International Journal of Library and Information Studies
Vol.4 (4) Oct-Dec, 2014 ISSN: 2231-4911

# A SCIENTOMETRIC ANALYSIS OF RESEARCH PRODUCTIVITY IN WINE FLU DISEASE

**N. SIVAKAMI**
Sr. Librarian
Sri Sai Ram Engineering College
Tambaram, Chennai-600 044
e-mail: sivakami.lib@sairam.edu.in

**DR. C. BASKARAN**
Deputy Librarian & Research Supervisor
Department of Library & Information Science
Alagappa University,
Karaikkudi-630 003, India.
e-mail: cbklis@gmail.com

## ABSTRACT

*Swine Flu is that, unlike seasonal flu, which is typically most dangerous to the very young, elderly and those with a weakened immune system. Swine flu can also be threatening to young and healthy people. By keeping this in mind the researcher intends to study the research productivity of Swine Flu. This study attempts to analyze the performance of researcher working in the field of swine flu in terms of relative growth rate, authorship pattern, scattering of articles in different sources and country wise distribution. The period of study was 2001to 2012. A total of 50627 records were obtained from MEDLINE databases have been taken for this study. The MEDLINE is freely available on the Internet and searchable via PubMed and NLM's National Center, compiled by NLM (National Library of Medicine). All kinds of resources are fallen in highest in the year 2010 & 2011. Collaborative authors' productivity is more than a single contribution. The degree of collaboration C= 0.884 represents 88 percent of collaborative authors article that were published during the study periods. Bradford's law fits well on sample.*

**Key Words:** MEDLINE, Swine Flu, Relative Growth Rate, Doubling time, Authorship pattern, Degree of Collaboration, Bradford's Law.

## INTRODUCTION

Research activities have resulted in considerable output of scientific literature and the number of periodicals has grown in every branch of science. The study scrutinizes research performance of global scientists in the field of Swine Flu (Influenza A H1N1).On April 2009, the Centers for Disease Control and Prevention (CDC) identified two cases of human infection with influenza A (H1N1) v characterized by a unique combination of gene segments that had not been identified among human influenza a virus. Additional cases were rapidly reported leading the WHO to declare a pandemic phase level, indicating widespread human infection.

Swine Flu is that, unlike seasonal flu, which is typically most dangerous to the very young, elderly and those with a weakened immune system. Swine flu can also be threatening to

young and healthy people. By keeping this in mind the researcher intends to study the research productivity of Swine Flu. This study attempts to analyze the performance of researcher working in the field of swine flu in terms of Relative growth rate, authorship pattern, scattering of articles in different sources and country wise distribution.

## LITERATURE REVIEW

Few quantitative studies have been carried in the past analyzing overall medical or biomedical research.

Satyanarayana[1] examined Indian contribution in biomedical research (3605 papers in 1990 and 3241 papers in 1994) as indexed in three databases, such as Index Medicus, Excerpta Medica and Tropical Disease Bulletin. Srivastava and Diwakar[2] provided a comparative analysis of Indian biomedical papers (4732 in 1999 and 6088 in 2007), using SCI database. Kundra[3] analyzed the research collaboration (as reflected in co-authored papers) in Indian medical research from 1900 to 1945, by focusing on the pattern of collaboration in basic and applied research, multiplicity of authors and types of collaboration. Dutt *et al*[4] analyzed 2183 papers by Chinese researchers and 1034 papers by Indian researchers in the field of plant-based medicine during 1990-2004 as indexed by PubMed. Arunachalam[5] examined the relevance of Indian medical research during 1981-1985 using Science Citation Index database and concluded that Indian global share of research in medical sciences is very small compared to our contribution in other S&T fields. Arunachalam[6] re-examined the relevance of Indian medical research by repeating the above study by using MEDLINE database from 1987 to 2004. He examined 19,916 Indian medical papers in 1440 journals, of which 14,822 were published in journals with impact factor less than 1.0 in contrast to only 58 papers in journals with impact factor more than 8.0. Dandona *et al.*[7] assessed the health research output and concluded that both the magnitude and distribution of research output are not commensurate with the disease profile and burden. In the later much broader study, Dandona *et al.*[8] examined Indian medical publications in PubMed database and unpublished research reports available in the public domain from 2001 to 2008. According to this study, public health research in India has grown in the past decade, but continues to be inadequate in scope and quality, considering the country's daunting disease burden. Jain[9] examined the visibility and extent of coverage of Indian biomedical and life sciences journals in global alerting services. Pandya[10] examined the Indian medical research output and discussed the factors for low output of Indian authors and institutions and also indicates that although the number of Indian medical journals is rising rapid. Park and Choi[11] introduced a methodological approach to extract distinctive features of Swine (H1N1) Flu through data mining clinical documents by randomly selecting 20 clinical documents from first visit records of patients who had visited emergency room in Seoul National University Hospital. The symptoms are mostly about upper respiratory infection. They suggested this methodological approach could be used in novel infectious disease management and research to prevent spreading of the pandemic at the beginning stage. Amit etal[12] had reported in their paper Swine flu has been confirmed in a number of countries and it is spreading from human to human, which could lead to what is referred to as a pandemic flu outbreak. Luchs[13] conducted a research to analyze the profile of the Brazilian scientific production in the A(H1N1) influenza field between 2009 and 2011in MEDLINE, SciELO and LILACS databases, selecting papers in which the tern “H1N1” and Brazil. The research revealed that the impact factor ranged from 0.0977 to 8.1230. Amsaveni etal[14] conducted scientometric measures of swine research performance in India during 1971 to 2010 with Science Citation Index. In that study they had found the highest number of papers were published in 2010 that is after the 2009 outbreak was detected in Mexico

