

Dynamics of retractions and retraction-related records in Middle East-affiliated research during the first quarter of the 21st century: a bibliometric analysis of the Retraction Watch Database, 2000 to 2025

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Dynamics of retractions and retraction-related records in Middle East-affiliated research during the first quarter of the 21st century: a bibliometric analysis of the Retraction Watch Database, 2000 to 2025

Abstract

Background. Retractions and related editorial notices have increased markedly over the past two decades, but regional patterns remain incompletely characterised. We examined the magnitude, temporal pattern, stated reasons, journal distribution, latency, and collaboration profile of Retraction Watch Database records involving at least one author affiliated with the Middle East during 2000-2025.

Methods. We extracted Retraction Watch Database records dated between January 2000 and December 2025 with an author affiliation in one of 17 Middle Eastern countries: Bahrain, Cyprus, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Palestine, Qatar, Saudi Arabia, Syria, Turkey, the United Arab Emirates, and Yemen. Full retractions and related record types were retained and described separately. Annual percent change (APC) was estimated by Poisson regression. Country differences in reason profile and time from publication to retraction were assessed by Monte Carlo chi-square and Kruskal-Wallis tests. Concentration across journals was summarised by the Gini coefficient and cumulative-share thresholds. Population denominators for 2023 were applied for descriptive context only.

Results. A total of 6,723 retraction-related records met the inclusion criteria, of which 90.2% were full retractions. The overall APC was 25.4% per year (95% CI, 24.7 to 26.1; $p < 0.001$). The regional share of worldwide Retraction Watch records rose from 4.65% in 2000 to 24.96% in 2025. Five countries (Saudi Arabia, Iran, Egypt, Iraq, and Turkey) accounted for 87.2% of all country-attributed records in the Middle East, with the understanding that multinational records could be attributed to more than one country. Iraq (APC 89.0%, 95% CI, 80.9 to 97.5) and Saudi Arabia (APC 43.7%, 95% CI, 41.5 to 45.9) showed the steepest growth, whereas Israel showed the slowest (APC 9.3%, 95% CI, 6.5 to 12.3) and the longest median lag to retraction. Median time from publication to retraction was 1.75 years (IQR, 0.87 to 3.18). Compromised peer review or rogue-editor activity rose sharply after 2020 and was cited in 44% of notices in 2025. Computer-aided or computer-generated content was cited in 10.1% of all notices, almost exclusively after 2022. Retractions were concentrated in a small number of journals (Gini coefficient, 0.66; top 5 journals, 14.7% of records).

Conclusions. Middle East-affiliated retraction-related records grew faster than worldwide Retraction Watch records from 2000 to 2025 and represented approximately one in four records globally by 2025. The recent surge is driven by compromised peer review, paper-mill activity, and post-2022 concerns about undeclared computer-generated text. Country profiles diverge substantially; therefore, policy responses should be denominator-aware, collaboration-aware, and tailored to the dominant integrity signal in each national research system rather than framed as a single regional problem.

Keywords: retraction; research integrity; bibliometric analysis; Middle East; paper mill; Retraction Watch; international collaboration.

1. Introduction

Retraction is the strongest formal corrective mechanism available to scientific journals (Brainard & You, 2018). The annual number of retractions issued in the indexed literature has grown more than fifty-fold since 2000, both in absolute terms and as a proportion of published articles (Hesselmann et al., 2017; Sebo & Sebo, 2025b; Steen et al., 2013). Two largely independent drivers are usually invoked: more vigilant post-publication surveillance by editors, sleuths, and integrity offices on the one hand, and a real increase in the underlying rate of misconduct on the other (Bordignon, 2020; Fanelli, 2009; Hesselmann et al., 2017). From 2020 onwards, industrial-scale fabrication by so-called paper mills and manipulation of peer review have become quantitatively important, and the public diffusion of large-language-model tools has added a newer challenge around manuscript provenance and undisclosed generated text (Cabanac & Labbé, 2021; Christopher, 2021; Else & Van Noorden, 2021; Haider et al., 2024).

The Middle East is an informative but methodologically sensitive setting for examining these dynamics. The region includes heterogeneous national research systems. Some countries, including Saudi Arabia, Qatar, and the United Arab Emirates, have pursued rapid output growth and internationalisation. Others, including Egypt, Iran, Iraq, and Turkey, support large university populations under variable conditions of conflict, sanctions, rapid demographic growth, or changing research-governance capacity. Israel differs from many regional systems because of its long-standing high R&D intensity, high researcher density, and mature biomedical and technology sectors, which may affect both publication volume and the speed and type of post-publication scrutiny (OECD, 2026; World Bank, 2026a, 2026b). Single-country and short-period bibliometric studies on retractions in the Middle East have been published (Liu & Lei, 2021; Mhamdi, 2026; Sebo & Sebo, 2025b), but comprehensive regional analyses covering the full first quarter of the 21st century remain limited. We therefore analysed all Retraction Watch Database records attributable to authors based in 17 Middle Eastern countries between 2000 and 2025, with particular attention to country-specific profiles, lag to retraction, and international collaboration patterns.

2. Materials and methods

2.1. Data source

Data were obtained from the Retraction Watch Database (RWDB), maintained by the Center for Scientific Integrity (Center for Scientific Integrity, 2026). RWDB is the most comprehensive open repository of retraction and retraction-related records and has been used as the primary or supplementary data source in recent scientometric studies of retraction (Liu & Lei, 2021; Ribeiro & Vasconcelos, 2018; Sebo & Sebo, 2025a, 2025b). Each record contains the title of the affected paper, author and affiliation strings, journal, publisher, broad subject categories, original publication date, notice date, the nature of the notice, listed reason or reasons, and notice-paywall status at the time of database curation.

