Chapter V

Findings and Conclusion
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5.1 Introduction

The Present project is a study of "Growth and Collaboration Trends in Acquired Immune Deficiency Syndrome Research Literature: A Bibliometric Analysis". The study includes an analysis of AIDS literature drawn from MEDLARS, between the years 1991 and 2000. Further the study identifies the course of trend in AIDS research as revealed by AIDS literature output. The study fulfilled the identified objectives and tested the set of hypotheses formulated.

5.2 Economic Growth and Literature Output

The GDP of countries has been taken into account to find out whether the economy of a country has an effect on its scientific literature output on AIDS. The study results revealed that there was no link between GDP of a country and its research literature output though some major powers like U.S.A., and UK were exemptions. Moreover, no link was found between the number of casualties in AIDS and the quantum of research output on AIDS.

5.3 Types of Publications

A broader classification of the AIDS literature resulted in 25 types of documents. Of the 25 varying items of documents, those having the
characteristics of primary sources were 22, secondary sources were 2, besides a single item of tertiary source.

Among all the categories of publications, the journal articles ranked first. Major source of information for AIDS is in the form of periodical literature.

A trend analysis of periodicals literature showed a decline in the output of records from 1991 ending with 2000. Though records on Clinical Trials showed a decline from 1991 to 2000 with irregular ups and downs in between the trend for future periods commencing with 2002 showed an upward curve denoting an ascending track. The decrease in the number of journal articles and the increase in the Clinical Trials as well as the Technical reports in the future trend shows that the future publications on AIDS research may be practical, lab oriented publications rather than theoretical ones.

5.4 Country-wise Distribution of AIDS Literature

Of the total 43,468 bibliographic records, 50.06 per cent was contributed by United States individually while other countries numbering 74, taken collectively contributed the remaining 49.04 per cent. England was the second major individual contributor with 20.94 per cent. United States and England taken together contributed an exact 70 per cent to the world AIDS literature.

Of the total literature output Germany and France occupied the third and fourth position with 3.6 and 3.4 per cent respectively. Less than 3 per
cent but above 2.2 per cent of contributions were by the Netherlands, Switzerland and Spain. One per cent and above but below 1.5 per cent of the total was contributed by Italy, Canada, Japan and Denmark. Other countries contributed individually below 1 per cent.

5.5 Relative Position of India

India contributed 294 items forming 0.67 per cent of the total, closely followed by Sweden with 293 items. 90 per cent of the total literature output during the decade ending with 2000 was contributed by eleven countries in the world, U.S.A. as the leader with 50.6 per cent and Denmark with the least among the eleven being 1.12 per cent. Major countries which contributed less than one per cent included China, Russia, India, Italy and Austria.

5.6 Ranking of Journals and Their Country of Origin

The present study, while ranking the journals on the basis of productivity and the country of origin of publications, infers that United States ranked first with an overall 50 per cent of the total journals followed by England having one fifth.

The publications from various countries are grouped as Asian, African, American, European and Australian Countries. Based on this grouping, it is found that Australian countries had the least publication count with a negligible percentage of 0.982 and a total publications of 427.
The second least publication count was from the African countries with a percentage of 1.102 and the total publications is 474.

The maximum output was by the American Countries. The second maximum publication count is from European countries. Among the European countries, England ranked first in the research output on AIDS literature followed by Germany and France.

Among the African countries, South Africa had the maximum output with 0.771 per cent of the world total output.

Japan ranked first among the Asian countries in the scholarly output on AIDS research which is 1.311 percent. India being an Asian country ranked second among the Asian group with an output of 0.676 percent in the total output.

5.7 Authorship Pattern Analysis

64,958 authors have contributed 43,468 items. The per capita authorship was 0.67

Of the total literature output, 1993 marked the peak with 5242 items followed by 1994 and 1996. Starting with 1997 the output trend took a decline with 2182 items in 2000 forming less then 50 per cent of the peak mark reached in 1993.

Authorship ranged between single and as many as 26 in producing individual item among the contributions. Single author contributions formed 23.80 per cent, two authors contributions formed 13.57 per cent. Three
authors contributions formed 12.49 per cent, while five authors contributions formed 10.2 per cent.

Multiple authors contributions ranging above seven authors were in inverse proportion to the number of contributions. Seven authors contributions formed 6.34 per cent while six authors formed 8.6 per cent. Nine authors formed 4.5 per cent while eight authors formed 4.32 per cent. Ten and eleven authors formed 2.36 per cent and 2.02 per cent respectively. All the other types of authorship ranging between 12 and 26 were less than 1 per cent each.