## METHODOLOGY

PubMed being the most widely search system provides free access to the database of bibliographic information, which consists primarily of MEDLINE. MEDLINE is an important and large bibliographic database on **biomedicine, health and life sciences** made by the US National Library of Medicine. MEDLINE covers every aspect of medicine, including nutrition and health, veterinary science, environmental health, occupational health, biology, microbiology, biotechnology and toxicology. MEDLINE describes publications from more than 70 countries from 1966 to the present. A search was made in PubMed for 'swine flu' with all the terms in MeSH (Medical Subject Heading) with limits as 'humans', '12 years (01/01/2001 to 31/12/2012)' and 'English language' on 9/5/213. . A total of 50627 records were obtained from MEDLINE databases have been taken for this study. The MEDLINE is freely available on the Internet and searchable via PubMed and NLM's National Center, compiled by NLM (National Library of Medicine). The records were downloaded in MEDLINE format and converted to access tables and analyzed. This study covers the measure of the relative growth rate, authorship pattern, scattering of articles in different sources and country wise distribution.

## RESULTS AND DISCUSSION

### Relative Growth Rate and Doubling Time

The analysis of growth rate of Swine Flu research output aims to identify the trends and growth of prospects in the present study. The published literature is taken as a target to measure the knowledge in a discipline, and the growth rate study of publications would provide some useful results. The rate of growth of Swine Flu literature is determined by calculating relative growth rates and doubling time for publications.

The relative growth rate is the increase in the number of publications per unit of time. Hence, one year is taken as the unit of time. The mean relative growth rate R (1-2) over a specified period of interval can be calculated from the following equation suggested by Mahapatra[15].

$$R(1\text{-}2) = W_2 - W_1 / T_2 - T_1$$

Where,

$R$ = Mean relative growth rate the specific period of interval;
$W_2$ = $\log W_2$ (Natural log of initial number of publications);
$W_1$ = $\log W_1$ (Natural log of initial number of publications);
$T_2 - T_1$ = Unit difference between the initial time and final time

Therefore,

$R(a)$ = Relative growth rate per unit of publications per unit of time (Year)

A direct equivalence exists between the relative growth rate and doubling time. If the number publications of a subject doubles during a given period then the difference between the logarithms of the numbers at the beginning and at the end of the period must be the logarithms of the number 2. This difference has a value of 0.693. Thus, the corresponding doubling time for publication can be calculated by the following formula: Doubling time (Dt) = 0.693/R (a)

