CHAPTER 5

FINDINGS, SUGGESTIONS AND CONCLUDING REMARKS

In this chapter the major findings based on the analysis and interpretation are presented and listed under appropriate headings. This is followed by the resulting by products of this study such as Directory of Health Science Research Institutions in major countries such as USA, China, Japan and UK are given. A few areas for further research in this field are also enumerated.

5.1 MAJOR FINDINGS

5.1.1 General

1. A total of 1,13,794 records were covered in SCOPUS database for the period 1971-2012 in the field of Health Science (Section 4.2).

2. USA ranks as the top most country with a maximum number of contributions followed by United Kingdom, Canada, Australia and Germany as second, third, fourth and fifth position respectively (Table 4.1 and Figure 4.1).

3. India ranks tenth position in health science contribution. (Table 4.1)
5.1.2 Quantum of Health Science Research publications

1. The total number of publications in Health Science after the elimination of duplicate records were 1,13,794 and the same have been considered for the purpose of analysis (Table 4.1).

2. Global contribution is 51 times more than the Indian contribution. Top three countries such as USA, UK, and Canada are providing more than three times the Indian contribution. Out of which USA has 19.51 times more contribution in comparison with Indian output. UK has nearly 5 times more than Indian contribution. Canada has three times. (Table 4.2).

3. On comparison with USA contribution, the global contributions are only 2.61 times of USA Contribution. India contributes 5% of USA contribution. This indicates that India too has substantial contribution in health science.

4. From the year 1994 onwards there is a study growth on publications and the same gets doubled once in two years upto 2000. Overall Publication output was found to be steadily increasing nature. The year 2008 yielded 7,845 (6.89%) articles followed by the year 2009 with 8,029 (7.06%) articles, 2010 with 8,881 (7.80%) articles, 2011 with 10,459 (9.19%)
articles, and in the year 2012 with 12,029 (10.57%). (Table 4.3, Figures 4.2 and 4.3)

5. It seems that there could not be any Indian contribution during eight years 1974, 1976, 1977, 1981, 1983, 1986, 1987 and 1994. From the year 1997 onwards there is a study growth on publications and the same gets doubled once in two years 2002. (Table 4.3)

6. Substantial growth can be seen during the last two block years, that is from 1999 to 2012. Global output during the said period is 84.17%. Therefore it can be inferred that the awareness on health science has been witnessed during the period 1999 and 2012. The awareness on health science has been witnessed during the period 1999 and 2012 in India. In general it can be inferred that the awareness on health science gain momentum during the period 1999 to 2012 (Table 4.4).

5.1.3 Relative Growth Rate (RGR) and Doubling Time (Dt.)

1. RGR ranges from 0.07 to 0.72. Average RGR of global output works out to 0.27. The doubling time ranges from 0.97 to 9.46 over the period. In the year 2009 the Dt(P) is 6.76. It shows that Health Science publications gets doubled with in 4½ years. Average doubling time works out to 5.74 which indicates that the publications in health science research
doubles once in every six years. (Table 4.5, Figures 4.5 and 4.6)

2. RGR ranges from 0.10 to 0.69. Average RGR of Indian output works out to 0.22. The doubling time ranges from 1.00 to 12.12 over the period. In the year 2009 the Dt(P) is 3.82 and reduces to 3.01 in the year 2012. It shows that Indian Health Science publications gets doubled with in 3 years. Average doubling time works out to 4.04 which indicate that the publications in health science research doubles once in every four years. The graph shows the relative growth rate is linear in nature. (Table 4.6).

