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Abstract

Public health is facing a current covid-19 crisis situation in the world. This study aims to analyze particular the South Asian Association for Regional Cooperation (SAARC) countries' public health research interest and growth. This bibliometric study selected the "Public Health" keyword from Scopus database geographical area selected was only SAARC countries in the title only and retrieved 1720 published articles. The time period selected was from 1957 to March 2021. 5758 authors were identified to published relevant studies on total over an average of 7.34 years in public health. The data retrieval most productive three main publishing countries India, Pakistan, and Bangladesh. Most productive institutions and authors are from India. Bibliometric analysis showed growth in international collaboration with the USA among most SAARC countries. The most productive journal was found to be "Indian Journal of Public Health" and the most productive author Ramasam, Y. J having a total of publication 57. This bibliometric analysis provides an inclusive overview of the public health research conducted in SAARC countries, which helps researchers, policy makers, and practitioner better understand the development of public health care and possible practice implications. Future Public health research should be dedicated to filling in the gaps between SAARC Countries health care research.

Keywords: Public Health, SAARC Countries, Bibliometric, Scopus, R Studio Cloud

Introduction:

Public health has garnered much attention in last year or so due to the COVID-19 pandemic. The health systems of the developed countries crumbled against the pandemic. In this context, it is imperative to understand research efforts made in the field especially in the developing world context. (Wang, 2020) The current article attempts to analyze the recent research trends in the domain of public health in the context of South Asian region, specifically SAARC countries. The importance of public health research is imminent in this region as most of the SAARC countries are developing economies with low- and middle-income level. (Das, et al., 2015) There are constraints on the resource these countries can devote on health system, and hence unlike developed countries emphasis on the health system strengthening, universal health coverage, protection from catastrophic health expenditures etc. (Rahman, Khanam, & Rahman, 2018) Become much more relevant in these countries. In these countries, the health expenditure as percentage of GDP is amongst the lowest across the globe. (Khan, et al., 2015) It becomes imperative to understand the field level issues and public health challenges these countries are facing. The study may help identify common issues and cross-country learnings for strengthening the health systems.

Review of Literature

Public healthcare disbursement, the level of deficiency, income difference, gender education and other socio-economic issues were the main determining factors of child mortality. (World Bank, 2004) World Bank study on Indian states using panel data for the period 1980–1999 found no special belongings of healthcare system disbursement on child mortality rate. (Burnside & Dollar, 1998) Public health research output in India has increased meaningfully, there are marked disproportions in relation to the weight of disease and the environmental distribution of research. Methodical priority location, adequate funding, and established capacity building are needed to address these inequities. (Kalita, Shinde, & Patel, 2015). Positive relationship between public health sectors expenditure performance for 30 OECD countries, Sri Lanka, Russia and Nigeria, respectively. On the other hand, Filmer and Pritchett. (Filmer & Pritchett, 1997) Health research output shows that despite the ever-growing prominence of human mobility across the globe, and Sustainable Growth Goals of departure no one behind, research output on immigrants' health is not consistent with the global migration pattern. A stronger evidence base is needed to enable authorities to make evidence-informed decisions on migration more impotence of health policy (Sweileh, et al., 2018) Every country develop health infrastructure for his countries and context is different, and as such there is no single system design ordinary, but there are several key points that can be contained by administrations as they look to better position their health source chains system for the future (Tompsett, Bornbush, Dickens, & Hart, 2014) university level done Quantitative study, usually show researcher tried to understand the growth of productivity publications (Patel & Bhatt, 2019). Bibliometric study was conducted to find out newly established central universities research

productivity's in last 10 years output. Majority of collaboration with among universities and good growth of physical and allied sciences compared to other subject. (Pandya, Joorel, & Solanki, 2021) The bibliometric study of scientific collaboration on COVID-19 current trends show to institutions collaboration with china and US. (Duan & Xia, 2021)

Research Methodology

To conduct this research, the term “Public Health” (between quotation marks) was used. The search was made in only titles, keywords words of publications, not currently. That is, it was necessary that the terminology be current in at least one of these fields. It did not define a period for the research because it sought to map all the products available in Scopus through March 2021, the data collection period. Researcher set limitations with only South Asian Association for Regional Cooperation (SAARC) Countries (Afghanistan, Bangladesh, Bhutan, India, the Maldives, Nepal, Pakistan, and Sri Lanka) Publications. After the initial survey resulted in a population of 1720 articles available in Scopus that included the term “Public Health,” with limitations for areas of capability. In this database of 1720 articles from Scopus online database, a review was conducted of the presence of the term “Public Health” in titles. After we found this article research added all these articles in this study. The bibliometric analysis of this study was conducted using a sample of 1720 articles published between 1957 and March 2021. The flow of research for the conduction of this bibliometric study can be seen in Figure 1.