When the number of authors increased per record, there was a decline in the number of publications and hence was inferred that both were in inverse proportion.

5.8 Authorship Pattern: Trend Analysis

Authorship pattern displayed a wide range from single authorship to a collaborative group effort of as many as 26 authors. Among the contributions single authors were found to be predominant while multiple authorship showed a steady decline in the number of contributions.

An application of the principles of regression analysis to the data on authorship revealed the following.

- In the pattern of single authorship, the observation revealed that despite its dominance over other types of number of collaborators, there was a steady fall and hence a decline in the number of single authors year after year.
A statistical probability based on the observed trend resulted in a forecast that in 2002 single author contribution may fall.

2005 may suffer a depression in the case of single authored contributions while after five years i.e in 2010 the total number of single authored contribution may ascend to 393.

5.9 Collaborative Authorship Trend

The application of the formula of regression analysis revealed interesting results. Right from two authorship collaboration to seven authors collaboration, a steady, though small, declining trend was noticed.

At the same time, collaborative authorship ranging from eight to ten authors was found to be on the increase. It was found that a statistical projection revealed the trend that the contributions to AIDS literature authored by eight to ten may record a dominant trend during the years following 2001 ending with 2010.

5.10 Single versus Multi Authored Publication - Degree of Collaboration

The analysis of single versus multi authored papers revealed the following facts.

Single authored papers marked a declining trend while multi authored papers recorded an increasing trend. In recent decades there has been a gaining trend towards collaboration in research in almost all pure and applied sciences. Subramanian has deduced a formula for calculating the degree of collaboration.
The analysis of the extent of collaboration of AIDS research reveals the following facts.

- Degree of collaboration had an initial value of 0.71 per cent in the year 1991 and it increased to 0.84 in the year 2000.

- This revealed the declining of single author papers and on the other hand an increase in the multiple authorship.

- This is the evidence that scientists in AIDS research intended to take collaborative participation in research problem solving activities.

- The result evidenced in the application of Subramanian's formula corroborated the results obtained through the regression analysis.

Collaborative authorship is found to be the trend of the day during the period under coverage and hence it is found to be at its maximum throughout the period of coverage. Though wider variation is noticed in the authorship pattern between single and two or three authored publications, the difference between the category of two authors and three authors collaboration was very low. This indicates that the authors preferred to publish either individually or resort to be in a group of more than three authors.
5.11 Single Authored Publications - Trend analysis

Single authored publications recorded an increasing trend from 1992 to 1993 but slipped off to a gradual declining trend towards 2000 and beyond.

5.12 Two Authored Publications - Trend analysis

The publications authored by two recorded a maximum in the year 1996 and minimum in 2000. The trend line representing the two authored publications displayed a decline 1998 onwards and at this rate per se is projected to continue beyond 2000 also.

5.13 Three Authored Publications - Trend analysis

The publications by three authors recorded a maximum in the year 1996 and minimum in 2000. A gradual decline after 1996 was noticed. The trend line representing the three authored publications showed a decline towards 2000 and is projected to continue beyond 2000 too.

5.14 More than Three Authors - Trend Analysis

The publications by the category of more than three authors had its maximum in the year 1997 and a minimum in the year 2000. There was a decline after 1997 though publications showed an increase in the year 1999 alone but not later. The trend line based projection lead to the inference that three authors contributions may to suffer in the new millennium and beyond.
5.15 Lotka's Law of Author Productivity

The study of author productivity is very essential in identifying the research performance of any area in science. The author productivity is determined on the basis of number of papers contributed by the Scientists in a field. The analysis of author productivity enables to identify the extent of contribution made by the researchers in a particular area of a subject. The inference from the frequency of names of authors and number of contributions showed an inverse proportion.

It could be deduced that in general when the number of contribution increases, the number of collaborators decreased. In this context it is appropriate to examine the implication of Lotka's law in relation to authors productivity in AIDS research.

In the light of Lotka's law, the outcome of the investigations is as follows:

The results of this study so far as authors productivity is concerned, it corroborated with that of Lotka's finding with a slight variations of 0.127.

The result of Lotkas finding is n = 2 while the result in the present investigation is n = 2.127

5.16 Value of Group Co-efficient for Collaborative Authorship

The number of collaborative authored publications was found to be four folds over that of the single authored publications. Among the
collaborative publications the degree of collaboration was found to be maximum in the category of more than three authors while it was at a minimum in the case of three author collaborations. The value of group coefficient of publications was maximum in the case of more than three author publications.

