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DISEASE BURDEN OF NATIONS AND RESEARCH OUTPUT: BIBLIOMETRIC ANALYSIS OF EBOLA VIRUS DISEASE

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Abstract

Literature output for a period of 30 years spanned between 1985 and 2014 has been obtained from PubMed. A sum total of 2172 records were retrieved and analysed bibliometrically. The publications output registers a growth since 2000 and maintains a steadiness up to 2014. For the first decade ending with 1994, many years witnessed mostly less than 10 publications while 100 and above items could be traced only from and after 2003. There is an upheaval in the quantum of research output noticed in 2014, though the calendar has a few more days to complete the year. Regarding region-wise research output in the context of author affiliation, North America tops the list with 1076 publications forming almost half the population of publications followed by authors belonging to a cluster of nations coming under the European regions are found to be closely tailing behind North America (44.8%). Africa, with a heavy disease burden has only 19 publications forming less than 1 per cent of the total publications output. India draws a blank and did not participate in Ebola Virus Disease.

Keywords*: Ebola Virus Disease; Bibliometric Analysis; Publication Counts; Bibliometric Indicators.*

Introduction

Research and development (R&D) into health is increasingly recognized as critically important in the fight against the major causes of morbidity and mortality among poor people in developing countries. In March 2014, global health officials recognized an outbreak of Ebola virus disease (EVD) in Guinea, West Africa. In retrospect, officials determined that the outbreak began in December 2013, and spread to the adjacent countries of Liberia and Sierra Leone. In September 2014, the U.S. Centers for Disease Control and Prevention (CDC) confirmed the first EVD case diagnosed in the United States[1], heightening concerns among some who fear that the disease could spread in American communities.[2] Unless otherwise cited, information in this report is drawn from Ebola information pages of CDC[3] and the World Health Organization (WHO).[4] The Ebola virus disease (EVD) is named after the Ebola River, near where the virus was discovered in 1976 in Zaire, now known as the Democratic Republic of the Congo (DRC). It is in the filovirus family, so called because of its filamentous shape. EVD is also known as Ebola hemorrhagic fever. The disease sometimes causes hemorrhage (i.e., bleeding) from body openings, but this symptom is not consistent. Five strains of Ebola virus have been identified. The Zaire strain is responsible for the current outbreak in West Africa. A slightly different Zaire strain is responsible for a smaller unrelated outbreak now in the Democratic Republic of Congo (DRC).

Bibliometrics

Every research publication is appended with a bibliography of cited documents. Such bibliographies collected from various articles and indexed in secondary sources form the basic units of analysis to bibliometrics. Bibliographic citation, in simple terms, is a list of documents cited in a research article. All the cited documents are enlisted while framing the bibliography. Each entry contains a uniform set of fields under document categories like books, journal articles, research reports etc. Each entry/unit in a bibliography includes a number of fields in accordance with a standard specification prescribed in a style manual as well as by the editorial policy of a journal which is chosen by a scholar for publishing his/her article. The present study is a bibliometric analysis of publications output in Ebola Virus Disease. The publications are drawn from the PubMed – an open source online database of international research output in Medicine and Life Sciences. This study covered a period of five years spanned between 1985 and 2014

Objectives of the Study

Regarding the analysis of publications in EVD has been covered at the global level with specific focus to the countries of incidence of the EVD. The objectives of this study include

(i) To measure the quantum of research (publications) literature/productivity for an identified period;

(ii) To measure the region-wise research contributions and to find out the correlation between the disease burden of nations and their research publications output frequency on the incidence of that disease.

Methodology

This is a bibliometric study. The data required for the bibliometric study of the EVD research literature output were retrieved from the PubMed for the period of 30 years spanned between 1985 and 2014 using the subject heading “Ebola Virus” tagged with the required individual year numbers. Selective statistical principles have been applied other than the Bradford’s law of scattering.

Limitations

The study is confined to research literature published from 1985 to 2014 drawn from the PubMed and does not include any article that falls outside PubMed.

Analysis and Interpretation

A sum total of 2172 publications were downloaded from the PubMed as in November.