2.2. Country selection and inclusion criteria

We retained a record if its affiliation field contained at least one of the following countries: Bahrain, Cyprus, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Palestine, Qatar, Saudi Arabia, Syria, Turkey, the United Arab Emirates, or Yemen. Multi-country records were counted once overall for

regional time-series and journal analyses. For country-level burden analyses, a record was counted once toward each Middle East country represented; therefore, country-attributed counts are not mutually exclusive and can exceed the overall number of records. When a record listed multiple countries in the region, the first Middle East country listed was used as the primary affiliation for country-stratified analyses that required mutually exclusive groups. Records with a notice date between 1 January 2000 and 31 December 2025 were retained. Because late database updates and batch investigations can revise recent years, 2024-2025 estimates should be interpreted as current database snapshots rather than final historical totals.

2.3. Variable derivation

The RWDB Reason field is a semicolon-delimited list of controlled-vocabulary terms. We exploded the list to long format and mapped each term to one of ten thematic clusters: plagiarism; duplication; fabrication or falsification; image manipulation or image issues; data issues; authorship issues; compromised peer review (including rogue editor, fake peer review, and paper mill); ethics or approval; honest error; and undeclared text-generation tools, which captured the RWDB code 'Computer-Aided Content or Computer-Generated Content'. Subject areas were exploded analogously and aggregated to seven top-level RWDB categories: Health Sciences, Physical Sciences, Basic Life Sciences, Business and Technology, Environmental Sciences, Social Sciences, and Humanities. Time to notice was computed as the calendar difference between the original publication date and the notice date, in years; for full retractions, this is equivalent to the time from publication to retraction.

2.4. Statistical analysis

APC in annual record counts was estimated by Poisson regression of count on calendar year using a log link and reported as $(\exp(\beta)-1)*100$ with 95% confidence intervals derived from the model standard error. APC was estimated for the full period, for three pre-specified subperiods (2000-2009, 2010-2019, and 2020-2025), and for each country with at least 100 country-attributed records. The same pre-specified set of eight leading countries was used for country-stratified analyses: Saudi Arabia, Iran, Egypt, Iraq, Turkey, Jordan, the United Arab Emirates, and Israel. The country-by-reason association was tested using a chi-square test with a Monte Carlo p-value ($B=5,000$ replicates). Time to notice was compared across the eight leading countries using the Kruskal-Wallis rank-sum test. The trend in the proportion of notices citing compromised peer review or rogue-editor activity from 2010 to 2025 was assessed by the Cochran-Armitage test for trend. Concentration of records across journals was summarised by the Gini coefficient and by cumulative shares in the top 5, 10, 25, and 50 journals. The temporal trend in notice paywalling was modelled by logistic regression with calendar year as the predictor. For each leading country, we computed the proportion of records listing at least one author affiliation outside the Middle East and identified the top non-Middle-East collaborator countries by record count. Mid-2023 World Bank population denominators were used only to contextualise records per million inhabitants; they were not used to infer country-level risk because they do not adjust for publication volume, R&D expenditure, researcher density, subject mix, or database coverage (OECD, 2026; World Bank, 2026a, 2026b). All analyses were performed in R 4.5.3 using data.table, ggplot2, MASS, and officer/flextable. Statistical significance was set at two-sided $p<0.05$.

2.5. Ethics

All data were obtained from a publicly available database. The study did not directly involve human participants, patient data, animals, or biological specimens; no ethical approval was required.