**Table 1 –** Relative Growth Rate and Doubling Time of Swine Flu

| Sl.No. | Year | Number of Articles | Cumulative Number of Articles | $W_1$ | $W_2$ | R (a) = $W_2 - W_1 / T_2 - T_1$ | Dt. = 0.693/R(a) |
|---|---|---|---|---|---|---|---|
| 1 | 2001 | 2475 | | | 7.814 | | |
| 2 | 2002 | 2558 | 5033 | 7.814 | 8.524 | 0.710 | 0.976 |
| 3 | 2003 | 2638 | 7671 | 8.524 | 8.945 | 0.421 | 1.646 |
| 4 | 2004 | 2921 | 10592 | 8.945 | 9.268 | 0.323 | 2.146 |
| 5 | 2005 | 3266 | 13858 | 9.268 | 9.537 | 0.269 | 2.576 |
| 6 | 2006 | 3962 | 17820 | 9.537 | 9.788 | 0.251 | 2.761 |
| 7 | 2007 | 3822 | 21642 | 9.788 | 9.982 | 0.194 | 3.572 |
| 8 | 2008 | 4024 | 25666 | 9.982 | 10.153 | 0.171 | 4.053 |
| 9 | 2009 | 5712 | 31378 | 10.153 | 10.354 | 0.201 | 3.448 |
| 10 | 2010 | 6729 | 38107 | 10.354 | 10.548 | 0.194 | 3.572 |
| 11 | 2011 | 6905 | 45012 | 10.548 | 10.715 | 0.167 | 4.150 |
| 12 | 2012 | 5615 | 50627 | 10.715 | 10.832 | 0.117 | 5.923 |
| | **Total** | **50627** | | | | **3.018 (0.25)** | **34.822( 2.9)** |

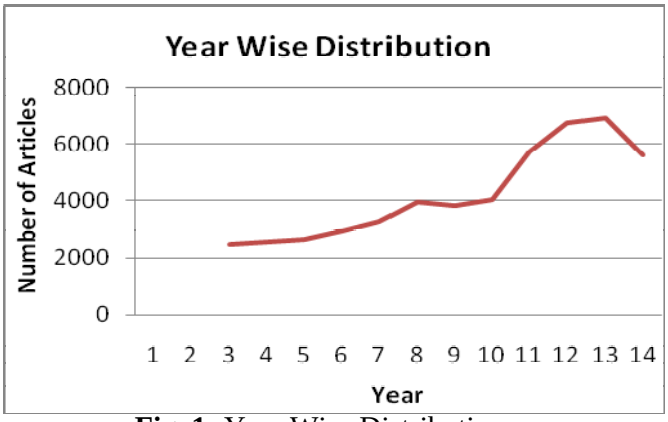


**Fig. 1-** Year Wise Distribution

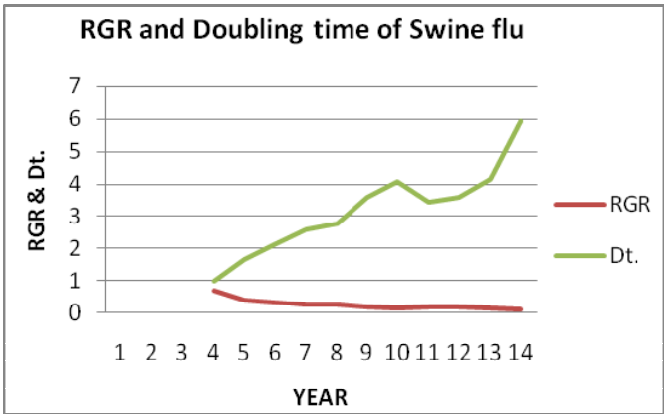


**Fig. 2-** RGR and doubling time of Swine flu

The Relative Growth Rate R (a) and Doubling Time Dt. of publication derived and The relative growth rate declined from 0.71 at 2001 to 0.12 in the year 2012. The whole study period records the mean relative growth rate of 0.25. The doubling time for publication of all sources of Swine Flu research output increased from 0.97 in 2001 to 5.29in 2012. The doubling time of publications at the aggregate level has been computed as 2.9 years is presented in table1.

It could be deducted from the discussion above that generally there is progressive increase in the number of publications of research output on Swine Flu literature. However its relative growth rate has shown a decline trend which means the rate of increase is low in terms of proportion, and this has been highlighted by doubling time for publications, which is more than the relative growth rate.

**Authorship Pattern**

A significant note of the study is that the majority of the articles are contributed by multiple authors. Especially triple author contribution is highest among the author collaborative productivity. It indicates that the single authored work is less than that of the multiple authored contributions. Among the authorship pattern three authored collaboration output has been leading followed by four authored collaboration and five authored collaboration output is high level. Nine, ten authored collaboration output is very low. The study has identified the factor; the three or four or five authored team is leading their research work and is very successful at every year output in the subject of Swine Flu.