Table.1

Annual Output of Publications in Ebola Research and its Probable Publications' Growth

S.No	Year	No of Publication(Y)	X	X^2	XY
1	1985	3	-14.5	210.25	-43.5
2	1986	5	-13.5	182.25	-67.5
3	1987	4	-12.5	156.25	-50
4	1988	4	-11.5	132.25	-46
5	1989	9	-10.5	110.25	-94.5
6	1990	8	-9.5	90.25	-76
7	1991	5	-8.5	72.25	-42.5
8	1992	12	-7.5	56.25	-90
9	1993	16	-6.5	42.25	-104
10	1994	7	-5.5	30.25	-38.5
11	1995	51	-4.5	20.25	-229.5
12	1996	60	-3.5	12.25	-210
13	1997	43	-2.5	6.25	-107.5
14	1998	44	-1.5	2.25	-66
15	1999	87	-0.5	0.25	-43.5
16	2000	67	0.5	0.25	33.5
17	2001	75	1.5	2.25	112.5
18	2002	81	2.5	6.25	202.5
19	2003	106	3.5	12.25	371
20	2004	92	4.5	20.25	414
21	2005	83	5.5	30.25	456.5
22	2006	87	6.5	42.25	565.5
23	2007	110	7.5	56.25	825
24	2008	62	8.5	72.25	527
25	2009	73	9.5	90.25	693.5
26	2010	94	10.5	110.25	987
27	2011	147	11.5	132.25	1690.5
28	2012	132	12.5	156.25	1650
29	2013	100	13.5	182.25	1350
30	2014	505	14.5	210.25	7322.5
		2172	**0**	**2247.5**	**15892**

Source : PubMed 2014.

Table.1 reveals the annual output of Ebola Research literature output for a period of 30 years spanned between 1985 and 2014. The publications output registers a growth since 2000 and maintains a steadiness upto 2014. For the first decade ending with 1994, many years witnessed mostly less than 10 publications while 100 and above items could be traced only from and after 2003. There is an upheaval in the quantum of research output noticed in 2014, though the calendar has a few more days to complete the year.

Probable Future Growth of Publication in Ebola Research

Straight Line Equation

a = ∑ Y/N = 2172/30 = 72.4

b = ∑ XY/ X^2 = 15892/2247.5 = 7.07

Estimated Literature in 2020 is

X = 20.5

Y = 72.4 + 7.07 (20.5) = 217.335 = 217 (Approx.)

Other things being equal, in the year 2020, the probable output is estimated to be numerically 217 which is less than the individual year's output in 2014. Because an outbreak was reported in USA in the middle of 2014, the research has been put on a fast track by USA and UK which could have been one of the reasons for such an extraordinary scenario in the research publication front. Otherwise, the peak point of a research field should be an appropriate point for deciding future course of its development. Such a statistical formula requires data, bibliometrically for a range of years in order to identify the peak point in Ebola virus research.

Table 2

Ebola Virus affected Countries (No of Cases) and Research Publication

S. No	Country	No. of Reported Incidents (1985 to 2014)	Research Output	Percent of Total Publication
1	Liberia	3929	0	0
2	SIERRA LEONE	2246	0	0
3	GUINEA	1199	0	0
4	Dem. Rep. of Congo	611	0	0
5	Gabon	214	0	0
6	Uganda	586	5	0.23
7	South Sudan	17	0	0
8	South Africa	2	5	0.23
9	Nigeria	20	0	0
10	Spain	1	4	0.18
11	USA	1	1054	48.53
12	Senegal	1	0	0
13	Ivory Coast	1	0	0

Source: WHO, 2014.

Of all the African countries affected by EVD, Liberia is the worst affected one with the highest incidence followed by Sierra Leone and Guinea in the second and third place respectively. Apart from the African countries, USA and Spain reported one case each. Research output is found to be nil from the African countries except Uganda, South Africa. Though Spain and United States reported only one case of EVD, Spain has brought out 4 publications while United States prove to be prolific in its research output with an extraordinary 1054 publications. A simple numeration of the EVD and the quantum of publications reveal that there is no correlation between the disease burden of a country and its research output.

Country of Authors: Various Regions

S. No	Region	Count	Percent
1	North America	1076	49.53
2	Europe	975	44.88
3	Asia	83	3.82
4	Africa	19	0.87
5	Oceanic	18	0.83
6	South America	1	0.05
		2172	

Source: WHO, 2014

Regarding region-wise research output in the context of author affiliation, North America tops the list with 1076 publications forming almost half the population of publications followed by authors belonging to a cluster of nations coming under the European region is found to be closely tailing behind North America (44.8%). Africa, with a heavy disease burden has only 19 publications forming less than 1 per cent of the total publications output. India draws a blank and did not participate in Ebola Virus Disease.

Conclusion

This is a bibliometric study of EVD research publications covering period of 30 years, a bibliometric study being one among the very few so far. EVD is a dreadful disease which was identified in 1976. After an outbreak in year 2000 and later, correspondingly there has been an increased in research publications output since 2007. After the report of a single incidence EVD in United States 2014, a hectic research activity is witnessed in USA, UK and many east European countries. The resulting factor is 2014 alone has registered more than 500 publications on EVD, ever to be registered in a single year. The Global Health Security Agenda aims to strengthen public health systems in countries that need it most in order to stop outbreaks before they become emergencies. We believe that stopping

outbreaks in a way that leaves behind stronger systems to identify, stop, and prevent future health threat is a moral imperative.

Reference

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