14
2013	47358 (8.25)	42153 (7.68)	202947 (2.56)	68762 (2.79)	4.29	1.45
2014	47610 (0.53)	42131 (-0.05)	94642 (1.20)	33221 (1.35)	1.99	0.70
2015	45407 (-4.62)	39595 (-6.01)	20199 (0.26)	7354 (0.30)	0.44	0.16
Total (Avg.)*	550490 (7.36)*	494607 (6.79)*	7914563	2460945	14.38	4.47

ACG% - Annual Corresponding Growth Percentage; Avg. -Average

of 18.4% of the total citations received by the nursing research articles during the period of study are self-citations. On average, each nursing publication during each individual year has received 14.38 citations of which 4.47 citations are self-citations. A maximum of 32.06 citations was recorded against each research article in the year 2000, while a minimum 0.44 citations

was recorded in the year 2015 (Table 1).

Of the total nursing research output published at the global level during the period of study, nearly 89% has come from the world's 21 leading nursing research countries alone, while the remaining 11% has come from the remaining 191 nursing research countries of the world. The United States has emerged as one of the

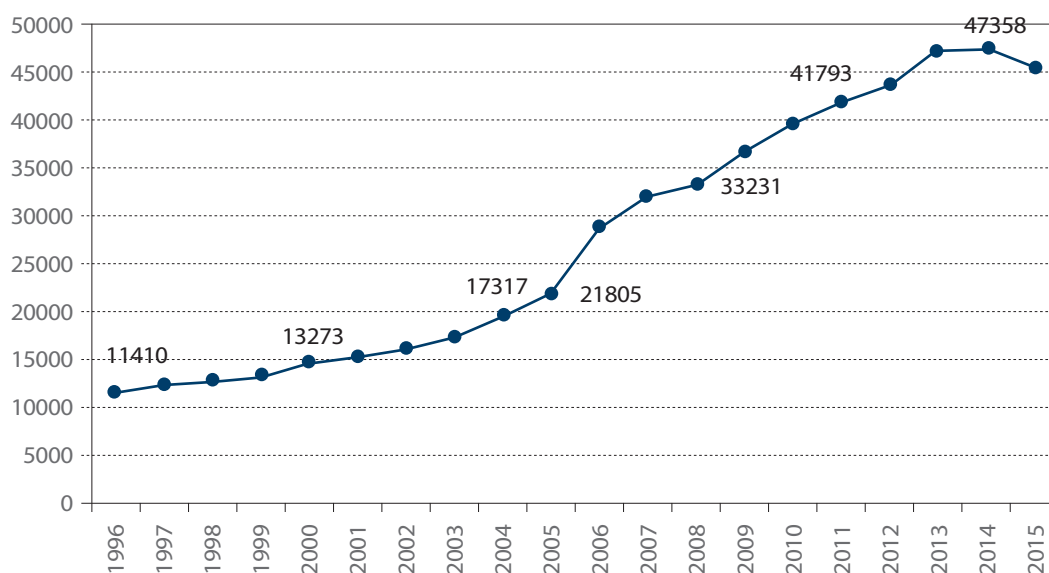


Fig. 1 Growth of nursing research publications (1996-2015)

world's largest nursing research countries, which alone has contributed 35.21% of total nursing research output at the global level. The U.S. is followed by the U.K. and Australia with an individual global research share of 11.21% and 4.75%, respectively. India stands at the bottom of the table with a global research share of 0.77%, while the average contribution of each nursing research country at the global level during the period remained 0.47% (Table 2).

Citation distribution has become one of the most important parameters in assessing research quality. Accordingly, of the total citations received by nursing research articles at the global level, 2,940,245 (37.15%) were received alone by the research articles published from the U.S., reflecting the dominance of research articles published from the U.S. in nursing. The U.S. is followed by the U.K. and Australia with a citations share percentage of 10.69% and 4.32%, respectively.