**Table 2-** Authorship Pattern of publications on Swine Flu

| Sl. No. | Authorship Pattern | Publications | % | Number of Authors |
|---|---|---|---|---|
| 1 | Single | 5617 | 11.09 | 5617 |
| 2 | Double | 5430 | 10.73 | 10860 |
| 3 | Three | 5906 | 11.67 | 17718 |
| 4 | Four | 5848 | 11.55 | 23392 |
| 5 | Five | 5745 | 11.35 | 28725 |
| 6 | Six | 5208 | 10.29 | 31248 |
| 7 | Seven | 4009 | 7.92 | 28063 |
| 8 | Eight | 3274 | 6.47 | 26192 |
| 9 | Nine | 2332 | 4.61 | 20988 |
| 10 | Ten | 1775 | 3.51 | 17750 |
| 11 | More than ten | 4421 | 8.73 | - |
| 12 | Without author | 1053 | 2.08 | 0 |
| | **Total** | **50627** | **100.00** | |

**Degree of Collaboration**

To determine degree of collaboration in quantitative terms, the formula given by Subramanyam, K. (1983)[16] was used.

C = NM / NM+NS

Where

C = Degree of collaboration
NM = Number of multi authored papers
NS = Number of single authored papers

C = 5617/45010+5617 = 0.884

In the present the study the value of the C is

C = 0.884

**Table 3 –** Degree of collaboration of Swine Flu Research output

| Year | Single Author | Multiple Authors | Total | Degrees of Collaboration |
|---|---|---|---|---|
| 2001 | 293 | 2182 | 2475 | 0.882 |
| 2002 | 330 | 2228 | 2558 | 0.871 |
| 2003 | 335 | 2303 | 2638 | 0.873 |
| 2004 | 378 | 2543 | 2921 | 0.871 |
| 2005 | 481 | 2785 | 3266 | 0.853 |
| 2006 | 622 | 3340 | 3962 | 0.843 |
| 2007 | 405 | 3417 | 3822 | 0.894 |
| 2008 | 395 | 3629 | 4024 | 0.902 |
| 2009 | 875 | 4837 | 5712 | 0.847 |
| 2010 | 683 | 6046 | 6729 | 0.898 |
| 2011 | 438 | 6467 | 6905 | 0.937 |
| 2012 | 382 | 5233 | 5615 | 0.932 |
| **Total** | **5617(11.09)** | **45010 (88.91)** | **50627** | **10.602 (0.884)** |

The degree of collaboration in the swine flu study is 0.884 which clearly indicates its dominance upon multiple authors' contribution. Out of the total 50627 literature published 88.9% of them are published under joint venture of publication in Swine Flu research. In the study period of 12 years from 2001 to 2012, the degree of collaboration lies between 0.84 and 0.93. Among the entire study period the year of 2011 and 2012 has the highest collaboration (0.937 and 0.932). Overall the average degree of collaboration of the whole sample year is 0.884. Based on this study, the result of the degree of collaboration C = 0.884, i.e. 88 percent of collaborative authors' articles published during the study period.

**Country wise distribution of Swine Flu research output**

Totally 69 countries were contributing 50627 articles that were published in Swine Flu research in the world wide. Among this 69 countries United State of America produced 24376 (48.15%) of articles and occupied first place. England 11016 (21.76%) and Netherland 5301 (10.47%) occupied second and third place respectively. India places a 16$^{th}$ position with 266 articles (0.53%). The countries like Bosnia and Herzegovina, Bulgaria, Cuba, Georgia (Republic), Venezuela stand in the lost position with one article each, which shows the reason be the lack of facilities and application in Swine Flu as shows in table 4.