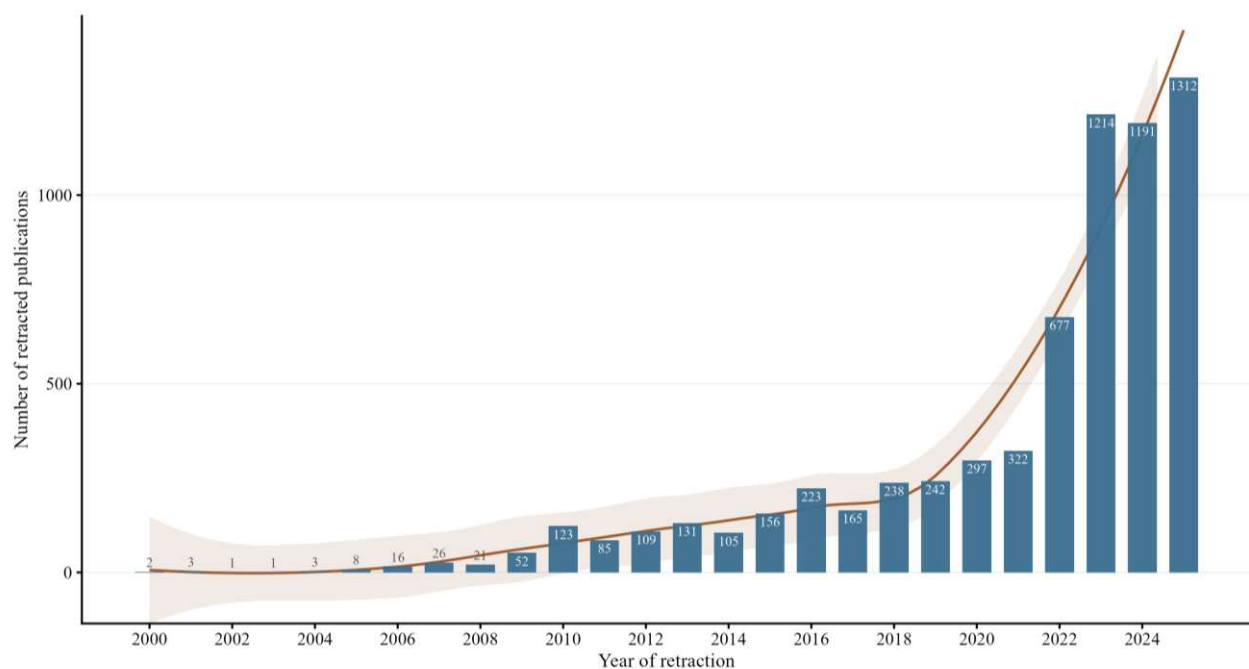
3. Results

3.1. Overall sample and temporal growth

A total of 6,723 retraction-related records issued between 2000 and 2025 carried at least one Middle East author affiliation. The records spanned 1,779 unique journals and 294 unique publishers. Most notices were full retractions (90.2%), followed by expressions of concern (7.5%), corrections (2.2%), and reinstatements (0.1%); therefore, the main temporal and country analyses should be read as analyses of RWDB records, with full retractions forming the large majority. Only 1.3% of notices were paywalled at notice date, and the probability of paywalling declined over time (logistic regression odds ratio per calendar year, 0.84; 95% CI, 0.81 to 0.87; $p < 0.001$).

Annual counts increased from fewer than five records per year before 2005 to 1,312 records in 2025 (Figure 1A). Across the full 2000-2025 period, the average annual percent change was 25.4% per year (95% CI, 24.7% to 26.1%; $p < 0.001$). Growth was fastest in 2000-2009 (APC, 55.6% per year; 95% CI, 42.6% to 69.8%; $p < 0.0001$), moderated in 2010-2019 (APC, 11.4% per year; 95% CI, 9.4% to 13.4%; $p < 0.0001$), and accelerated again in 2020-2025 (APC, 34.4% per year; 95% CI, 32.1% to 36.8%; $p < 0.0001$). The Middle East share of all worldwide RWDB records rose from 4.65% in 2000 to 8.16% in 2020 and 24.96% in 2025, indicating that regional record growth outpaced the global RWDB trajectory (Figure 1B).

A



B

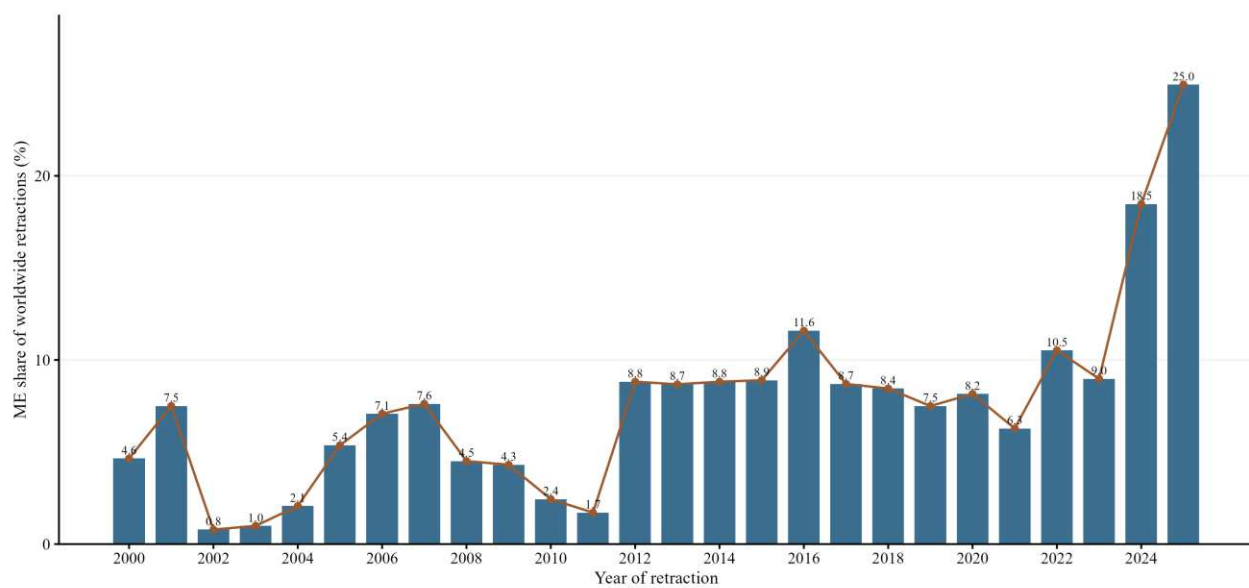


Figure 1. (A) Annual Retraction Watch Database records attributed to Middle East-affiliated authors, 2000 to 2025. Orange line shows a LOESS smoother with 95% confidence ribbon. (B) Middle East share of worldwide Retraction Watch Database records by notice year.

3.2. Country-level burden and growth

Country-attributed counts were highly concentrated. Saudi Arabia (n=2,266; 27.8% of country-attributed records), Iran (n=2,063; 25.3%), Egypt (n=1,157; 14.2%), Iraq (n=871; 10.7%), and Turkey (n=765; 9.4%) collectively accounted for 87.2% of all country-attributed Middle East records. Because multinational records can be counted for more than one country, these shares should not be interpreted as mutually exclusive fractions of the 6,723-record regional dataset. When counts were normalised by 2023 population, Saudi Arabia (61 records per million inhabitants) and Bahrain (45 per million) ranked highest, followed by Iran, Cyprus, and Qatar (23, 23, and 23 per million, respectively). These per-million figures should be interpreted descriptively because they do not adjust for national publication volume, R&D intensity, researcher density, disciplinary composition, or international collaboration structure (Table 1).