Research quality is generally assessed by analyzing the average citations received by the research article. The greater the number of citations received by a re-

search article, the more qualitative the research work is deemed to be. Accordingly, in the above tabulation an attempt was made to reflect the average number of citations received by each research article published at both the global level and country level. The U.S., besides being the leading nursing research country, is also the most cited one, but the average number of citations received by each research article published in the nursing research journals of the U.S. is far less than the average number of citations received by research articles published from other smaller European countries. The average number of citations received by each research article published from Finland, Denmark, and the Netherlands are 28.67, 28.01, and 23.51. The U.S., U.K., and Australia, which otherwise are the three leading nursing research countries in the world, have on average received 15.17, 13.71, and 13.06 citations per research article, respectively. Brazil stands at the bottom of the table with an average 6.64 citations per research article (Figure 2).

Self-citation is equally a practice prevalent among

Table 2. Leading Research Countries in Nursing across the World

Rank	Country	Documents (Share %)	Citable documents (Share %)	Citations (Share %)	Self-Citations (Share %)	Avg. Citations per Document	Avg. Self-Citations per Document H index	H index
1	United States	193819 (35.21)	171586 (34.69)	2940245 (37.15)	1425604 (57.93)	15.17	7.36	323
2	United Kingdom	61730 (11.21)	52419 (10.60)	846269 (10.69)	223598 (9.09)	13.71	3.62	215
3	Australia	26168 (4.75)	23228 (4.70)	341667 (4.32)	81210 (3.30)	13.06	3.10	161
4	France	25265 (4.59)	22614 (4.57)	249586 (3.15)	48000 (1.95)	9.88	1.90	148
5	Canada	24794 (4.50)	22186 (4.49)	406479 (5.14)	81663 (3.32)	16.39	3.29	138
6	Germany	23082 (4.19)	20561 (4.16)	323890 (4.09)	74268 (3.02)	14.03	3.22	165
7	Spain	16289 (2.96)	13860 (2.80)	197624 (2.50)	52237 (2.12)	12.13	3.21	123
8	Brazil	13050 (2.37)	12507 (2.53)	86638 (1.09)	34046 (1.38)	6.64	2.61	123
9	Japan	12907 (2.34)	12026 (2.43)	196953 (2.49)	49731 (2.02)	15.26	3.85	141
10	Italy	12761 (2.32)	11406 (2.31)	241581 (3.05)	46571 (1.89)	18.93	3.65	157
11	Netherlands	12239 (2.22)	11341 (2.29)	287747 (3.64)	48579 (1.97)	23.51	3.97	74
12	Sweden	10185 (1.85)	9660 (1.95)	219906 (2.78)	41607 (1.69)	21.59	4.09	131
13	South Korea	9935 (1.80)	9739 (1.97)	77289 (0.98)	19182 (0.78)	7.78	1.93	75
14	China	9294 (1.69)	8965 (1.81)	78867 (1.00)	22909 (0.93)	8.49	2.46	74
15	Taiwan	6219 (1.13)	6017 (1.22)	61702 (0.78)	13373 (0.54)	9.92	2.15	120
16	Switzerland	6074 (1.10)	5437 (1.10)	134317 (1.70)	13100 (0.53)	22.11	2.16	65
17	Finland	4863 (0.88)	4631 (0.94)	139404 (1.76)	17495 (0.71)	28.67	3.60	129
18	Denmark	4684 (0.85)	4403 (0.89)	131198 (1.66)	18302 (0.74)	28.01	3.91	125
19	Norway	4535 (0.82)	4311 (0.87)	89358 (1.13)	14191 (0.58)	19.70	3.13	104
20	Belgium	4474 (0.81)	4129 (0.83)	90179 (1.14)	12167 (0.49)	20.16	2.72	100
21	India	4216 (0.77)	3933 (0.80)	50186 (0.63)	15905 (0.65)	11.90	3.77	69
22	Rest of the World	63907 (11.61)	59648 (12.06)	723478 (9.14)	107207 (4.36)	11.32	1.68	
	Total	550490	494607	7914563	2460945			