5.17 Single versus Multi Authored Publication-Degree of Collaboration

The analysis of single verses multi authored papers revealed some interesting facts. Single authored papers had a decreasing trend while multi authored papers were on the ascendance. Degree of collaboration revealed that the declining of single author papers and an increasing trend regarding multiple authored papers.

5.18 Author Frequency

The incidence of maximum frequency of author by name Cohen is found to be in 119 contributions. In other words Cohen wins the contributor's classic. The inference is, the frequency of names of authors and number of contributors were in reverse proportion.

5.19 Number of Pages: Year-wise

A scientist may consider the number of pages in an article as his individual, private time factor is a constant and may become even a constraint while the average number of pages in an article exceeds his propensity to read.
The quantum of AIDS literature published in different languages from various countries ranged from less than 10 pages up to 200 pages. Papers not exceeding 10 pages formed the highest sum with 88.21 per cent followed by 11 to 20 pages forming 9.95 per cent. A declining trend is recorded in the number of contributions while the number of pages increased. Quantum of pages and the number of contributions were in inverse proportion. Contributions ranging between 21 and 200 pages formed a negligible percentage.

Per capita number of pages per item ranged between 10 and 200. Frequency was more regarding documents measuring up to 20 pages. Documents ranging between 60 and 100 per capita pages were negligible and did not come with in percentage calculation.

5.20 Quantum of Pages: Trend Analysis

AIDS literature is available from a single page comments up to more than 100 paged monographs. Documents in 10 pages ranked first. But this may have a decreasing trend between the period from 2001 to 2010. At the same time publications having pages from 22 to 30 are supposed to have a rising trend.

5.21 Language: Year - wise Distribution of Publications

Documents in monolingual form were in 26 different languages including English. There were 7 bilingual languages that included English - French, English - Italian, English - Portuguese, English - German, English - Spanish, German - French, English - Russian. Other than
English, in polyglot documents three languages namely French, Spanish and German were involved. English and French were found to be common in almost all polyglot documents.

It is to be noted that all the languages involved in polyglot were European languages and no oriental language was to be found in those documents. One advantage of English being the majority language of AIDS literature is that, scholars in many of the African, Saharan, Australian and Asian countries are familiar with English language. Hence the presumption is that English to vernacular translation possibilities carry the message to the labour class which suffers the fangs of the dreadful disease AIDS.

AIDS literature in English dominated the information environment during the decade covered between 1991 and 2000 with a very high score. English proved to be the lingua franca to the majority of the scientific community working on AIDS all over the world.

5.22 Dominance of English

It is noted that English has been maintaining the dominance in science communication since long. In the Encyclopedia of library and information science, in a signed article on Biological literature, H.E. Kennedy and Phyllis V.Parkins stated that "the ratio of English to foreign language literature in 1967 (47:53) was similar to that of 30 years ago." Linking the above reference to the present study, it can be inferred that

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roughly speaking, English has been maintaining a solo lead in science communication, which is found confirmed by the present study also.

Out of the 11.5 per cent of non-English literature, majority is in European languages such as French, Spanish, German and Italian. Even among major European languages, other than English, the number of contributions is found to be meagre.

This shows contradiction over Allen Kent's observation in 1977 that 55 per cent of total scientific literature is in non-English which contributes in English language amounted to 45 per cent. But still a similarity could be noticed between Kent's 1 observations and AIDS literature statistics in 2000. English as a single language contributing to the growth of scientific literature leads a higher score not only in Kent's observation but even today in the result of this investigation.

A majority of bilingual documents involves English as a second component. The incidence rate of English in world bilingual literature was 60 per cent.

5.23 Language of Publication: Trend Analysis

The publication productivity of AIDS literature in English showed a gradual decline from 1991 onwards till 1999. But it has taken up a revival in the year 2000. The statistics when projected for the years 2001 to 2010 showed a further decline in the publications.

Though a dominance of English is witnessed in AIDS literature from an over all view, the performance of this language taken for each
individual year between 1991 and 2000 presents a different picture. 1991 literature alone witnessed the enormity of publications or the major portion for the decade, contributes to this generalization.

5.24 Good Homer Nods

The flow of publications was not even and overloaded during the beginning of 1991. From 1992 onwards a drought in AIDS literature output is noticed. English, a single dominant language of the majority of publications falls in line with the general declining trend. English publications on AIDS may take a negative trend if the current situation in AIDS research continues unabated.

All the other languages numbering 25 were found to have a negligible percentage each amounting to less than 1 per cent. Hindi – the national language of India figured among the languages in which there had been either two contributions.

Of the bilingual contributions the frequency of English as one of the two is more.