Data analysis

To analyze the 1720 articles of the sample, data tables were export from Scopus database and after prepared in the Bib Text file format and imported into the R Studio Cloud (R Studio , 2021) also VOSviewer used in the bibliometric statistical analysis. Next, tables and graphs were prepared in order to map the following bibliometric indicators: evolution of systematic construction; most used scientific journals; countries with the highest production; institutional affiliation of the researchers; most productive authors and citation; most cited papers and citation and co-citations map; and main topics surveyed. For the citation and co-citation analyses, R Cloud software was used (Patel, Trivedi, Bhatt, & Shanti, 2021), which supported the drawing of the most cited authors, countries, affiliation and the most used articles as reference in the sample texts and identifying key references and comprehensible links of co-citation on which researchers have helped to research (Chaudhari, Bhatt, & Mandalia, 2020).

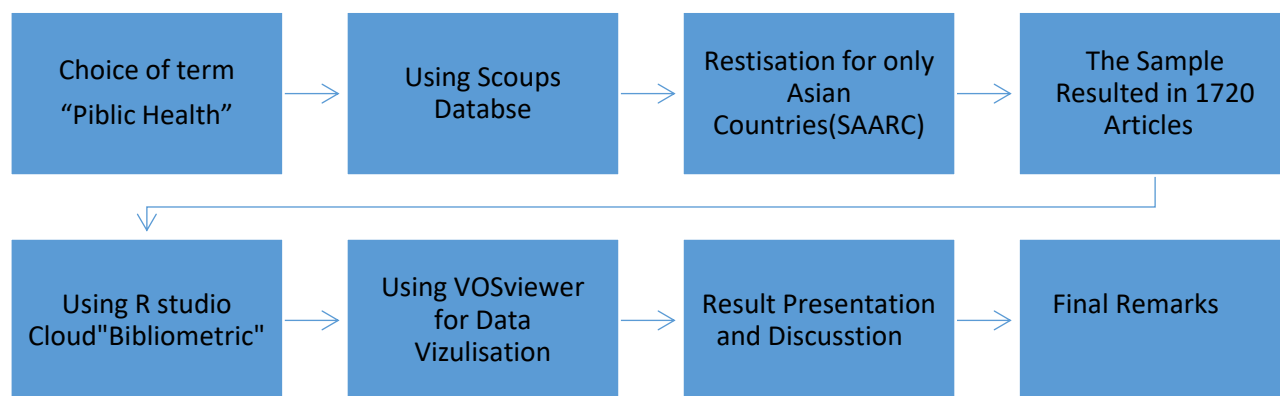


Figure 1. Flow of the Bibliometric Survey

Co-authorship Analysis

Co-authorship analysis, there are 49 countries in all that have institute affiliation in the publication of 5758 authors. Institute Affiliation of the SAARC countries in this study. Researcher analysis only 8 SAARC countries data only. Study find out of single-authored documents 345. Co-authorship Authors of multi-authored documents 5473, Co-Authors per Documents was (4.49%), and Collaboration Index was (3.98%) Obtainable of the total authors, only 78 meet the threshold of 5 number of article published documents and above for an author publication were acknowledged. The table below contains the top 15 authors that have the highest total links strength in Public Health publications for the period of 65 years from 1957 to March 2021.

Public Health Research Trends in SAARC Countries

Public Health research trends and productions by SAARC countries. are under the developing countries. The analysis of the top 15 countries having the highest number of publications, and the Vosviewer software Map clearly showed the spread of the publications by countries. Hence, conclusion will be drawn about the concentration of the research within the SAARC developing countries with good education and infrastructure has good public health research. Judging from the top 15 countries, the ratio publication the developed countries and the calculation for developing countries give clear outcome of landscape of dispersion the researches were done by countries. Also, the Vosviewer map conspicuously shows the countries on the map, therefore all that is needed to be do is to find what percentage are developed and what ratio are encourage good “public health” system infrastructure and research in countries .