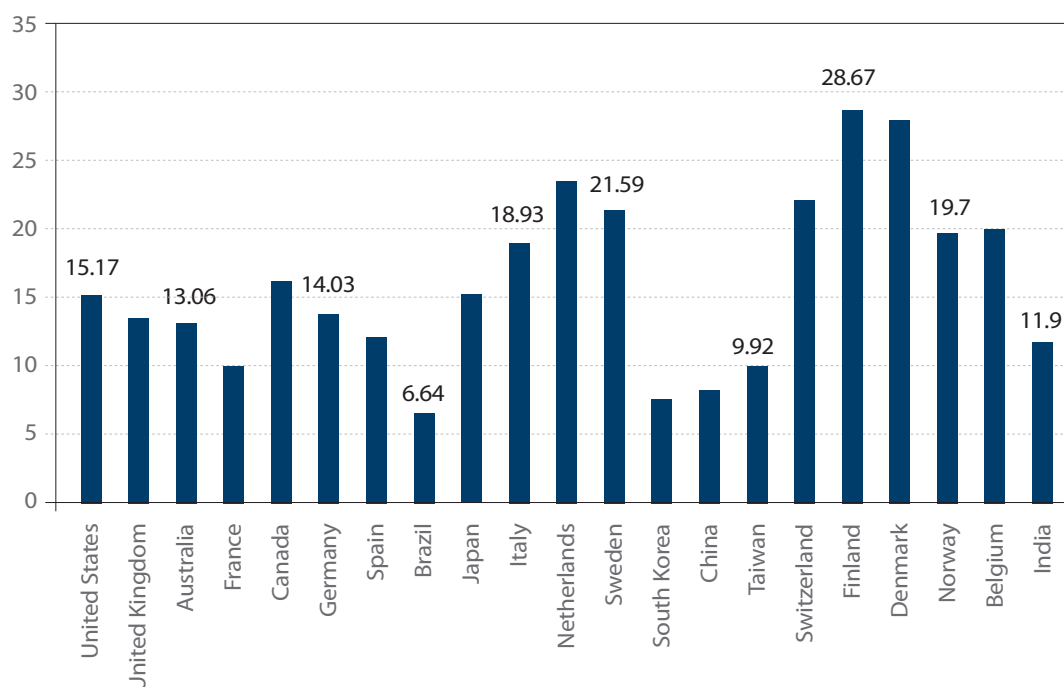


Fig. 2 Average citations per publication

researchers across the globe. Under self-citations, authors generally cite their own previously published work in their new research, and the trend has moved far beyond author self-citation. These days, the practice of self-citation is more prevalent among publishers who press authors to include a few references from similar work published in the journal they intend to publish their research results in. This helps to inflate the journal's impact factor and h-index. The United States is the world's largest self-citing country, as of the total self-citations received by nursing research articles at the global level, 57.93% are alone from the U.S. The U.S. is distantly followed by the U.K. and Canada with a global self-citation share percentage of 9.09% and 3.32%, respectively, while at the global level, of the total citations received by nursing publications during the period of study, 31.09% are self-citations (Table 2).

The distribution of nursing research publications at the continental or regional level reflects that the

research output from a particular region or continent depends more on type and kind of research infrastructure available in each individual country within a particular region. The U.S. and Canada are the only countries from North America which are active in nursing research, but given the research contribution of these two countries in nursing, North America is the world's leading continent, which has contributed the maximum 39.71% of total global nursing research output during the period of study. On the contrary, 52 countries from Africa are actively involved with nursing research, but their contribution to global nursing research during the period of study remained the lowest, viz., 1.38%. Western Europe is the second largest region to contribute to nursing research with 36.08%, followed by Asia and the Pacific region with their individual contributions of 9.64% and 5.49%. Latin America, the Middle East, and Eastern Europe are the other regions of the world which have contributed to