Table 1. Country-attributed burden and growth of Retraction Watch Database records

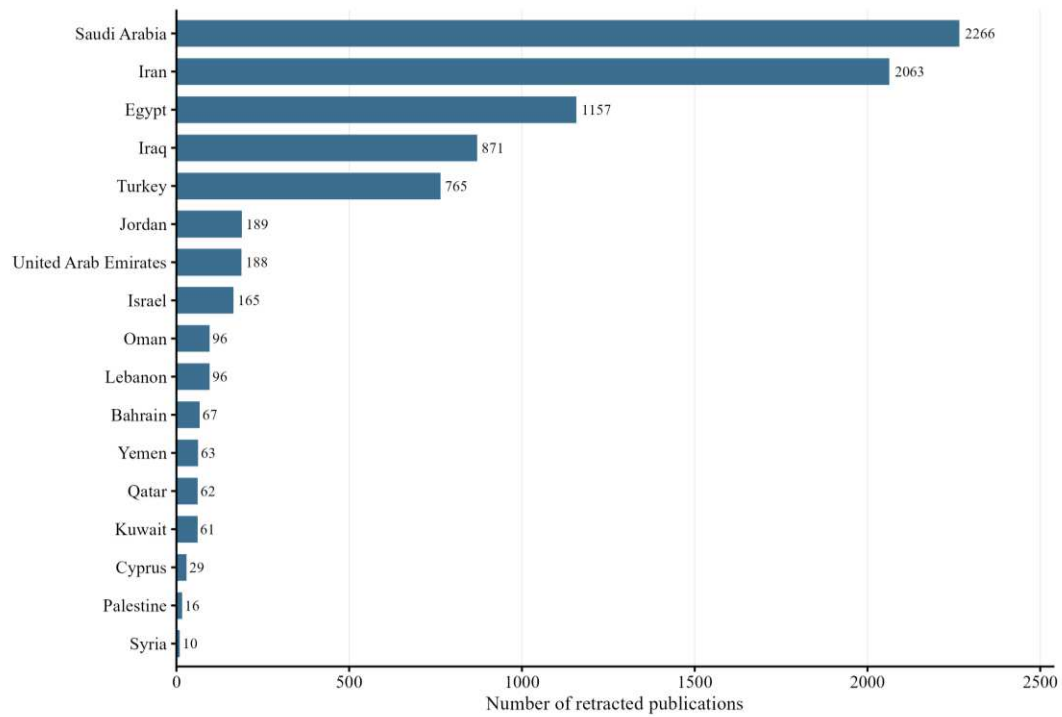
Country	Records, n	Share, %	Records per million	Retractions per million	APC, %	95% CI	Years observed
Saudi Arabia	2,266	27.76	36.90	61.41	43.66	41.48 to 45.88	21
Iran	2,063	25.27	89.20	23.13	16.25	15.25 to 17.25	22
Egypt	1,157	14.17	112.70	10.27	30.58	28.44 to 32.75	21
Iraq	871	10.67	45.50	19.14	89.03	80.91 to 97.50	14
Turkey	765	9.37	85.32	8.97	18.35	16.70 to 20.02	25
Jordan	189	2.32	11.34	16.67	32.59	26.95 to 38.47	19
United Arab Emirates	188	2.30	9.52	19.75	32.70	26.66 to 39.03	17
Israel	165	2.02	9.76	16.91	9.34	6.47 to 12.29	21
Lebanon	96	1.18	5.35	17.94	--	--	--
Oman	96	1.18	4.64	20.69	--	--	--
Bahrain	67	0.82	1.49	44.97	--	--	--
Yemen	63	0.77	34.45	1.83	--	--	--
Qatar	62	0.76	2.72	22.79	--	--	--
Kuwait	61	0.75	4.31	14.15	--	--	--
Cyprus	29	0.36	1.26	23.02	--	--	--
Palestine	16	0.20	5.04	3.17	--	--	--
Syria	10	0.12	23.23	0.43	--	--	--

Abbreviations: APC, annual percent change; CI, confidence interval; M, million. APC was estimated only for countries with at least 100 country-attributed records. Country counts are not mutually

exclusive because records with affiliations in more than one Middle East country were counted once for each represented country. Per-million estimates use 2023 population denominators and are descriptive only; they should not be interpreted as misconduct rates or output-normalised retraction risks.

Absolute country totals and per-capita rankings showed different patterns. In absolute country-attributed counts, Saudi Arabia and Iran dominated the regional burden, followed by Egypt, Iraq, and Turkey (Figure 2A). By contrast, population-standardised counts placed several smaller countries higher in rank, including Bahrain, Cyprus, Qatar, Oman, and the United Arab Emirates (Figure 2B). Country-specific APCs further separated volume from growth: Iraq had the steepest estimated increase (APC, 89.0% per year; 95% CI, 80.9% to 97.5%), followed by Saudi Arabia (43.7%), the United Arab Emirates (32.7%), Jordan (32.6%), and Egypt (30.6%); Israel had the slowest growth (9.3%) (Figure 3).