Results and analysis

Evolution of scientific production

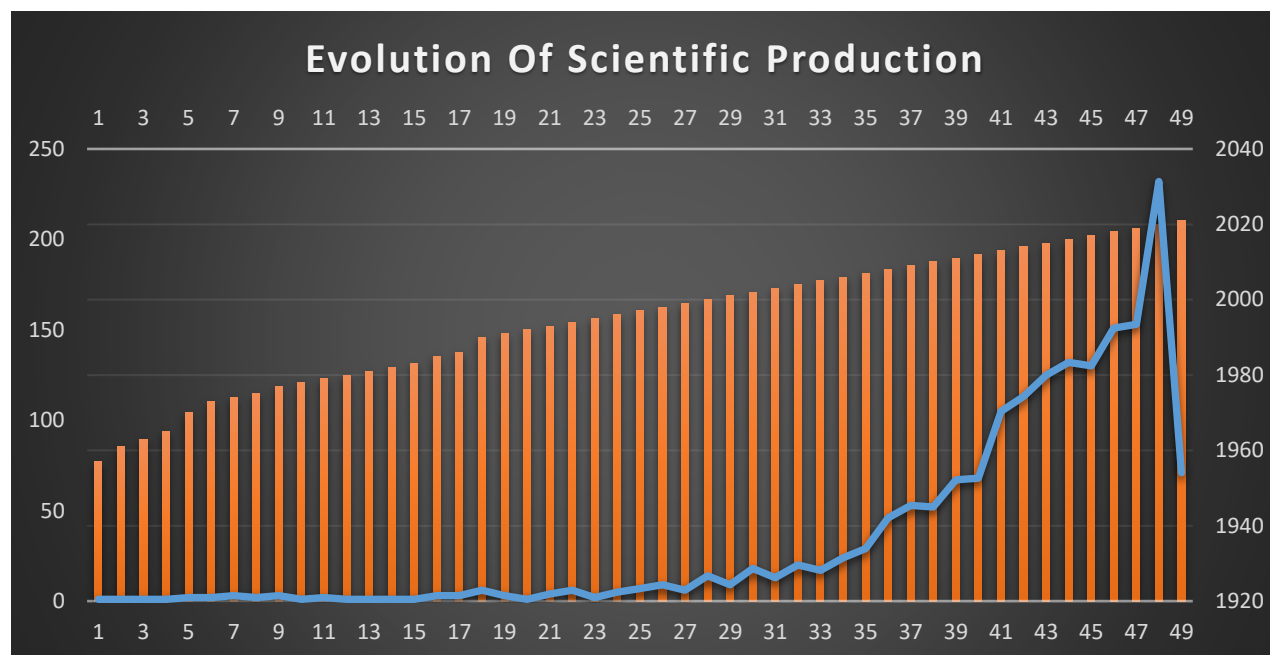


Figure 2. Evolution of the scientific publication (1957 to March 2021)

Source: Research data – Scopus-based survey

Publications growth on the Public Health theme increased over the period investigated (Figure 2). The first study was published in 1957. There followed average 1957 to 1965 only one paper. The period from 1970 to 1990 showed significant growth average publication on only 2. The period from 1991 to 2000 publication growth average 6 articles. The period from 2001 to 2010 showed significant growth publication average is 28 articles. The period from 2011 to 2021 showed significant growing publication growth average is 128 articles. These data show two publishing peaks: 2002, with 18 articles, dual the earlier year; and 2008, with 46 articles, the period from 2013 to 2021 each year 100 plus article was published.

Favorite Journals

Table 1: The top 15 most productive Journals on Public Health research

Rank	Source	TP	TC	ACPP	Cite Score 2019
1	Indian Journal of Public Health	70	207	2.96	1
2	Indian Journal of Community Medicine	40	307	7.68	1
3	Annals of Tropical Medicine and Public Health	37	16	0.43	0.4
4	Economic and Political Weekly	26	49	1.88	0.6
5	Indian Journal of Medical Research	26	293	11.27	2.2
6	National Medical Journal of India	26	89	3.42	0.8
7	BMC Public Health	25	203	8.12	3.9

8	Indian Journal of Public Health Research and Development	24	9	0.38	0.1
9	International Journal of Environmental Research and Public Health	21	351	16.71	3
10	Clinical Epidemiology and Global Health	18	20	1.11	1
11	International Journal of Preventive Medicine	18	41	2.28	2.2
12	Indian Pediatrics	17	25	1.47	1.3
13	Indian Journal of Community Health	16	15	0.94	0.2
14	Indian Journal of Medical Ethics	15	43	2.87	0.7
15	Frontiers in Public Health	14	35	2.50	2