**Table 4 -** Country wise distribution of Swine Flu research output

| Sl. No. | Place | No. of Articles | % | Cumulative % |
|---|---|---|---|---|
| 1 | United States | 24376 | 48.15 | 48.15 |
| 2 | England | 11016 | 21.76 | 69.91 |
| 3 | Netherlands | 5301 | 10.47 | 80.38 |
| 4 | Germany | 1890 | 3.73 | 84.11 |
| 5 | Switzerland | 719 | 1.42 | 85.53 |
| 6 | Japan | 710 | 1.40 | 86.93 |
| 7 | Denmark | 698 | 1.38 | 88.31 |
| 8 | Australia | 685 | 1.35 | 89.67 |
| 9 | France | 659 | 1.30 | 90.97 |
| 10 | Canada | 539 | 1.06 | 92.03 |
| 11 | Ireland | 423 | 0.84 | 92.87 |
| 12 | Sweden | 407 | 0.80 | 93.67 |
| 13 | China | 358 | 0.71 | 94.38 |
| 14 | Italy | 358 | 0.71 | 95.09 |
| 15 | New Zealand | 283 | 0.56 | 95.64 |
| 16 | India | 266 | 0.53 | 96.17 |
| 17 | Austria | 232 | 0.46 | 96.63 |
| 18 | Scotland | 179 | 0.35 | 96.98 |
| 19 | Poland | 166 | 0.33 | 97.31 |
| 20 | Brazil | 158 | 0.31 | 97.62 |
| 21 | Korea (South) | 134 | 0.26 | 97.89 |
| 22 | Thailand | 100 | 0.20 | 98.08 |
| 23 | Norway | 91 | 0.18 | 98.26 |
| 24 | Singapore | 90 | 0.18 | 98.44 |
| 25 | Spain | 77 | 0.15 | 98.59 |
| 26 | Slovakia | 56 | 0.11 | 98.70 |
| 27 | United Arab Emirates | 52 | 0.10 | 98.81 |
| 28 | Greece | 49 | 0.10 | 98.90 |
| 29 | South Africa | 49 | 0.10 | 99.00 |
| 30 | Israel | 48 | 0.09 | 99.10 |
| 31 | Belgium | 46 | 0.09 | 99.19 |
| 32 | Czech Republic | 43 | 0.08 | 99.27 |
| 33 | Saudi Arabia | 39 | 0.08 | 99.35 |
| 34 | Egypt | 29 | 0.06 | 99.41 |
| 35 | Turkey | 27 | 0.05 | 99.46 |
| 36 | Pakistan | 26 | 0.05 | 99.51 |
| 37 | Croatia | 24 | 0.05 | 99.56 |
| 38 | Iran | 21 | 0.04 | 99.60 |
| 39 | Malaysia | 19 | 0.04 | 99.64 |
| 40 | Hungary | 15 | 0.03 | 99.67 |
| 41 | Mexico | 14 | 0.03 | 99.69 |
| 42 | Bangladesh | 13 | 0.03 | 99.72 |
| 43 | Romania | 12 | 0.02 | 99.74 |

| | | | | |
|---|---|---|---|---|
| 44 | Papua New Guinea | 11 | 0.02 | 99.76 |
| 45 | Nepal | 10 | 0.02 | 99.78 |
| 46 | Finland | 9 | 0.02 | 99.80 |
| 47 | Nigeria | 9 | 0.02 | 99.82 |
| 48 | Portugal | 9 | 0.02 | 99.84 |
| 49 | Uganda | 9 | 0.02 | 99.86 |
| 50 | Argentina | 7 | 0.01 | 99.87 |
| 51 | Jamaica | 7 | 0.01 | 99.88 |
| 52 | Serbia | 7 | 0.01 | 99.90 |
| 53 | Kenya | 6 | 0.01 | 99.91 |
| 54 | Puerto Rico | 5 | 0.01 | 99.92 |
| 55 | Russia (Federation) | 5 | 0.01 | 99.93 |
| 56 | Unknown | 5 | 0.01 | 99.94 |
| 57 | Ethiopia | 4 | 0.01 | 99.95 |
| 58 | Sri Lanka | 4 | 0.01 | 99.95 |
| 59 | Colombia | 3 | 0.01 | 99.96 |
| 60 | Indonesia | 3 | 0.01 | 99.97 |
| 61 | Lebanon | 3 | 0.01 | 99.97 |
| 62 | Lithuania | 3 | 0.01 | 99.98 |
| 63 | Northern Ireland | 3 | 0.01 | 99.98 |
| 64 | Ukraine | 3 | 0.01 | 99.99 |
| 65 | Bosnia And Herzegovina | 1 | 0.00 | 99.99 |
| 66 | Bulgaria | 1 | 0.00 | 99.99 |
| 67 | Cuba | 1 | 0.00 | 100.00 |
| 68 | Georgia (Republic) | 1 | 0.00 | 100.00 |
| 69 | Venezuela | 1 | 0.00 | 100.00 |