5.25 Language of the Publications: Country - wise

75 countries contributed in 26 languages. English having a lion's share. Africa which is having higher incidents of AIDS contributed only 7 articles in African language. The literature output from Africa presenting a weaker picture showed that the research funding on AIDS was very much less as evidenced in a lower number of publications. This situation is in
total agreement with the findings of Subbiah Arunachalam and Subbiah Gunasekaran.

Of the total AIDS world literature 86.1 per cent was published in English language. While the rest of the literature was in non-English. Among the non-English AIDS literature, 25 languages served as *lingua franca*.

It is quiet interesting to note that six categories were noted to be in bilingual medium where all English was found with others. Arabic and Hindi were also among the non-English category each having two records. Only 4 languages contributed individually between 1.3 per cent among non-English language output.

5.26 Application of Zipf's Law

On application of Zipf's law to the words occurring in the title of records in the sample of the present investigation, it was found that the results coincided with those of Zipf's findings, with a small amount of difference.

Among the words, "AIDS" occupied the first rank with a highest score of frequency followed by HIV, naturally reflecting the theme taken for analysis.

5.27 Quantum of Pages Country-wise

AIDS research published in different countries have varied quantum of pages. The total number of pages range from 1-10 to about 200
pages. Among the total quantum of output, United States showed the maximum value of 19509 documents each with less than 10 pages. England ranked second. All the countries irrespective of their type had more documents with pages below ten. Frequency of the number of pages and the frequency of the number of items were in reverse proportion.

5.28 Application of Bradford's Law of Scattering

The top ranking publication count was in the periodical namely, "AIDS" contributing almost one third of the total output. The first 25 journals had produced 14537 items forming the first zone.

On application of Bradford's law on the data on AIDS literature it was found that the results of this study invalidated Bradford's Law of distribution.

5.29 Year-wise Ranking: Verification for Stability / Disturbance

The year-wise ranking of the journals has also been worked out to identify as to whether any single specific journal continues to lead or not. Of the total period under coverage spanning between 1991 and 2000, the journal entitled, 'AIDS' is found to have maintained a lead over all the other journals figuring in the database although the period under study.

Science which is one among the popular journal category could reach the fifth rank during 2000 and has a good ranking record in all the other years. This shows that popular journal which does not belong to the
Similarly, Nature which belongs to the General Science Journal category, also finds a prominent place among the high ranking category on AIDS research.

Since the total number of journals covered under the study period is more, the percentage of publication count on AIDS by journals beyond the rank of ten is less than 1 and the top most journal ranked first has an overall percentage of 6.74 only.

5.30 Bradford's Bibliograph

The number of source articles and the cumulative number of journals were plotted. The resulting graph begins as a rising curve and then continues as a straight line.

5.31 Conclusion

The absence of due contribution to AIDS literature from the developing world is conspicuous. Major countries like India and China need to pay more attention to AIDS research and literature output as they have been providing valuable guidance and leadership to other countries in a variety of concepts. In general, the developing countries which have been paying a heavy price economically and culturally to the haunting implications of AIDS, should open their eyes to fill up the research gap. It is a surprise to note that in the case of developing countries, the number of casualties in AIDS and the quantum of research output are almost in
inverse proportion. Excepting a few developed nations like U.S.A. and U.K., so far as AIDS research literature and GDP are concerned, it has been found in this investigation that there is no link between the two concepts while in general many studies have proved the other way.

As a continuation, further research can be undertaken to find out the reasons for the hollowness of contributions on AIDS between 1992 and 1999. It is during this decade, even the high scorers in contributions have suffered a depression. Efforts are lacking on the part of the developing countries to bring to records through clinical lab, the native medicine which belong to the category of naturopathy. Recognition is lacking to native medicines as the native medical information remains even today as hereditary. International databases should as part of their service consider including the information from developing nations. Preservation of information for posterity is part of information profession.

The Government of India which has been draining a lot of economic resources on AIDS awareness, like many other developing nations, should allocate more funds on the clinical and laboratory research on AIDS. For the generation and regeneration of research information, literature is the basis. It should be noted here that the famous information scientist, Eugene Garfield, the founding father of the Institute for Scientific Information (ISI), Philadelphia, noted in his "Life of an Information Scientist", that third world countries can excel in scientific research, if they can be provided with sufficient research literature. It is true. Developing nations should strengthen their information environment in general and in
identified areas warranting immediate attention, in particular. As a library professional, the investigator feels that resource sharing and networking among the Indian libraries as well as libraries in the developing countries should no more be a pipe-dream but a reality.

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