

World Map of Scientific Misconduct

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Abstract A comparative world map of scientific misconduct reveals that countries with the most rapid growth in scientific publications also have the highest retraction rate. To avoid polluting the scientific record further, these nations must urgently commit to enforcing research integrity among their academic communities.

Keywords Scientific misconduct · World map · Academic communities

Scientific and academic publications report the progress of new research in science. Scholars inform about their new contributions in science by the means of academic literature. Scientific publications have a rapid global growth, however, there are worldwide concerns about various types of unethical scholarly practice or research misconduct all over the scientific community (e.g., Hvistendahl 2013; Ataie-Ashtiani 2016; Stone 2016).

The world map of scientific plagiarism based on the technical manuscripts submitted to arXiv between 1991 and 2012 was prepared by accounting the number

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Table 1 Nations with more than 50,000 documents from 2011 to 15 March 2017

Country	No. of documents 2011-current	No. of retracted articles	Misconduct ratio	Ranking based on misconduct ratio	Ranking based on no. of documents
China	2,741,274	4353	1.588E-03	1	2
Malaysia	157,198	50	3.181E-04	2	35
Mexico	121,193	31	2.558E-04	3	29
Taiwan	252,497	46	1.822E-04	4	17
Pakistan	71,350	10	1.402E-04	5	46
Iran	271,403	38	1.400E-04	6	22
Saudi Arabia	97,886	8	8.173E-05	7	44
Hong Kong	100,036	8	7.997E-05	8	31
South Korea	465,211	32	6.879E-05	9	12
Egypt	92,328	6	6.499E-05	10	42
India	747,844	39	5.215E-05	11	9
Singapore	117,089	6	5.124E-05	12	32
Thailand	78,124	4	5.120E-05	13	43
Australia	529,779	19	3.586E-05	14	11
Netherlands	343,352	12	3.495E-05	15	14
Romania	87,280	3	3.437E-05	16	41
Japan	787,157	27	3.430E-05	17	5
Canada	606,562	20	3.297E-05	18	7
Italy	624,340	18	2.883E-05	19	8
Greece	114,300	3	2.625E-05	20	27
United Kingdom	1,145,434	30	2.619E-05	21	3
Ireland	79,950	2	2.502E-05	22	38
Germany	1,010,967	25	2.473E-05	23	4
Czech Republic	130,262	3	2.303E-05	24	28
United States	3,876,791	88	2.270E-05	25	1
Portugal	134,433	3	2.232E-05	26	33
Austria	142,689	3	2.102E-05	27	24
Poland	238,095	5	2.100E-05	28	19
Belgium	192,437	4	2.079E-05	29	21
Turkey	246,018	5	2.032E-05	30	20
Sweden	227,239	4	1.760E-05	31	18
France	712,371	10	1.404E-05	32	6
Argentina	77,402	1	1.292E-05	33	37
Russian Federation	340,791	4	1.174E-05	34	13
New Zealand	87,919	1	1.137E-05	35	36
Spain	526,613	5	9.495E-06	36	10
South Africa	110,908	1	9.016E-06	37	34
Norway	119,574	1	8.363E-06	38	30
Brazil	394,107	3	7.612E-06	39	15
Switzerland	258,541	0	0.000E+00	40	16

Table 1 continued

Country	No. of documents 2011-current	No. of retracted articles	Misconduct ratio	Ranking based on misconduct ratio	Ranking based on no. of documents
Israel	119,452	0	0.000E+00	40	23
Denmark	147,828	0	0.000E+00	40	25
Finland	115,287	0	0.000E+00	40	26
Hungary	63,662	0	0.000E+00	40	39
Ukraine	59,555	0	0.000E+00	40	40
Chile	62,837	0	0.000E+00	40	45

of authors who have copied significant chunks of the previously published works in their papers (Bohannon 2014). 57 nations with the minimum number of 100 submitted papers were considered in Bohannon's study. Ataie-Ashtiani (2017) provided a country ranking of the publication misconduct based on the number of retracted articles of the top 25 countries, in the number of publications, for the period of 1996–2014 using the Scopus database. Both of these studies showed that China is far ahead of the other countries in academic publication misconduct, followed by other nations such as Iran and India.

Here, a comprehensive scientific misconduct ranking of 180 countries and a three-dimensional world map of scientific misconduct is presented following the method of Ataie-Ashtiani (2017). The retracted scientific publications are closely associated to academic misconduct (Fang et al. 2012). The present data including the total number of documents and the number of retracted articles for the period from 2011 to now (15 March 2017) are compiled to provide an update status of the geography of academic misconduct. The total number of 19,967,965 documents and 4960 retracted articles were considered. The ratio of academic misconduct as the number of retracted documents to the total number of documents is calculated for each country and results are shown in the three-dimensional map in video S1 [Misconduct_WorldMap.mp4].

The data has also been provided in Table 1 only for the 46 nations with more than 50,000 documents in the database to avoid distortion (e.g., In Myanmar, there are only 1090 documents and the retracted articles are 2, therefore the ratio of misconduct is the highest for this country among the 180 nations). China, Malaysia, Mexico, Taiwan, Pakistan, Iran, Saudi Arabia, Hong Kong, South Korea, and Egypt are the leading countries in the publication misconduct ladder among these 46. Almost all of them are among developing countries, emphasising higher education and academic research, for the sake of scientific development advancement.

China with 4353 retracted articles out of 2,741,274 documents is the leading nation in breaching scientific integrity. If the ratio of misconduct for each country is normalized to that for Brazil, for the top 10 countries the ratios are 209, 42, 34, 24, 18, 18, 11, 11, 9, and 9 times higher than that for Brazil, which shows that China's scientific misconduct is an order of magnitude higher than those nations who follow it in this regard. This geographical scrutiny of publication misconduct confirms

Ataie-Ashtiani (2017) that the nations with the highest growth rate of scientific publications are also leading nations in publications misconduct. As a common index of scientific development, publications are exceedingly expected in these countries and researchers are under pressure of “publish or perish” (Qiu 2010), therefore, these countries need to profoundly promote research integrity among academic communities and to shift the stress from quantity to quality of publications.

Compliance with Ethical Standards

Conflict of interest The author declares no competing financial interest.

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