5.1.4 Nature of Publications

1. The single most prevalent form of Global health science publication is journals (63.34%), It is followed by Reviews (17.72%), Conference Proceedings is 9.98%, Editorial (2.19%) and only fraction of articles were found in Reports. In the case of Indian health science publications same trend persists. 70.55% research papers appears as journals. It is followed by Reviews (15.67%) and Conference papers (9.58%). (Table 4.7)

5.1.5 Language of Communication

1. Maximum number of articles is published in English language (91.64%), followed by Chinese (1.68%), French (1.16%),
Portuguese (0.85%), Spanish (0.83%). 99.61% of Indian contributions are in English language. However it is surprising to note that few articles are also written by French, Portuguese, Spanish, Chinese, German and Turkish. (Table 4.8)

5.1.6 Authorship Pattern

1. 69.61% were collaborative research either by two authors or more than two authors in the case of global publications. Only 30.39% of contributions were by single authors. In the case of Indian contribution too, 87.2% are collaborative in nature and Only 12.8% alone solo research. (Table 4.9).

2. In the case of Indian contribution only 286 (12.8%) of publications are single author publications. 78.2% of publications are collaborative in nature. Nearly 44.6% of articles are published by more than three authors. (Table 4.10)

3. Degree of collaboration for global publications ranges between 0.21 and 0.84 whereas for Indian publication ranges between 0.33 and 1.00. This shows that degree of collaboration of Indian publications are in higher order than global publications. (Table 4.12).

4. The global publication of health science 1,13,794 articles were authored by 3,61,058. Average number of authors per article for global publication works out to 0.315. Similarly Indian
publications of 2235 were authored by 8586. Average number of authors per article for Indian publication works out to 0.26. Even though the collaborative research exists, average number of authors for global paper may be three and for Indian papers it may be four.

5. Co-authorship index of both global and Indian publications of health science are more than world average of 100. (Table 4.17 and 4.18)

5.1.7 **Sub field on Health Science**

1. 1,13,794 publications have more than 30 subfields. Each article may represent more than one subfield. The total subfield of records accounts to 1,89,626 with the average of 1.67. This indicates that each publication deals with a minimum of two subfield.

2. The subfields Medicine (34.86%), Social Science (9.19%) are the top two contributions in Health Science research. The other four are “Biochemistry, Genetics and Molecular Biology” (6.66%), “Nursing” (5.32%), “Psychology” (4.67%) and “Agricultural and Biological Sciences” (4.14%). (Table 4.18)
5.1.8 Institutional Contribution

- In the global output the top 25 institutions contributions were only 12.83%. Among the 25 top institutions VA Medical Centre (961, 0.84%) and University of Toronto (944, 0.83%) are the top two positions. (Table 4.19)

- The top 25 institutions contributions were only 29.54%. Among the 25 top institutions “All India Institute of Medical Sciences” (135, 6.04%), “National Institute of Mental Health and Neuro Sciences” (44, 1.97%) and “Jawaharlal Nehru University” (34, 1.52%) are in top three positions. (Table 4.20).

5.1.9 Journals in Health Science

- Social Science and Medicing (1591 articles), Annals of the New York Academy of Science (852) and Science (811) journals are the major contributors in health sciences. Only 14.51% of the articles are appearing the top 30 journals. However 10% of the articles are appearing in seventeen journals. It seems no indian journal has appeared in the top 30 journals. (Table 4.21).

- “Environmental Monitoring and Assessment” (124 articles), “Asian Journal of Microbiology Biotechnology and Environmental Sciences” (85) and “AIDS and Behavior” (31)
are the major contributors in health sciences. Only 23.81% of the articles are appearing the top 20 journals. However 10% of the articles are appearing in top three journals. (Table 4.22)

5.1.10 Collaboration of Indian Publications

- Collaborative research is evident in Indian contribution irrespective of document type. (Table 4.23).

- These 25 countries collaborated in 666 publications. The percentage of collaboration of these 25 countries comes 29.84%. Out of 25 countries, Indian authors have more collaboration for 223 publications with USA (10.03%). It is followed by UK (3.72%), Canada (1.66%) and Australia (1.55%). (Table 4.24)

- Out of 68 authors who have contributed more than 20 publications, Okada contributed 74 publications. It is followed by Tanimoto with 72 publications and Mervis with 67 publications. (Table 4.25).