A



B

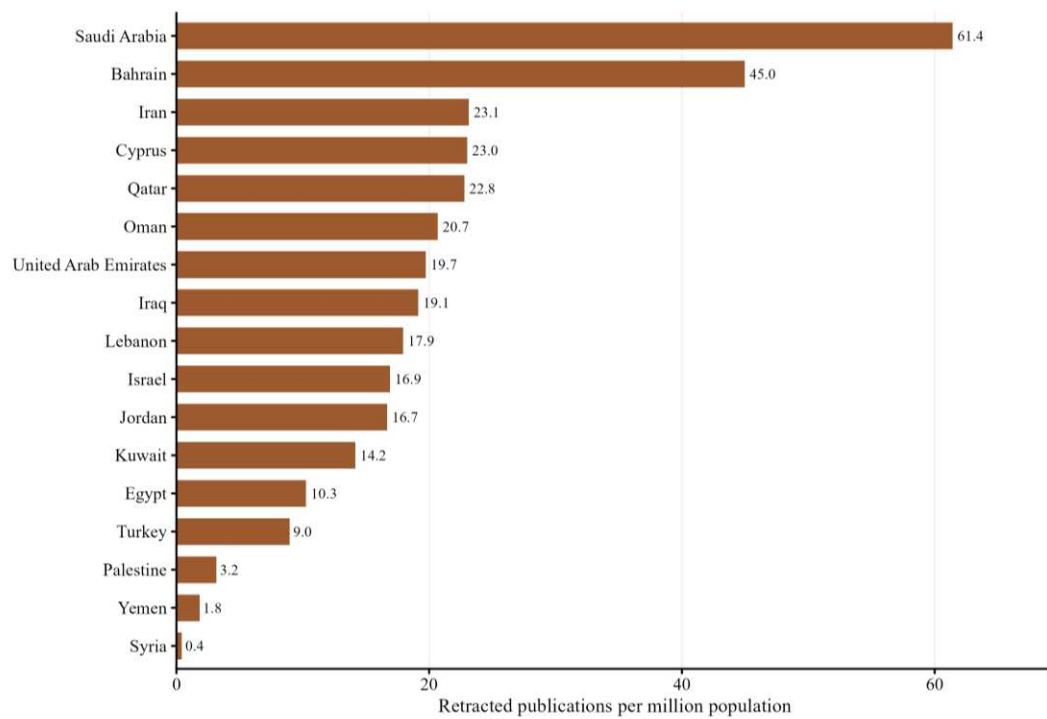


Figure 2 (A). Cumulative retraction counts by Middle East country, 2000 to 2025. (B). Retractions per million inhabitants, sorted by retraction rate using 2023 population denominators.

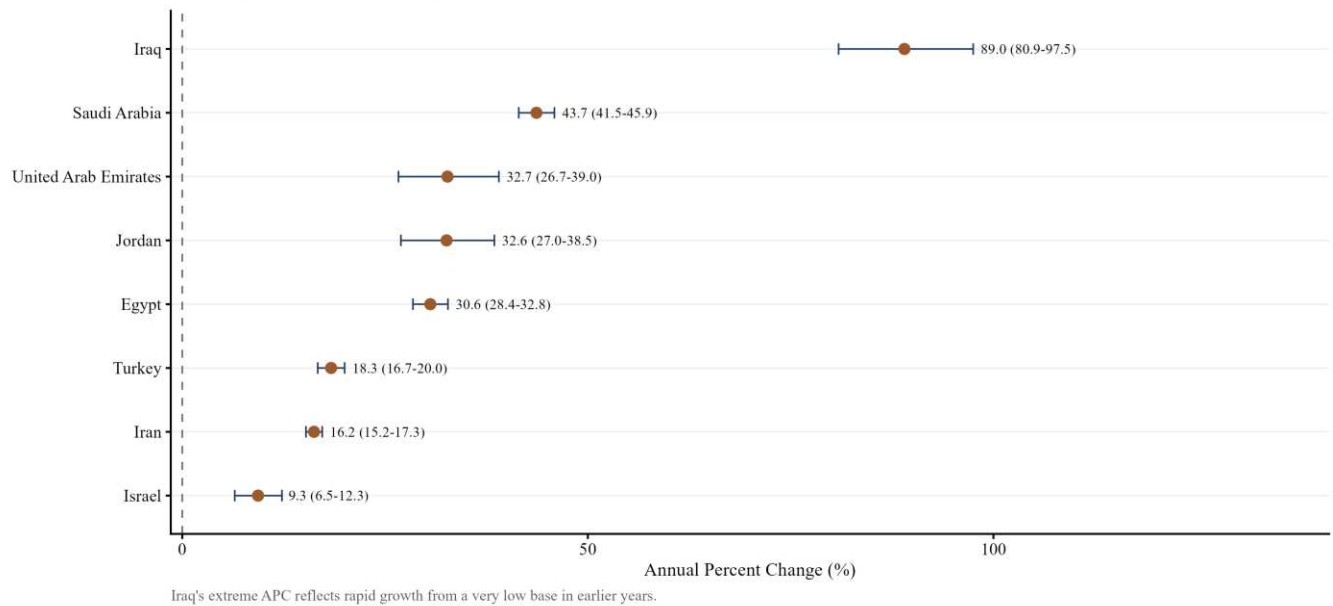


Figure 3. Annual percent change in country-attributed Retraction Watch Database records by country, 2000 to 2025, with 95% confidence intervals.

The year-by-country heatmap showed three major temporal signatures. Iran grew steadily through the 2010s and accelerated after 2022. Saudi Arabia contributed modestly until 2018 but became a dominant contributor from 2023 onward. Iraq had the most abrupt post-2020 escalation, reaching the largest annual contribution in 2025 (Figure 4). The stacked annual plot confirmed that the regional surge after 2020 was driven mainly by Saudi Arabia, Iran, Egypt, Iraq, and Turkey, with Iraq and Saudi Arabia accounting for a large share of the most recent peak (Figure 5).