TP: Total Publication; TC: Total Citation; ACP: Average Citation per paper

This research study has identified 15 top most prolific journals in the field of Public Health which are owned by different publishers see (table: 1). The journal with largest production is the “Indian Journal Of Public Health”(TC-207) which has 70 and is 4.06% of the total published articles within the period below evaluation. This is followed by the “Indian Journal of Community Medicine” has 40 total publication and this stands at 2.32% for the journals. “Annals of Tropical Medicine and Public Health” has 37 number of articles published which stand as 2.15%. But less citation received only (16). In the “International Journal of Environmental Research and Public Health” published 21 articles and has 1.22% of all articles published and received highest citation 351. The journal with most average citation per paper in the “International Journal of Environmental Research and Public Health” (ACPP-16.71) followed by the “Indian Journal of Medical Research” (ACPP-11.27) third rank was” BMC Public Health” (ACPP-8.12). Going by the 2019 CiteScore reports, two out of the fifteen top journals have CiteScore of more than 3.0. And three journals more than 2.0 CiteScore. The journal with the highest CiteScore is the Journal of BMC Public Health with 3.9 score. The journal with the least CiteScore of the scores of the fifteen top productive Indian Journal of Public Health Research and Development whose score is 0.01 published by Serials publication. This journal has the least score in everything including total publication, total citation, times cited etc.

Table 2: Top 15 most prominent Authors in Public Health research area

Rank	Author	Scopus Author ID	Year of 1st Publication	TP	h_index	g_index	TC	Current Affiliation	Country
1	Ramasamy J	55538523500	2013	57	4	8	86	Shri Sathya Sai Medical College & Research Institute	India
2	Shrivastava PS	55538731000	2013	52	4	8	83	Sri Vidyapeeth Deemed to Be University	India
3	Shrivastava SR	37104935800	2013	48	4	8	80	Sri Vidyapeeth	India

								Deemed to Be University	
4	Kumar R	57217697317	1999	20	5	10	116	All India Institute of Medical Sciences, New Delhi,	India
5	Zodpey S P	7003415080	2008	28	7	9	76	Public Health Foundation of India,	India
6	Kumar S	57220592049	2013	15	5	9	91	International Institute of Health Management Research	India
7	Kumar A	55716706200	2000	14	5	10	101	Xavier Institute of Social Service	India
8	Sharma A	56464503800	1996	27	7	8	85	Public Health Foundation of India	India
9	Reddy K S	35417788900	2002	13	5	13	242	Public Health Foundation of India	India
10	Singh S	57195606494	2008	13	4	7	59	National Centre for Disease Control,	India
11	Singh A	56096700700	2000	12	3	6	45	Ranchi Institute of Neuropsychiatry and Allied Sciences	India
12	Tiwari R	55314856100	2013	12	5	11	143	Indian Veterinary research Institute,	India
13	Rahman M	35571661300	2000	11	7	11	1583	UChicago Research Bangladesh,	Bangladesh
14	Sharma K	37079496900	2011	11	3	5	33	Public Health Foundation of India	India
15	Dhama K	6507396956	2013	10	7	10	207	Indian Veterinary Research Institute	India

Table no-2 study show, the discussion on the productive authors in the SAARC Countries field of Public Health was presented. The top most productive authors in the field, their Institute affiliation among others were provided. From the table, India has the highest number of authors i.e. (14 authors) followed by

Bangladesh with (1 authors). From authors' list, Ramasamy J of Shri Sathya Sai Medical College & Research Institute, India is first on the list. He authored 57 articles beginning from 2013, 4 h-index, 8 g-index and was cited 86 times. The second prominent author is Shrivastava P S, of Sri Balaji Vidyapeeth - Deemed to Be University, India. He published 52 articles in the field of the EO beginning from 2013; has 4 h-index, 8 g-index and was cited 82 times. Shrivastava S R of Sri Balaji Vidyapeeth - Deemed to Be University, India is third on the list. He authored 48 articles who first published in 2013, has 4 h-index, 8 g-index and was cited 80 times. fourth the Kumar R of All India Institute of Medical Sciences, India is forth on the list. He authored 20 articles who first published in 1999, has 5 h-index, 10 g-index and was cited 116 times. From authors' list thirteenth Rahman M of UChicago Research Bangladesh, Bangladesh He authored 11 articles beginning from 2000, 7 h-index, 11 g-index and was cited 1583 highest number of times. And authors list fifteen Dhama, K of Indian Veterinary Research Institute, India He authored 10 articles beginning from 2013, 7 h-index, 10 g-index and was cited 207 second highest number of times. The most productive authors institute affiliated list, Public Health Foundation of India was the 4 authors in the list, second of Sri Balaji Vidyapeeth - Deemed to Be University, was the 2 authors, and Indian Veterinary Research Institute also 2 authors in the list,

