

## EXPLORING TRENDS IN ENVIRONMENTAL POLLUTION AND HAZARDOUS CHEMICAL WASTE REPORTING

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### **Abstract**

In contemporary society, environmental pollution and hazardous chemical waste are pressing concerns. This study investigates reporting trends related to environmental pollution and hazardous chemical waste in twelve scientific journals and daily newspapers. Notably, we found that the year 2013 marked a significant peak with the highest number of articles on these topics. Understanding the publishing and reporting trends of these subjects is pivotal for informed public education and underscores the significant influence of scientific research in shaping media reporting. As the global community faces increasing environmental challenges, accurate and scientific-based reporting is essential for fostering public awareness and facilitating effective solutions.

### **Introduction**

Environmental pollution represents one of the greatest challenges of modern human society [1]. Common pollutants in the environment are chemical substances that can exist in various forms, such as chemical elements or compounds, either independently or in mixtures (which can be of homogeneous or heterogeneous composition) [2]. Chemical materials that possess properties classifying them as hazardous waste present a substantial challenge in terms of proper management [3]. Considering that hazardous waste management involves all activities aimed at establishing standardized procedures for categorization, labeling, packaging, transportation, processing, and storage of hazardous waste, it inevitably raises the question: how informed is the general public about the dangers that hazardous chemical waste can present to the human community? Common ways of disseminating information to the general public are achieved through communication channels such as newspapers, radio, television, the internet, and social media [4].

The most of the information on topics related to environmental pollution and hazardous chemical waste that needs to be communicated to the general human society must be based on scientifically confirmed truths to avoid partial or complete misinformation [5]. Since the significance of objective and timely public information is an important precondition for understanding existing threats and problems, it can be concluded that scientific research on environmental pollution and hazardous chemical waste are the foundation for media reporting on these topics [6].

The aim of this paper is to provide data on reporting in scientific journals and daily newspapers on the aforementioned topics of environmental pollution and hazardous chemical waste. Additionally, our goal is to attempt to identify any existing trends in this data.

### **Methodology**

For the analysis of environmental pollution (EP) and hazardous chemical waste (HCW) reporting in scientific journals (SJ) and daily newspapers (DNP), twelve websites representing online platforms of these SJ and DNP were selected. All selected SJ are journals categorized as

Q1 for the year 2022 according to the Scimago Journal & Country Rank (SJR). The chosen DNP comprise well-known daily newspapers with high circulation and readership, published and read in various parts of the world (USA, Great Britain, India, China, Australia).

Data collection for the number of articles on EP topics involved searching websites using the keyword "Environmental pollution". For collecting data on the number of HCW articles, the keyword "Hazardous chemical waste" was employed. The choice of these keywords may not be considered comprehensive and entirely reliable, but they serve as effective tools for searching and identifying of EP and HCW related articles within the selected SJ and DNP. Furthermore, website searches could have varied in terms of the parameters set by the search algorithms. Data retrieval from the SJ Nature and Science websites encompassed all journals of these publishers, while all other websites were surveyed concerning a specific SJ and DNP. The website searches were conducted from the same IP address (Belgrade, Serbia) using the same computer. Prior to each SJ and DNP search, browsing history and cache memory were cleared. Searches were conducted without logging into user accounts, utilizing the same web browser (Mozilla Firefox) with the same website [www.google.rs](http://www.google.rs). All searches were carried out during five consecutive days in September 2023.

Table 1. presents essential information on the SJ and DNP employed for the analysis of reporting on EP and HCW topics during 2000-2022 period.

**Table 1. Basic information on selected SJ and DNP**

Name of SJ/DNP	Type	Web address	Abbreviation
Nature	SJ	<a href="http://www.nature.com">www.nature.com</a>	NAT
Science	SJ	<a href="http://www.science.org">www.science.org</a>	SCI
Environmental Pollution	SJ	<a href="http://www.sciencedirect.com/journal/environmental-pollution">www.sciencedirect.com/journal/environmental-pollution</a>	ENPOLL
Journal of Hazardous Materials	SJ	<a href="http://www.sciencedirect.com/journal/journal-of-hazardous-materials">www.sciencedirect.com/journal/journal-of-hazardous-materials</a>	JHM
Waste Management	SJ	<a href="http://www.sciencedirect.com/journal/waste-management">www.sciencedirect.com/journal/waste-management</a>	WMAN
International Environmental Agreements: Politics, Law and Economics	SJ	<a href="http://www.springer.com/journal/10784/">www.springer.com/journal/10784/</a>	IEA
Review of European, Comparative & International Environmental Law	SJ	<a href="http://www.onlinelibrary.wiley.com/journal/20500394">www.onlinelibrary.wiley.com/journal/20500394</a>	RECIEL
Financial Times (International edition)	DNP	<a href="http://www.ft.com">www.ft.com</a>	FT
The Australian Financial Review	DNP	<a href="http://www.afr.com">www.afr.com</a>	AFR
The Wall Street Journal	DNP	<a href="http://www.wsj.com">www.wsj.com</a>	WSJ
China Daily (English)	DNP	<a href="http://www.chinadaily.com.cn">www.chinadaily.com.cn</a>	CD
The Times of India	DNP	<a href="http://www.timesofindia.indiatimes.com">www.timesofindia.indiatimes.com</a>	TOI