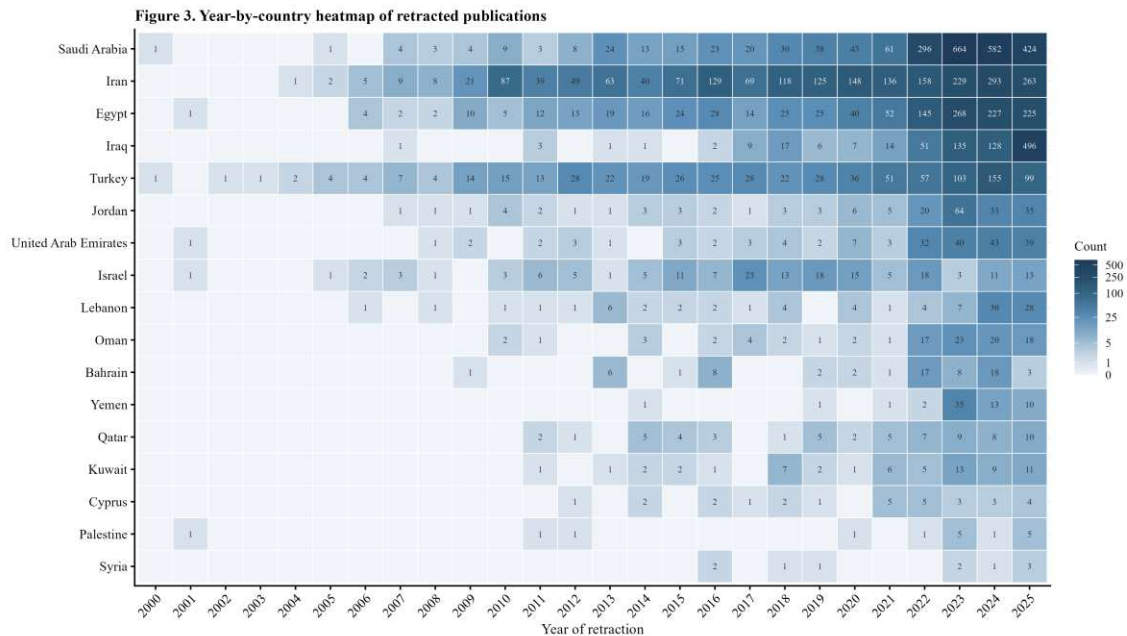


Figure 4. Year-by-country heatmap of country-attributed Retraction Watch Database records. Empty cells indicate no records.

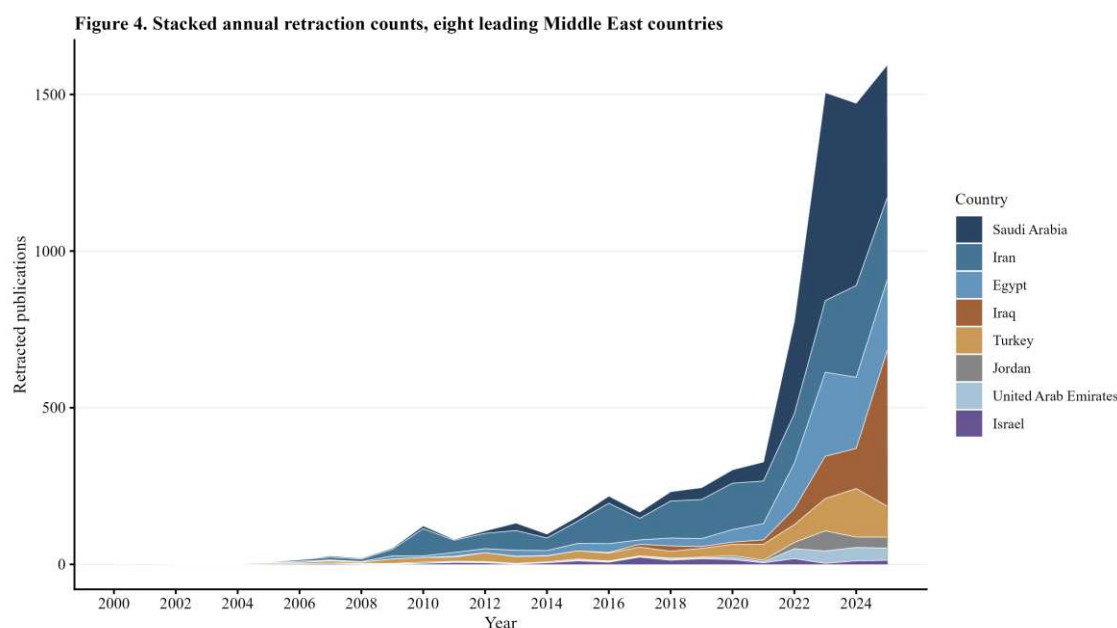


Figure 5. Stacked annual record counts for the eight leading Middle East countries.

3.3. Reasons for retraction and country-specific profiles

Each notice carried a mean of approximately three controlled-vocabulary reason terms. The most common individual reasons were Investigation by Journal or Publisher (54.7% of notices), Unreliable Results or Conclusions (39.5%), Concerns or Issues about Referencing or Attributions (25.5%), Compromised Peer Review (22.5%), and Investigation by Third Party (21.5%). Paper Mill was cited in 12.6% of notices, and Computer-Aided Content or Computer-Generated Content was cited in 10.1% (Figure 6).