Table 3: Top 15 most productive countries is Public Health Researches

Rank	Country	Documents	Citations	ACPP	Total Link Strength
1	India	1308	11782	9.01	717
2	United States	213	5556	26.08	572
3	Pakistan	207	1198	5.79	196
4	United Kingdom	162	5185	32.01	520
5	Bangladesh	132	3123	23.66	204
6	Nepal	81	725	8.95	119
7	Australia	58	2144	36.97	173
8	Switzerland	51	1878	36.82	248
9	Sri Lanka	50	623	12.46	61
10	Canada	42	1217	28.98	188
11	Germany	32	735	22.97	110
12	Netherlands	32	930	29.06	134
13	Sweden	30	1773	59.10	129
14	South Africa	29	1947	67.14	172
15	China	26	737	28.35	87
27	Afghanistan	12	46	3.83	20
86	Maldives	3	1	0.33	0
87	Bhutan	1	0	0.00	0

Country-wise publicatiois

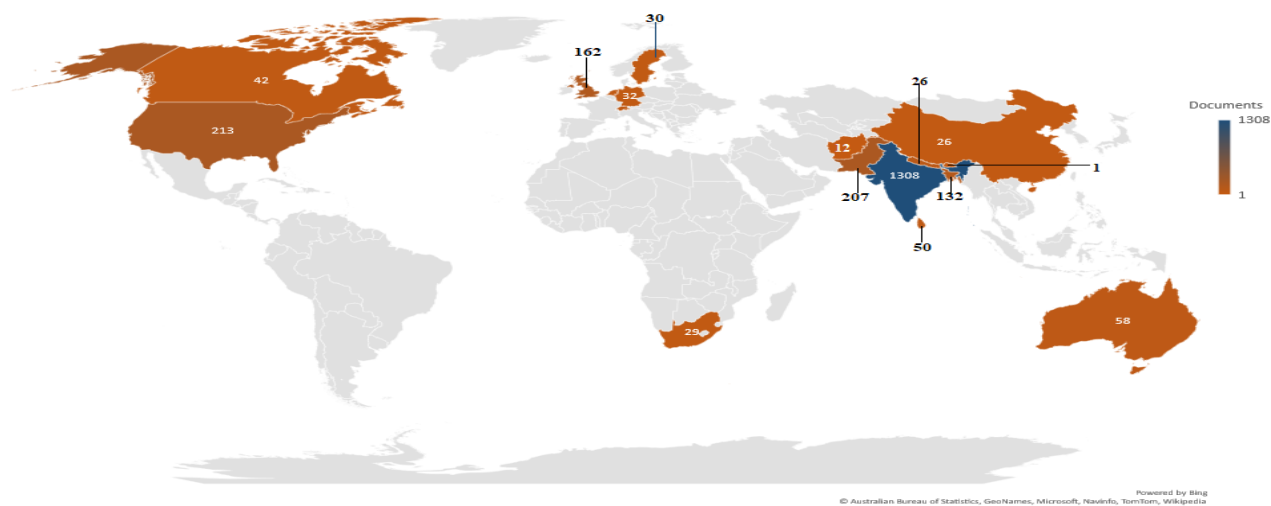


Figure 3. Top 15 most productive countries is Public Health Researches

Table: 3 shows the top 15 famous countries with collaboration with SAARC countries and most productive countries in the field of Public Health researches and rank list of all SAARC countries top 15 countries 5 SAARC countries in the list and Afghanistan rank 27 Maldives rank 86 and Bhutan rank is 87. The efforts of the research scholars from these SAARC countries have contributed greatly to the growth of this field. Public Health boosts opportunity identification. India has the highest number of publications in all SAARC Countries. India published 1308 articles and was cited 11782 times. And their Total Link Strength was 192. The next SAARC country on the list rank third is Pakistan with 207 publications, was cited 1198 times Total Link Strength was 50. In the list next SAARC Countries was Bangladesh rank five is Bangladesh with 132 article publications, was cited 3123 times total link strength was 28. Five SAARC countries were Nepal rank was six, 81 article publication and cited 725, total link Strength was 19. In the list rank nine was SAARC countries Sri Lanka Published 50 article and cited 623 and total link strength was 10. SAARC countries is Afghanistan was total rank 27, published 12 articles, and cited 46 times, total link strength was 20. SAARC countries is Maldives Published 3 article and cited 1 and total link strength was 0. And SAARC countries is Bhutan Published 1 article and cited 0 and total link strength was 0.