Table 3. Distribution of Nursing Publications at Continental and Regional Levels

Rank	Region	No of Countries (Share %)	Documents (Share %)	Citable Documents (Share %)	Citations (Share %)	Self-Citations (Share %)	Avg. Citations per Document	Avg. Self-Citations per Document
1	Northern America	02 (0.90)	218614 (39.71)	193773 (39.18)	3346727 (42.29)	1507267 (61.25)	15.31	6.89
2	Western Europe	26 (12.30)	198612 (36.08)	176189 (35.62)	3135489 (39.62)	633684 (25.75)	15.79	3.19
3	Asia Region	32 (15.10)	53083 (9.64)	50557 (10.22)	578464 (7.31)	138797 (5.64)	10.90	2.61
4	Pacific Region	17 (8.00)	30199 (5.49)	26721 (5.40)	402012 (5.08)	88134 (3.58)	13.31	2.92
5	Latin America	43 (20.30)	21083 (3.83)	20136 (4.07)	175569 (2.22)	46667 (1.90)	8.33	2.21
6	Middle East	16 (7.50)	13502 (2.45)	12656 (2.56)	127416 (1.61)	22750 (0.92)	9.44	1.68
7	Eastern Europe	23 (10.90)	7817 (1.42)	7381 (1.49)	81151 (1.03)	11064 (0.45)	10.38	1.42
8	Africa	52 (24.60)	7580 (1.38)	7194 (1.45)	67735 (0.86)	12582 (0.51)	8.94	1.66
	Total	211	550490	494607	7914563	2460945	14.38	4.47

nursing research by 3.83%, 2.45%, and 1.42% respectively (Table 3).

The citations and self-citations received by nursing publications are almost in proportion to each other. North America and Eastern Europe are the two leading regions which, apart from being the two leading regions of the world to contribute the maximum number of research articles, are also the leading regions which have received the maximum number of citations and self-citations against the research articles published.

India’s contribution to global nursing research is not that encouraging when compared to the research contribution of other leading nursing research countries of the world. On average nursing research in India during the period of study has grown at 9.77% annually, which is better by 2.41% when compared with the average annual corresponding growth (AACG) of nursing research articles at the global level. India’s contribution to global nursing research output during the period of study remained 0.76%, which is far less when compared with the research contribution of other countries in the field of nursing research (Table 4).

Of the total citations received by nursing research

articles at the global level, India had a share of 0.63%, while the share of self-citations remained 0.65%. Of the total citations received by research articles published from India 31.69% are self-citations, which is 0.60% less than the global self-citation percentage for the same period. On average, each nursing publication in India has received 11.90 citations per publication, which on average is 2.48 citations less than the average citations received by nursing research articles at global level. Accordingly on average, each Indian nursing research article has received 3.77 self-citations each publication, which is 0.70 citations less than the average global self-citations received by each nursing research article.

On average, 23.22% of the total nursing research output from India is based on international collaboration, while at regional level (Asia Region) India’s contribution to nursing research output remained 9.23%, with 0.58% at the global level. Given the magnanimity of India, its population size, and its skilled human resources in both biomedical and paramedical sciences, the contribution made by the country to global nursing research output during the period of study is not that encouraging compared to what it should have been.