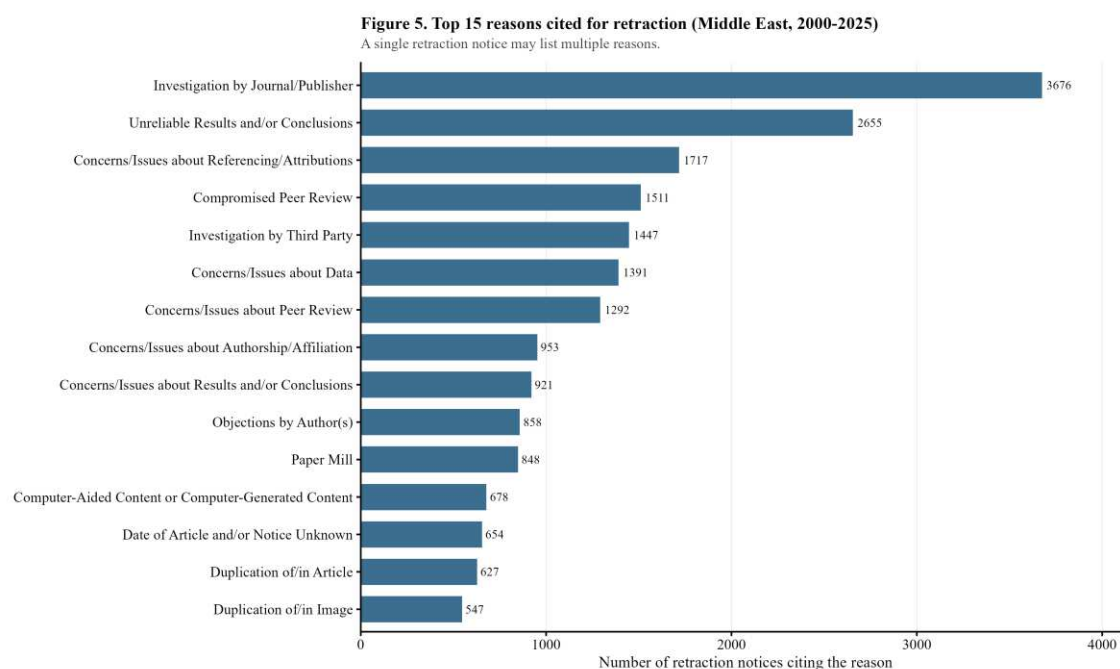


Figure 6. Top 15 individual reasons cited for retraction. A single notice may list multiple reasons.

After mapping individual reason codes to broader thematic clusters, the dominant categories were compromised peer review, authorship issues, data issues, and duplication. Cluster trajectories differed sharply over time: plagiarism and duplication were visible before 2020, whereas compromised peer review, paper mills, image issues, and undeclared text-generation tools expanded mainly after 2020, with the latter signal concentrated after 2022 (Figure 7).

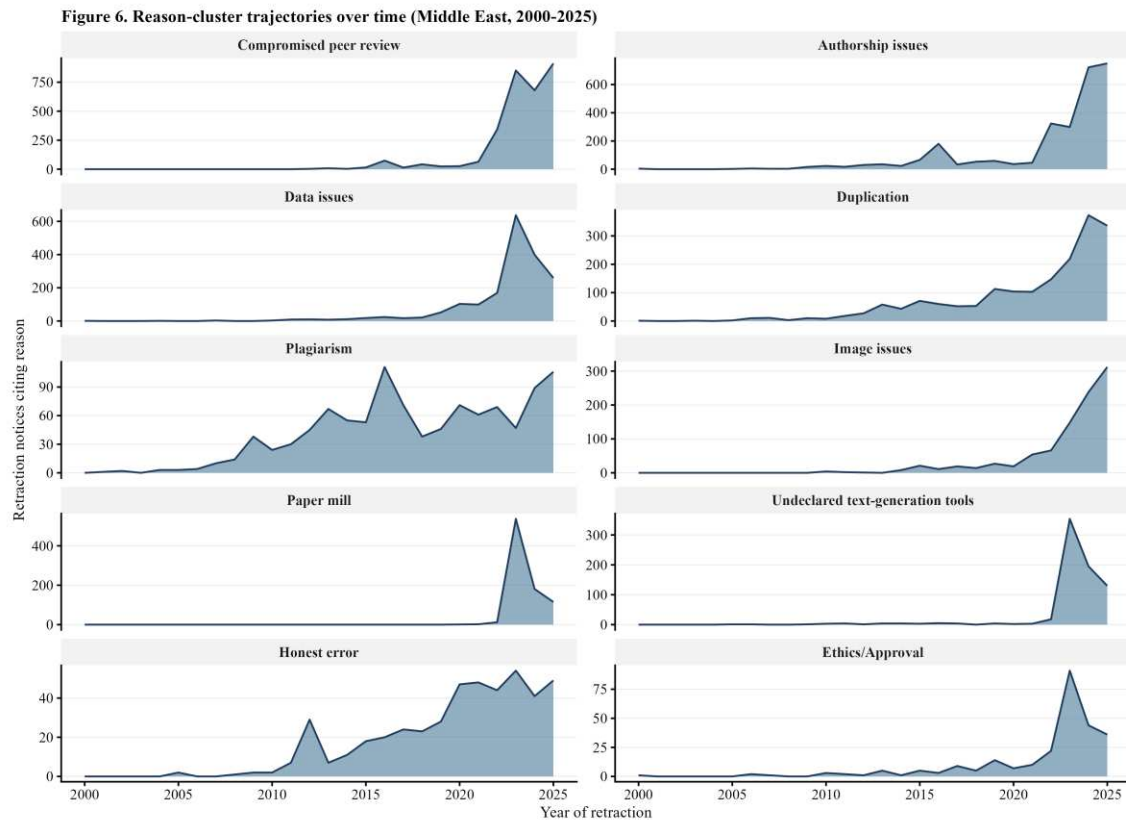


Figure 7. Reason-cluster trajectories over time. Counts denote the number of notices in a given year that cite at least one term mapping to the cluster.

The reason profile differed significantly among the eight leading countries (Monte Carlo chi-square=2993.78; $p=2.0e-04$). Saudi Arabia was characterised by a combination of peer-review compromise, authorship issues, and paper-mill flags; Iraq by near-universal peer-review compromise; Egypt by data, authorship, duplication, and image-related issues; and Israel by longer-lag biomedical and image-related retractions. International collaboration was also uneven, ranging from 31.9% in Iran to 78.7% in the United Arab Emirates (Table 2).