Table 4: Top 15 most productive Institution Affiliations is Public Health Researches

Rank	Organization	Countries	Documents	Citations	Total Link Strength
1	Department Of Community Medicine, Shri Sathya Sai Medical College And Research Institute	India	34	34	2
2	Public Health Foundation Of India	India	29	404	2
3	All India Institute Of Medical Sciences	India	16	127	1
4	London School Of Hygiene And Tropical Medicine	London	14	943	1

5	Christian Medical College Centre Of Social Medicine And Community Health, Jawaharlal Nehru University	India	5	9	0
6	Department Of Agriculture Food And Environment University Of Pisavia	India	5	5	0
7	Centers For Disease Control And Prevention	Italy	4	93	0
8	University Of Basel,	United States	4	68	0
9	Community Empowerment Lab Department Of Biological Sciences, University Of Sargodha	Switzerland	4	37	0
10	National Institute Of Health	India	4	26	0
11	Public Health Nutrition And Development Centre	Pakistan	4	17	0
12	National Institute Of Health And Family Welfare	Pakistan	4	14	0
13	Aga Khan University	India	4	4	0
14		India	4	3	0
15		Pakistan	4	1	0

The contribution of different Public Health organizations was estimated by the institute of the affiliation of at least one author of the published research papers. Table 4 lists top 15 institutions that contributed in the first organization 34 article published. Department Of Community Medicine, Shri Sathya Sai Medical College and Research Institute, in India. Follow by Public Health Foundation of India contributed nearly 29 Articles, third rank All India Institute of Medical Sciences (AIIMS) Articles published 14, in the Top 15 Institute in India (8) and Pakistan (3).

Table 5. List of the 15 most cited articles in Scopus, from the sample of 1720

Authors	Title	Source title	Citations
Patel V. et al. (2007)	Mental health of young people: a global public-health challenge	Lancet	1419
Smith A.H. et al. (2000)	Contamination of drinking-water by arsenic in Bangladesh: A public health emergency	Bulletin of the World Health Organization	1386
Woodcock Mr. et al. (2009)	Public health benefits of strategies to reduce greenhouse-gas emissions: urban land transport	The Lancet	654
Peres M.A. et al. (2019)	Oral diseases: a global public health challenge	The Lancet	285
Strosnider H. et al. (2006)	Workgroup report: Public health strategies for reducing aflatoxin exposure in developing countries	Environmental Health Perspectives	274
Bryce J. et al. (2003)	Reducing child mortality: Can public health deliver?	Lancet	265

Cesari M. et al. (2016)	Frailty: An Emerging Public Health Priority	Journal of the American Medical Directors Association	249
Vijayachari P. et al. (2008)	Leptospirosis: An emerging global public health problem	Journal of Biosciences	234
Van Brakel W.H. et al. (2006)	The Participation Scale: Measuring a key concept in public health	Disability and Rehabilitation	206
Mustafa M.S. et al. (2015)	Discovery of fifth serotype of dengue virus (denv-5): A new public health dilemma in dengue control	Medical Journal Armed Forces India	205
Csete J. et al. (2016)	Public health and international drug policy	The Lancet	203
Reddy K.S. (2002)	Cardiovascular diseases in the developing countries: Dimensions, determinants, dynamics and directions for public health action	Public Health Nutrition	194
Schouten E.J. et al. (2011)	Prevention of mother-to-child transmission of HIV and the health-related Millennium Development Goals: Time for a public health approach	The Lancet	184
Lutful Kabir S.M. (2010)	Avian colibacillosis and salmonellosis: A closer look at epidemiology, pathogenesis, diagnosis, control and public health concerns	International Journal of Environmental Research and Public Health	179
Khan A.U. et al. (2017)	Structure, Genetics and Worldwide Spread of New Delhi Metallo- β -lactamase (NDM): a threat to public health	BMC Microbiology	178

Notes: Number of citations considering the total citations identified in Scopus.