## Results and discussion

After gathering data related to the number of articles published on the topics of EP and HCW in the chosen SJ and DNP, results have been obtained and are exhibited in Tables 2. and 3.

**Table 2. Published articles in the selected SJ&DNP concerning EP during 2000-2022 period**

Year	NAT	SCI	ENPOLL	JHM	WMAN	IEA	RECIEL	FT	AFR	WSJ	CD	TOI
2000	67	71	212	58	25	0	0	0	64	1335	0	26
2001	63	63	247	42	24	14	0	0	38	1392	136	131
2002	100	85	312	32	24	17	87	0	46	1101	352	250
2003	66	74	302	43	35	15	76	0	49	988	309	217
2004	122	69	303	67	41	13	21	17	48	1029	268	103
2005	111	70	353	100	47	14	13	47	75	1244	569	79
2006	91	60	458	230	62	15	29	99	70	1636	989	62
2007	126	62	497	324	81	14	17	133	82	2248	1085	100
2008	147	68	556	397	119	15	62	103	99	2119	812	200
2009	172	58	474	765	146	11	29	120	104	2571	820	496
2010	158	81	493	520	107	14	18	121	61	3236	1366	368
2011	194	74	506	497	101	9	24	131	62	3185	3332	645
2012	242	81	449	332	112	11	34	131	25	2970	3464	863
2013	266	94	504	287	121	18	19	198	22	3532	7717	969
2014	348	90	475	229	112	12	36	141	80	3687	5595	910
2015	555	89	500	295	172	13	16	259	111	3522	5421	1206
2016	867	100	960	303	174	21	22	200	57	2938	3550	1164
2017	992	120	1114	307	208	18	28	249	93	2088	3670	1186

<b>2018</b>	978	155	1506	364	259	19	31	279	82	1656	1575	1264
<b>2019</b>	1246	145	1642	506	211	14	27	282	92	1793	1240	1337
<b>2020</b>	1630	195	2133	1089	226	18	40	232	58	1566	457	1087
<b>2021</b>	1836	940	2406	1741	264	21	21	276	95	1924	490	1039
<b>2022</b>	2121	237	2016	1739	209	24	42	234	64	1805	449	1277
<b>Total</b>	12498	3081	18418	10267	2880	340	692	3252	1577	49565	43666	14979

Table 3. Published articles in the selected SJ&DNP concerning HCW during 2000-2022 period

Year	NAT	SCI	ENPOLL	JHM	WMAN	IEA	RECIEL	FT	AFR	WSJ	CD	TOI
<b>2000</b>	4	7	6	77	31	0	0	0	3	2761	0	4
<b>2001</b>	7	3	9	87	22	2	0	0	1	2773	1	10
<b>2002</b>	4	9	8	95	39	4	25	0	1	2531	6	18
<b>2003</b>	5	4	13	92	32	3	42	0	3	2632	2	15
<b>2004</b>	4	1	7	131	32	1	2	5	1	2196	5	9
<b>2005</b>	9	3	15	204	33	1	3	39	3	2233	12	15
<b>2006</b>	12	5	20	398	43	0	9	42	0	2355	24	11
<b>2007</b>	18	5	16	561	62	5	5	44	1	2674	18	7
<b>2008</b>	13	4	17	612	82	1	24	47	0	2947	12	14
<b>2009</b>	21	5	11	1221	101	0	5	48	0	3296	18	36
<b>2010</b>	18	2	15	770	93	5	4	64	1	4838	29	22
<b>2011</b>	10	2	15	655	77	0	2	48	1	5167	104	44
<b>2012</b>	20	12	21	409	90	0	7	54	0	4941	65	62
<b>2013</b>	17	8	16	318	92	1	11	69	1	6037	83	49
<b>2014</b>	27	4	13	255	102	1	12	57	0	5208	38	46
<b>2015</b>	45	7	17	308	141	4	2	84	4	4494	39	62
<b>2016</b>	55	9	51	297	161	4	8	48	0	3835	43	52
<b>2017</b>	87	10	52	330	145	2	7	51	2	3058	22	62
<b>2018</b>	61	8	73	335	166	3	14	61	0	2414	18	68
<b>2019</b>	102	13	91	484	135	2	3	82	0	2136	57	69
<b>2020</b>	141	17	121	820	119	1	5	55	1	1941	14	38
<b>2021</b>	156	64	155	1264	107	3	5	76	1	1723	10	58
<b>2022</b>	207	27	158	1091	115	2	9	79	0	1918	10	65
<b>Total</b>	1043	229	920	10814	2020	45	204	1053	24	74108	630	836