Table 4. India's Contribution to Nursing Research at Global Level

Year	Documents (ACG %)	Citable Documents (ACG %)	Cites (Share %)	Self Cites (Share %)	Citations per Doc.	Self Citations per Doc.	%age International Collaboration	%age Share Asia	%age Share World
1996	78 (-)	78 (-)	1430 (2.85)	555 (3.49)	18.33	7.12	17.95	11.56	0.41
1997	83 (6.41)	80 (2.56)	1018 (2.03)	332 (2.09)	12.27	4.00	9.64	11.53	0.42
1998	77 (-7.22)	73 (-8.75)	1529 (3.05)	544 (3.42)	19.86	7.06	14.29	10.10	0.38
1999	101 (31.16)	95 (30.13)	1109 (2.21)	347 (2.18)	10.98	3.44	18.81	12.07	0.47
2000	91 (-9.90)	89 (-6.31)	1860 (3.71)	584 (3.67)	20.44	6.42	10.99	9.44	0.41
2001	84 (-7.6)	83 (-6.74)	2563 (5.11)	994 (6.25)	30.51	11.83	14.29	8.74	0.36
2002	122 (45.23)	122 (46.98)	2925 (5.83)	1060 (6.66)	23.98	8.69	12.3	11.23	0.51
2003	137 (12.29)	129 (5.73)	3395 (6.76)	1138 (7.15)	24.78	8.31	24.82	10.83	0.56
2004	129 (-5.83)	127 (-1.55)	3939 (7.85)	1432 (9.00)	30.53	11.10	19.38	9.66	0.49
2005	170 (31.78)	158 (24.40)	3549 (7.07)	1074 (6.75)	20.88	6.32	25.29	11.02	0.59
2006	211 (24.11)	201 (27.21)	3202 (6.38)	1262 (7.93)	15.18	5.98	21.8	9.67	0.57
2007	243 (15.16)	225 (11.94)	4682 (9.33)	1702 (10.70)	19.27	7.00	29.63	8.31	0.58
2008	227 (-6.58)	212 (-5.77)	3316 (6.61)	1085 (6.82)	14.61	4.78	25.11	7.19	0.53
2009	280 (23.34)	263 (24.05)	4151 (8.27)	1038 (6.53)	14.83	3.71	28.57	7.89	0.66
2010	282 (0.71)	267 (1.52)	3405 (6.78)	857 (5.39)	12.07	3.04	29.79	7.13	0.65
2011	307 (8.86)	289 (8.23)	2973 (5.92)	671 (4.22)	9.68	2.19	30.29	7.35	0.69
2012	364 (18.56)	335 (15.91)	2546 (5.07)	577 (3.63)	6.99	1.59	29.12	7.97	0.82
2013	373 (2.47)	342 (2.08)	1533 (3.05)	403 (2.53)	4.11	1.08	29.76	7.38	0.80
2014	441 (18.23)	396 (15.78)	878 (1.75)	189 (1.19)	1.99	0.43	38.10	8.17	0.91
2015	416 (-5.6)	369 (-6.81)	183 (0.36)	61 (0.38)	0.44	0.15	34.62	7.48	0.91
Total (avg.)*	4216 (9.77)*	3933 (9.02)*	50186	15905	11.90	3.77	23.22	9.23	0.58
RoW	546274	490674	7864377	2445039	14.39	4.47			
World	550490	494607	7914563	2460945	14.38	4.47			

ACG% - Annual Corresponding Growth Percentage; Avg. - Average

6. DISCUSSION AND CONCLUSION

There is a steady increase in the global nursing research output. Nursing publications since 1996 have grown in number by 297.95% by the year 2015 at an average annual corresponding growth of 7.36%, which is quite encouraging. If we look at the growth of articles and journals in nursing during the last decade, viz., between 2006-2015, then in 2006 28,952 research articles were published in as many as 422 nursing journals, while in 2015 45,407 research articles were published in 575 journals, which means research articles in nursing during the decade grew by 56.83% in number, while journals indexed by SCImago in nursing during the same period grew by nearly 36.25% (SCImago Lab, 2015).

Nearly 90% of the global nursing research output has been reported by the 20 leading countries of the world, while the remaining 10% was reported from the remaining 192 countries of the world. The U.S., U.K., Canada, France, Australia, Germany, Spain, Japan, Italy, and Netherlands are the world's ten leading research countries in the field of nursing research, constituting nearly 75% of the global nursing research output. Countries like Finland, Denmark, Belgium, Norway, and India are at the bottom of the table, as each of these countries during the period of the study contributed less than 1% of the total global nursing research output. This disproportionate distribution of nursing research output is an area of concern, and in order to have a sustainable and robust health sector all across the globe with a promising future, there is a far greater need to work towards the promotion of nursing research at the global level.