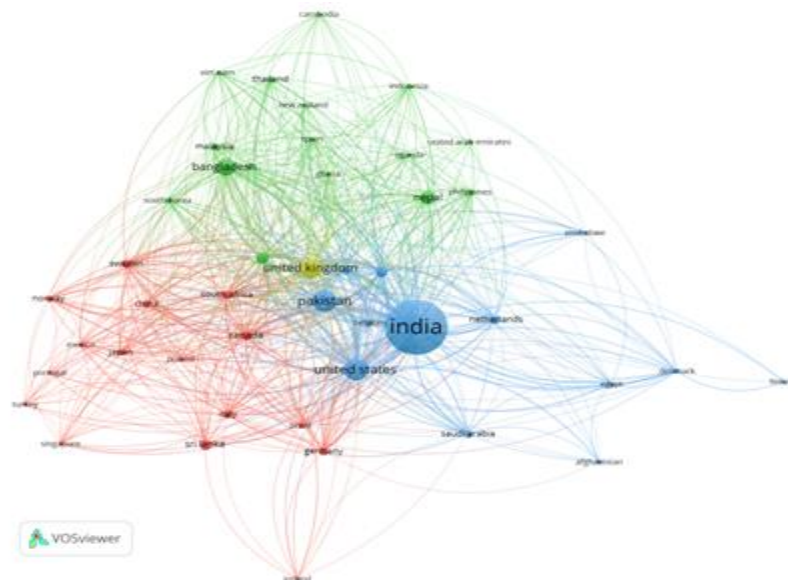


Figure 4. The country co-authorship network of Public Health Research

Country co-authorship network analysis reflects the degree of communication between SAARC countries as well as the significant countries in Public health Subject field. By exploring the systematic works of co-authorship among countries, we developed the international country collaboration with co-authorship network map using VOSviewer software (Figure 4). In Figure 4, a circle characterizes a country, the size of each circle denotes the number of articles of each country,. A line is established when two countries have a collaborative connection. The depth of each line reflects the tightness of cooperation and the number of partnerships between countries/regions. We set the threshold as 4, there are 46 countries meeting the requirement. The VOSviewer software divides these 46 circles into 4 clusters. Cluster 3 rank first is India was linking 44 countries, and total strength 711. Cluster 3 rank second is US was link 44 countries and total strength 572, and third Cluster 4 rank third is UK was link 44 countries and total strength 520.



Figure 5 the organizations co-authorship network of Public Health research

The contribution of different organizations was estimated by the institute of the affiliation of at least one author of the published papers. Table 4 lists top 15 institutions that contributed 18 or more papers. Of the organizations, there were 157 organizations meet the thresholds of 5, but 3 organizations were not connected to each other, so, this left us with 154 organizations as shown in Figure 5. Each circle characterizes one organization and the extent of each circle characterizes the number of articles of each organization. A line is established when two organizations have a collaborative relationship, the thickness of each line reflects the tightness of cooperation and the number of collaborations between organizations, the closer the circles the closer the collaboration. The VOSviewer software divided these 58 institutes into 10 clusters with 10 different colors.