Based on the data presented in Tables 2. and 3, it can be concluded that the highest number of articles on the both topics, EP and HCW, (a total of 20449, expressed as the sum of EP and HCW) were published in the all selected SJ and DNP during the year 2013. Furthermore, Figure 1. illustrates the trend in the total number of published articles on the both topics, EP and HCW, during the period from 2000 to 2022.

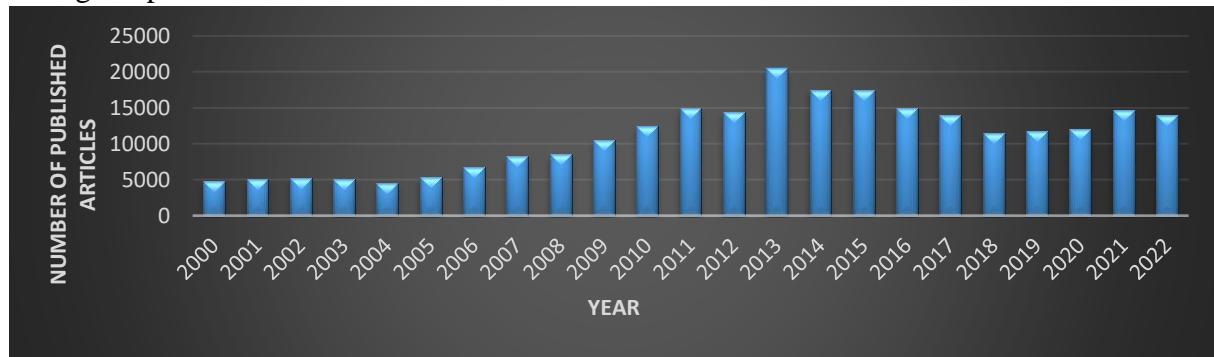


Figure 1. Published articles of EP+HCW topics during 2000-2022 period

In Figure 2, the ratio of the number of published articles on HCW to the number of published articles on EP (expressed as HCW/EP in %) for each individual SJ and DNP is displayed. Specifically, HCW/EP values for WSJ, JHM, and WMAN range from 70.14% to 149.52%, confirming an increased focus on reporting HCW topics in these SJ and DNP. In the case of JHM and WMAN, such a HCW/EP ratio is expected since these are SJ dedicated to HCW topics. Assuming that the editorial board of the WSJ recognized the financial and economic significance of HCW issues, the exceptionally high HCW/EP value (149.52%) can be attributed to this editorial policy.

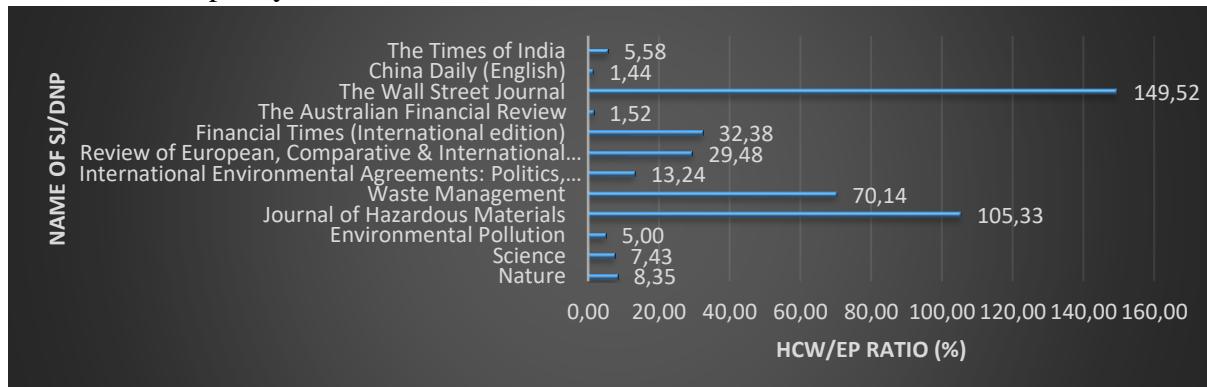


Figure 2. HCW/EP ratio for each individual SJ and DNP during 200-2022 period

To determine the presence of a linear dependency between the number of published articles on individual topics, EP and HCW, for each SJ and DNP, a linear regression analysis method was applied. In Table 4, it can be observed that in all SJ and DNP, except for IEA and AFR (83% of SJ and DNP), the value of R is greater than 0.70, indicating the existence of a linear dependency between the number of published articles on EP and HCW topics [7].