- Nearly 64 Indian authors have contributed more than 10 papers in health sciences. These 64 authors total contribution works out to 44.97% of the contribution. Among the 64 authors, Parthasarathy has more number of publications (35, 1.57%). It is followed by Singh with 31 publications (1.39%) and Roy with 26 publications (1.16%) (Table 4.26).
5.1.11 Citation Pattern

- It can be seen from Table 4.27, average authors for every year for global output ranges between 1.33 and 4.04. Similarly average number of pages ranges between 7.54 and 15.22 which indicates, on an average, that each article has minimum of 7 to 16 pages. The average number of citation ranges between 0.33 to 30.51. In general during the 43 years of publications indicates that each paper on an average has three to four authors, 9 to 10 pages and carries citation 12 to 13. (Table 4.27)

- Average authors for block year of global contribution ranges between 1.42 and 3.56. Similarly average number of pages ranges between 8.80 and 11.09 which indicates, on an average, that each article has minimum of 8 to 11 pages. The average number of citation ranges between 0.87 to 24.39. (Table 4.28).

- The average citation per article of Indian contribution works out 13.25. (Table 4.29)

- Two authors and three authors’ papers have more number of citations than that of single author and more than three authors paper. (Table 4.30)
5.1.12 Publication Efficiency Index

- The publication Efficiency Index is greater than one in two block years (ie. 1992-1998 and 1999-2005) indicates that the impact of publications is more than the research effort devoted to it for the particular block years. Out of these two block years, 1999-2005 the impact of the publication is more than research effort. (Table 4.31)

5.1.13 Activity Index

- Two authors collaboration is more active in third, fourth and six block years. In the case of three authors and More than three authors the collaboration is very activity. (Table 4.33)

- Activity index for health science publication is more than 100 from the year 2007 onwards which indicates that activity research in health science is evident from 2007 to 2012. (Table 4.34)

A total of 63 papers of Indian contributions were cited more than 50 times. Out of which four papers were cited 65 times. One paper which has highest number of times cited ie. 620 times. It is followed by a paper which has 402 times citation. Two papers were cited more than 305 times. There papers each were cited 50 times and 51 times respectively (Table 4.35).
These 63 papers were distributed over the period of 12 years. Out of 63 papers which has more than 50 citations, 14 papers that were published in the year 2002. It is followed by 12 papers belongs to 2008 and 11 papers that belongs to 2003. One paper that has published in the year 1995 has more than 50 citations. The papers that are published in the year 1996, 1997, 1999, 2004 and 2010 has not received more than 50 citations. It can be inferred that the publications of the year 2002, 2003 and 2008 are having high research value. It can also infer that the publications receive citations only after one year of publications (Table 4.36).

58.7% of publications belong to Journal article. It is followed by review nature publications (38.1%). Two conference publications were also received more than 50 citations. It can be inferred that in the case of health science publications Journal articles, review papers and conference papers are most important (Table 4.37).

Four solo research papers have also received more than 50 citations. However 59 papers were collaborative nature. Out of which 16 three authors publication has received first position. It is followed by four author publications (15) and two author’s publications (10) were ranked second and third position. 8% of publications have more than 10 authors (Table 4.38).

The life span period of the highly cited 63 articles ranges from 2 to 13 years. The average life span period of the highly cited article works out to 6.90 years. The Life span period of health science articles are 6 to 7 years (Table 4.39).
There are eighteen articles out of 2235 which has citations more than 100. The following are few inferences of these 18 articles

- Eight are journal articles, 9 review papers and one conference papers.
- Three are solo research papers and 15 were collaborative research.
- The type of publications of these three solo research papers was one Conference paper, and review and two review papers (Table 4.40).

5.2 FINDINGS IN RELATION TO HYPOTHESES

The study undertaken has indicated that the hypotheses:

1. Research productivity in Health Science is comparatively higher in developed countries. There is significant difference on the publications with respect to country wise distribution.

2. There exists a significant level of difference between Health Science research performance of Indian scientists and scientists of other countries.

3. Among the third world countries, India contributes substantially in Health Science research.
4. Journal plays major role in publishing papers on Health Science. There is a significance difference in form of publication in publishing research papers.