**Analysis of document type of publication in Swine Flu**

The productivity of scientists on Swine Flu spreads over variety of publication media, like that journal articles, reviews, letters, news, editorial, etc. It is clear from the analysis that the share of journal articles is the most prominent bibliographic form of publication and it occupies 77.6% (39265) of total publications. Review articles with 6102 (12%), Letter with 1910 (3.8%), news with 991 (1.96%), editorial with 904 (1.79%) contributions. Remaining document types scored the low numbers of output below one percentage for communication among the Swine flu researchers.

**Table 5 - Document type of publication in Swine Flu**

| Sl.No. | Pub. Type | No. of Articles | % |
|---|---|---|---|
| 1 | Journal Article | 39265 | 77.56 |
| 2 | Review | 6102 | 12.05 |
| 3 | Letter | 1910 | 3.77 |
| 4 | News | 991 | 1.96 |
| 5 | Editorial | 904 | 1.79 |
| 6 | Randomized Controlled Trial | 371 | 0.73 |
| 7 | Validation Studies | 311 | 0.61 |

| | | | |
|---|---|---|---|
| 8 | Multicenter Study | 203 | 0.40 |
| 9 | Congresses | 102 | 0.20 |
| 10 | Introductory Journal Article | 93 | 0.18 |
| 11 | Practice Guideline | 77 | 0.15 |
| 12 | Patient Education Handout | 44 | 0.09 |
| 13 | Portraits | 36 | 0.07 |
| 14 | Interview | 34 | 0.07 |
| 15 | Meta-Analysis | 33 | 0.07 |
| 16 | News Paper Articles | 27 | 0.05 |
| 17 | Video-Audio Media | 25 | 0.05 |
| 18 | Overall | 20 | 0.04 |
| 19 | Historic Articles | 16 | 0.03 |
| 20 | Retracted Publication | 15 | 0.03 |
| 21 | Bibliography | 11 | 0.02 |
| 22 | Lectures | 8 | 0.02 |
| 23 | Legal Cases | 7 | 0.01 |
| 24 | Addresses | 6 | 0.01 |
| 25 | Technical Report | 6 | 0.01 |
| 26 | Twin Study | 5 | 0.01 |
| 27 | Case Reports | 1 | 0.00 |
| 28 | Evaluation Studies | 1 | 0.00 |
| 29 | Guideline | 1 | 0.00 |
| 30 | Interactive Tutorial | 1 | 0.00 |
| 31 | Published Erratum | 1 | 0.00 |
| | | **50627** | **100.00** |

**Bradford's Law of Scattering**

Samuel Clement Bradford in 1934 points out that if scientific journals are arranged in order of decreasing productivity of articles on a given subject, they may be divided into a nucleus of periodicals more particularly devoted to the subject and several groups and zones containing the same number of articles as the nucleus when the number of periodicals in the nucleus and succeeding zones will be 1: n: $n^2$.

Bradford's Law states that journals in a single field can be divided into three parts, each containing the same number of articles:

* A core of journals on the subject, relatively few in number, that produces approximately one-third of all the articles;
* A second zone, containing the same number of articles as the first, but a greater number of journals, and
* A third zone, containing the same number of articles as the second, but a still greater number of journals.

The mathematical relationship of the number of journals in the core to the first zone is a constant n and to the second zone the relationship is $n^2$. Bradford expressed this relationship as $1 : n : n^2$

**Table 6 Bradford's Distribution of Journals**

| Zone | Journals | Articles | Bradford Multiplier |
|---|---|---|---|
| Zone 1 | 60 (1.68) | 16978 (33.54) | - |
| Zone 2 | 379 (10.62) | 16928 (33.44) | 6.31 |
| Zone 3 | 3129 (87.69) | 16721 (33.02) | 8.26 |
| **TOTAL** | **3568** | **50627** | **14.56 (7.28)** |

Table 6 Shows that a small group of 60 journals identified as the nuclear or core zone representing 1.68% of journals covered 16978 (33.54%) of articles. The second large group of 379 (10.62%) journals covered 16928 (33.44%) of articles and the third largest group of 3129 (87.69%) journals covered 16721 (33.02%) of articles. The Bradford multiplier between the Zone 1and 2 is 6.31, it is 8.26 between zone 2 and 3. The average multiplier is 7.28. It can be thus concluded that Bradford's law fits well in the sample of Swine Flu.