Table 4. Linear regression R-values (x-axis: EP; y-axis: HCW)

	NAT	SCI	ENPOLL	JHM	WMAN	IEA	RECIEL	FT	AFR	WSJ	CD	TOI
R	0.9873	0.9668	0.9785	0.8868	0.8989	0.4239	0.8655	0.8936	0.0950	0.8770	0.7192	0.9624

In addition, this study evaluates the number of EP+HCW articles published in two distinct three-year periods: the COVID-19 period (from 2020 to 2022) and the pre-COVID-19 period (from 2017 to 2019). It measures this against the total number of articles on EP+HCW topics published during the entire study period from 2000 to 2022, expressed as a ratio (in %).

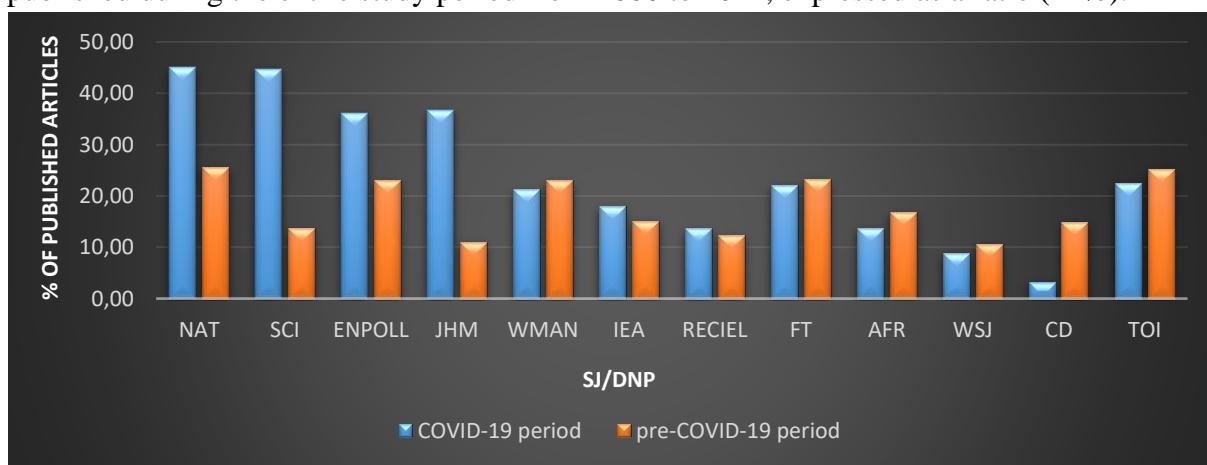


Figure 3. EP+HCW articles production during the COVID-19 and pre-COVID-19 periods

From Figure 3, it is evident that NAT and SCI, as well as ENPOLL and JHM (all SJ), experienced a significant increase in the production of articles on EP+HCW topics during the COVID-19 period compared to the pre-COVID-19 period. This can be attributed to the fact that during the COVID-19 restrictions, researchers had more time available for writing and publishing scientific papers. Conversely, CD experienced a significant decrease in the production of articles on EP+HCW topics during the COVID-19 period compared to the pre-COVID-19 period, which can be linked to the focus of this DNP on reporting events related to COVID-19, given that China was significantly impacted by this public health crisis. All others DNP (FT, AFR, WSJ, and TOI) as well as SJ (WMAN, IEA, and RECIEL) did not exhibit any significant differences in the production of articles on EP+HCW topics between the pre-COVID-19 and COVID-19 periods.

## Conclusion

Analyzing 12 selected scientific journals and daily newspapers, this study examined reporting trends during the period from 2000 to 2022 on environmental pollution and hazardous chemical waste. The year 2013 marked a zenith with more than 20000 articles on these subjects. Within 83% of all observed journals/newspapers, a linear correlation between the percent of articles published on environmental pollution and hazardous chemical waste subjects in an individual journal/newspaper is confirmed. During the COVID-19 period, there were varying reporting trends on aforementioned topics, as some scientific publications increased their production.

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