5. Maximum number of articles published in English language. The level of significance on the awareness on various aspects of the acts among the LIS professionals depends upon the gender, domain and category of institution in which they are employed.

6. There exist the collaborative research dominates in the field of Health Science.

Stated in Chapter 1, under section 1.8 have been tested in Chapter 5 and found valid.

5.3 SUGESTIONS AND CONCLUSION

SUGGESTIONS

HEALTH SYSTEM REFORMS

Health systems throughout the world are searching for better ways of responding to present and future challenges. The economic restructuring and its effect on public spending, the modernisation of the State, the revaluation of the social sector, the search for efficiency, effectiveness and sustainability, and the due response to demographic, epidemiological, technological and cultural changes are identified as common elements that
influence the health sector’s organisation and functioning initiatives for reform. This has led to the analysis, design and implementation of health system reforms world-wide.

Health reforms are characterised by policy processes demonstrating sustained change beyond one-time efforts or sudden transformations. Reforms include provision for their own maintenance and continuation as well as information and decision systems capable of influencing their course. Reforms mean change at both the institutional and policy levels, that is, how things are done and how they are decided.

Reforms are supported by a knowledge base which must

(a) delineate the area of activity which is to be reformed;

(b) specify the originally desired overall purpose of the delineated activities;

(c) establish why the existing set-up is not achieving the desired overall purposes; and (d) identify proven and viable strategies to deal with all of the above.

**STRATEGIES FOR HEALTH SCIENCE**

The strategies that need to be pursued in determining the way forward in achieving an increase in health science by:
• providing a review of existing knowledge of the health science sub-sector and increasing understanding of the implications;

• raising awareness of the urgent need to address current, continuing and emerging problems in the context of the efficient use of natural resources; and

• responding to the compelling quest to maximise the multifunctional contribution of health science to sustainable food security, stable livelihood systems and environmental integrity.

In broad terms, these major concerns indicate the need to focus on the following goals for the health science sub-sector:

• define ways to increase awareness and provide informed views on the extent of the global importance of health science for human welfare;

• promote improved understanding of the value of the numerous contributions that health science;

• identify the major constraints limiting health science;

• benefit from lessons learned from past practical experiences;

• identify the major challenges and opportunities for development; and
• define strategies, global policy development issues and future directions that can support increasing health science and health care contributing to the greatest possible extent.

5.4 BYPRODUCTS OF THE STUDY

This study has facilitated for the compilation of directory of institutions involved in Academic Health Science centers for the major productive countries such as USA, UK and other countries.

i. Appendix A : Directory of Health Science Research Institutions in USA, UK and other countries.

ii. Appendix B : List of Allied Health Professions.

iii. Appendix C : Recognized Allied Health Professions

5.5 DIRECTIONS FOR FURTHER RESEARCH

The present study of research productivity on Health Science offers avenues for further research on the following areas:

1. The extent and pattern of collaboration research in the subfields of Health Science research.

2. The citation patterns in Health Science research contributions.

3. Mapping the literature on Health Science

4. Study of Indian output on Health Science
5. Impact of Health Science research literature on the branches of medical applications.

5.6 CONCLUSION

Health sciences are reforming their structures and services world-wide. Both, developed and developing countries are searching for better organization and functioning schemes of their health science organizations. The social service delivery system in developing countries is severely limited in its ability to respond and adjust to changing circumstances by institutional, organizational, and structural factors.

In this study, a preliminary literature outcome on the basis of health sciences was provided. The recent rise of interest among the health science education community in individual faculty making subjective judgements about medical trainee performance appears to be directly related to the introduction of notions of integrated competency-based education and assessment for learning. However Berendonk et al. (2013)¹ begins with the “cognitive bias” perspective, but goes on to explore the assessor’s perceptions of their role, the task, and the assessment context. Although it is known that assessor expertise plays an important role in performance assessment, the roles played by different factors remain to be unravelled. It is therefore essential to conduct an exploratory study with the aim of building a preliminary model to gain a better understanding of expertise of health science literature.

Reference