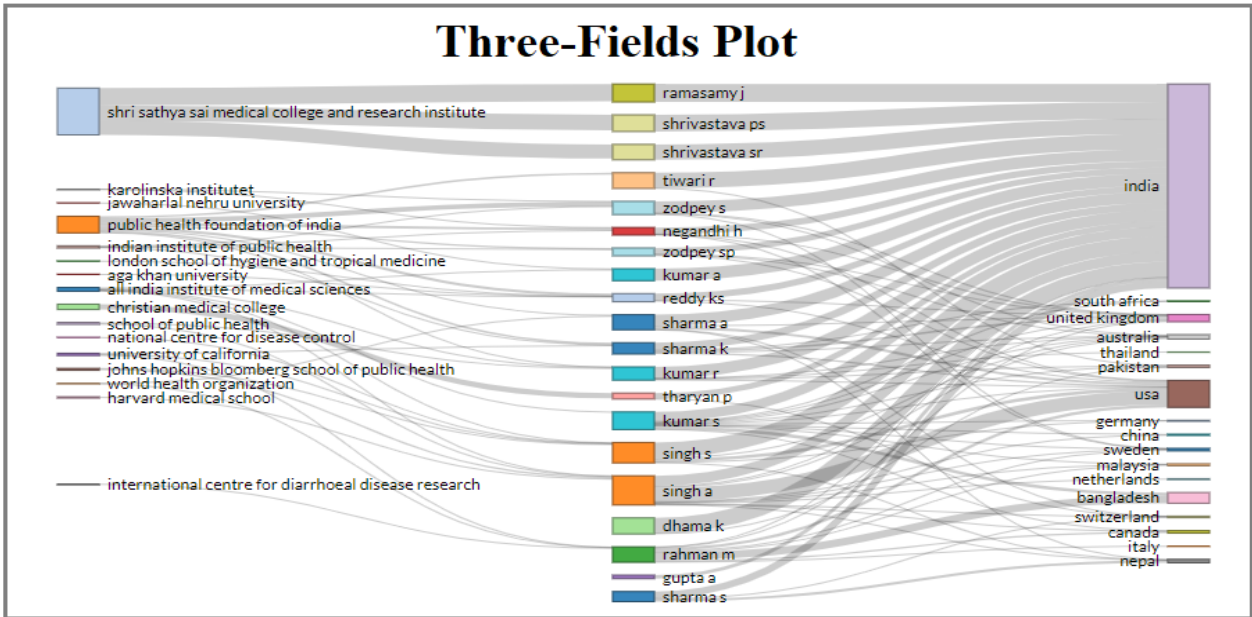


Figure 7 Three Fields plot Institute name, Author names and Keywords

Figure 7 shows the three fields plot network map of institute name, authors name and author's countries name, by R Studio software. All of 16 top institute names most productive 20 authors name and his countries name.

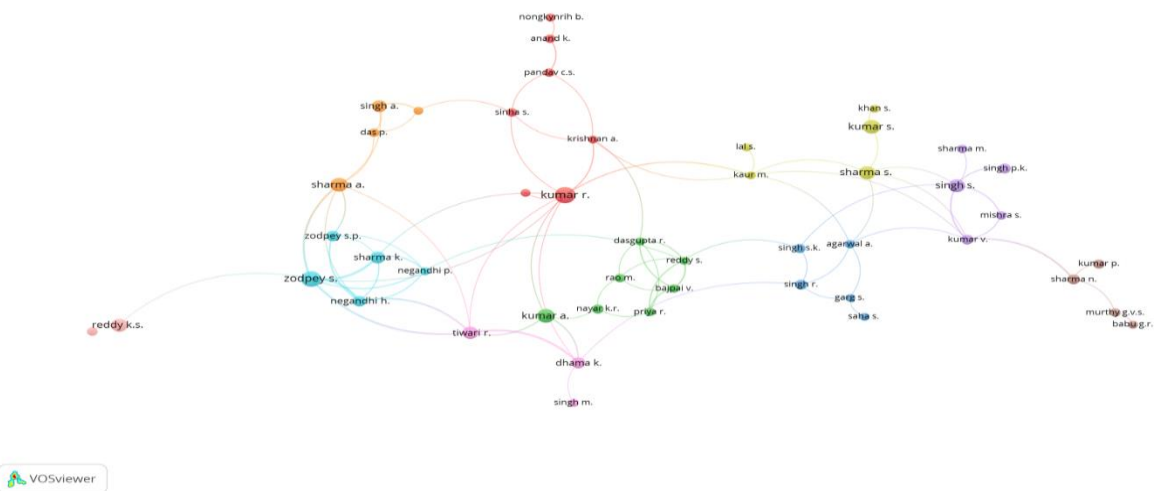


Figure 8 co- Authors network with minimum 5 papers with Public health

Figure 8 shows the network map of co-authorship analyzed by VOSviewer software. Of the all 78 authors who were published 5 articles, the size of the circle represents the number of articles in which

each authors collaboration with authors based on the number of co-authorship. In general, the larger size of a circle, the more often the vital co-authors seems. Two authors are nearer to each other if they concurred in the evaluated publications more frequently. There are ten main clusters that characterize ten different zones of “public health” research.

Conclusions

This bibliometric study analyzed total number of 1720 publications of SAARC countries related to Public Health that were extracted from the Scopus database. The analysis of data presents some novel findings. First, SAARC countries in total published 1720 articles. Of them, India published highest publications, followed by Pakistan. Second, publications of India received large number of citations 11782 and ACPP 9.01. Third, the highest publications of Bangladesh, Shri Sathya Sai Medical College and research institute, appeared to be the most involved institution among the institutions of SAARC Countries with 34 publications, followed by Public Health Foundation of India with 29 publications, and most productive top 4 authors in Top 15, USA appears to be the most collaborated country among SAARC Countries followed by UK. Eighth, highest number of Public Health researches is published in Indian Journals of Public Health, publication by Indian author Ramasam Y J (SCOUPS ID 55538523500) is Published 57 Article and largest citations. In summary, the evolution in the number of public health related research articles by researchers in SAARC Countries has been encouraging; and this pattern of growth is expected to continue. Significant variations in article publishing were observed across in SAARC Countries. Hence, future research on bibliometric analyses of articles published by SAARC Countries investigators ought to conduct separate county evaluations with standardized approaches, as well as define the overall patterns, to provide a more comprehensive view of their bibliometric characteristics.

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