## CONCLUSION

The highest publications are in the years 2010 and 2011. The whole study period records the mean relative growth rate of 0.25 and the doubling time for publication at the aggregate level has been calculated as 2.9 years. Single authored work is less than that of the multiple authored contributions. It means that the collaborative authors' contribution is very high. The efficiency of the author could be recognized. Therefore, the individual scientists may be stimulated to distribute more number of contributions. A comparison of USA output in relation to the world output may help in understanding the contribution in a better angle. The atmosphere and infrastructure are also very effective for the entire development of Swine Flu research area. Bradford's law fits well in the sample of Swine Flu.

## REFERENCES

1. Satyanarayana, K. (2001) Final Report of the project on National Mapping of Science: Biomedical Sciences. Retrieved September 9, 2013.
2. Srivastava, D., & Diwakar, S. (2008, July 29 – Aug 1). Changing face of Indian Medical Research: A collaboration analysis of papers from SCI (1999 and 2007). *Paper presented at Fourth International Conference on Webometrics, Informatics and Scientometrics, Institute for Library and Information Science, Berlin.*
3. Kundra, R. (1996). Investigation of collaborative research trends in Indian medical sciences, 1900-1945. *Scientometrics, 36 (1),* 69-80.
4. Dutt, B., Kumar, S., & Garg, K. C. (2009) Mapping of Plant-based medical research in China and India. *Research Evaluation, 18 (1),* 51-59.
5. Arunachalam, S. (1995, June 7-10). Research if relevance mattered? Medical research in India as reflected in SCI 1981-85. *Paper presented at Proceedings of the 5th Biennial International Conference of the International Society for Scientometrics and Informetrics. River Forest, IL, Illionois,* USA, 33-42

6. Arunachalam, S. (1997). How relevant is research done in India? A study based on MEDLINE. *Current Science, 72(12),* 912-922.
7. Dandona, L., Sivan, Y. S., Jyothi , M. N., Bhasker, V. S., & Dandona, R. (2004). The lack of public health research output from India. *BMC Public Health, 4*, 55.
8. Dandona. L., Raban, M. Z., Guggilla, R. K., Bhatnagar, A., & Dandona, R. (2009). Trends of the public health research output from India during 2001-2008. *BMC Medicine 7*, 59.
9. Jain, N. C. (2008, July 29 – Aug 1). Growing visibility of Indian biomedicine and life science journals in global alerting services. *Paper presented at Fourth International Conference on Webometrics, Informatics and Scientometrics, Institute for Library and Information science, Berlin.*
10. Pandya, S. (1990). Why the output of medical research from India is low? . *British Medical Journal, 301(11),* 333.
11. Park, Heekyong. and Choi, Jinwook (2010). Extracting Distinctive feature of Swine (H1N1) Flu through data mining clinical documents. *Proceeding of 2010 workshop on Biomedical natural language processing, Sweden, 15th July 2010,* 130-131.
12. Amit, Jaiswal. Abhinav, Kumar. Rohit, Soni K. Rohit, Patidar. (2011). Swine Flu (H1N1) virus, prevention and their treatment: a review. *International Research journal of Pharmacy, 2(5),* 88-90.
13. Luchs, Adriana. (2012). Profile of Brazilian scientific production on A/H1N1 pandemic influenza. *Ciene.saude coletiva, 17(6),* 1629-1634.
14. Amsaveni, N. Raja, S. Ashokkumar, P. Kalidha. (2012). Scientometric measures of swine research performance in India during 1971-2010. *Discovery Science, 1(3),* 54-57.
15. Mahapatra, M. (1985). The validity of the theory of exponential growth of Scientific literature. *Paper presented at Proceedings of 15th IASLIC conference, IASLIC, Bangalore,* 81-70.
16. Subramaniam, K. (1982). Bibliometric study of research collaboration: A review. *Journal of Information Science, 6,* 33-38.

---ꕥ❁ꕥ---