The North America, Western Europe, Asia, and Pacific regions are the ones which can be considered as actively involved with nursing research and are somewhat the developed regions of the world on this front, while on the contrary regions like Africa, the Middle East, Latin America, and Eastern Europe are the regions which can be considered as devoid of having a robust nursing health sector. If North America on one hand has contributed 39.71% of the total global research output, Africa on the other has made a meagre contribution of 1.38%, which is nearly 3,000 times less than that of North America. There is far greater need to reduce the regional reliance on each other both at a

practice and research level.

The disproportionate growth and distribution of nursing research output across different regions is an area of concern. As for North America, it is only the U.S. and Canada which are actively contributing to nursing research, while the remaining countries from the continent or region appear to rely heavily on the U.S. and Canada for the latest developments in nursing research. On average, each nursing research country in the world has published 2,596 research articles during the period of study at an average of 129 research articles each year, while at a regional level, on average, 5,465 articles were published by each nursing research country each year from North America, with 381 articles by each country each year from Western Europe, 82 articles by each country each year from Asia, 88 from the Pacific region, 24 from Latin America, 42 from the Middle East, 17 from Eastern Europe, and 7 research articles each year from each African country.

The dominance of developed countries in nursing research output is very much evident, while poor and less developed countries on the other hand, for want of adequate resources and other infrastructure, are not able to even meet their individual requirements, with the result that these countries are not able to have a sustainable health sector. The developed nations have a better role to play in bailing out the poor and developing countries of their backyard so as to enable them to meet their research requirements. Brazil, Sweden, South Korea, China, Switzerland, Taiwan, Finland, Denmark, Belgium, Norway, and India are some of the upcoming nursing research countries of the world. These nation states, apart from meeting their own requirements, are supposed to reach out to those nation states which require their services and support.

As of date, the fact remains that 75% of the total global nursing research output during the period of study has come from the world's ten leading nursing research countries alone, whereas the remaining 25% has come from the remaining 202 nursing research countries of the world. In order to meet the global demand of nursing practices and the research supplement thereof required for sustainability, global demand cannot be met by the research activities of the world's ten leading nursing research countries alone. There is a far greater need for the other research countries of the world to strive harder to raise their research

standards not only by making their own health sector sustainable, but also by looking beyond the borders of their own country.

China and India are the two most populous countries of the world. Both these countries till the recent past used to term their populations as a curse, but both these countries have realized the true potential of their human resource, which they now believe is their greatest blessing in order to turn their countries into developed and powerful nations. India and China have become the leading markets of human resources and the nursing profession is no exception. Nursing professionals from both these countries are in great demand across the global populace and the world too is looking at these two nations for meeting their biomedical and paramedical requirements.

India is one of the leading countries in the world fulfilling the demand for nursing professionals from various countries. Trained and skilled nursing professionals from India are in great demand across Europe and the Middle East. Apart from fulfilling the demand for nursing professionals from various countries, India is also one of the leading countries involved with training, research, and teaching in nursing. India has to play a much bigger role in nursing research and for that, the institutions involved in the teaching and training of nursing and practicing paramedical and nursing professionals should be motivated to undertake research activities.

The distribution of nursing research at the global level is neither in proportion to global nursing practices nor in proportion to global nursing requirements, given the demand for nursing professionals all across the globe. The disproportionate research output in this particular paramedical science is bound to result in unsustainable nursing practices at the global level, and this is something which is very much prevalent across the different countries of the world.

The recording of tacit knowledge from well-trained nursing professionals is going to help a great deal in attaining the larger objectives of the nursing profession. It is equally desirable to involve and promote the nursing professionals to pursue research activities in their desired area. Countries that are rich in nursing knowledge and research should extend all support and cooperation to nations which require assistance in developing better nursing practices.

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