Table 2. Country profiles among the eight leading countries

Country	Total records	Dominant reason-cluster pattern	Median lag to notice, years (Q1-Q3)	International collaboration, n (%)
Saudi Arabia	2,266	Peer-review compromise, authorship issues, paper mill	1.58 (0.98-2.35)	1,623 (71.62)
Iran	2,063	Authorship, duplication, peer-review concerns	1.94 (0.77-4.43)	659 (31.94)
Egypt	1,157	Data issues, authorship, duplication, image	2.12 (1.01-4.36)	463 (40.02)

Country	Total records	Dominant reason-cluster pattern	Median lag to notice, years (Q1-Q3)	International collaboration, n (%)
		issues		
Iraq	871	Near-universal peer-review compromise	1.84 (1.28-1.84)	458 (52.58)
Turkey	765	Peer-review compromise, authorship, plagiarism	1.34 (0.67-2.58)	291 (38.04)
Jordan	189	Authorship, peer-review compromise, paper mill	1.43 (0.78-2.04)	96 (50.79)
United Arab Emirates	188	Authorship and international collaboration	1.24 (0.58-2.02)	148 (78.72)
Israel	165	Longer-lag biomedical/image-related retractions	3.36 (0.73-8.26)	72 (43.64)

Values for reason clusters are not mutually exclusive because a single notice may list multiple reasons. Median lag is the time from publication to notice. International collaboration indicates records with at least one non-Middle-East author affiliation.

The country-by-cluster heatmap clarified these contrasts. Image-related flags were proportionally most common in Israel and Egypt. Compromised peer-review flags were almost universal in Iraq and common in Saudi Arabia, whereas paper-mill flags were most prominent in Saudi Arabia and Jordan. Authorship or attribution-related flags were especially frequent in the United Arab Emirates (Figure 8). The proportion of Middle East notices citing compromised peer review or rogue-editor activity rose from less than 2% before 2010 to 65% in 2023 and remained high in 2024-2025 (Cochran-Armitage chi-square=670.12; $p<0.001$) (Figure 9).

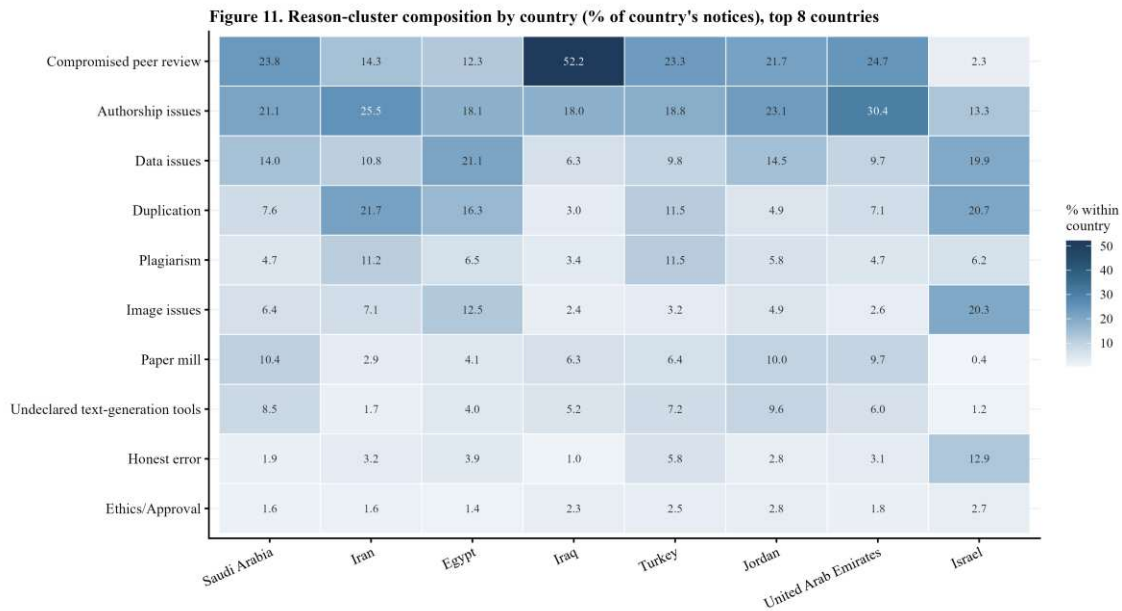


Figure 8. Reason-cluster composition by country, eight leading countries. Values are percentages within each country's notices.

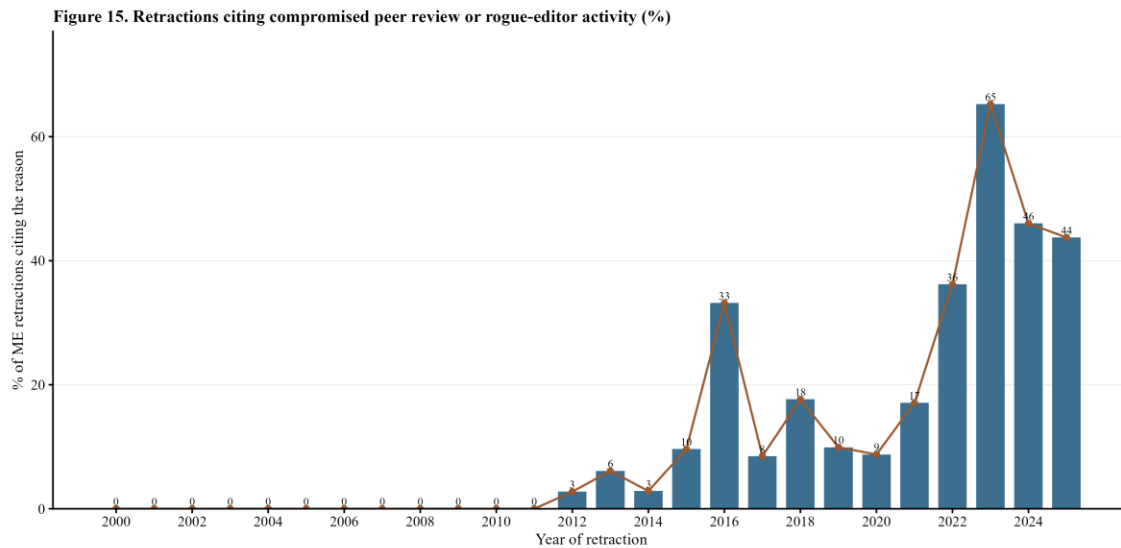


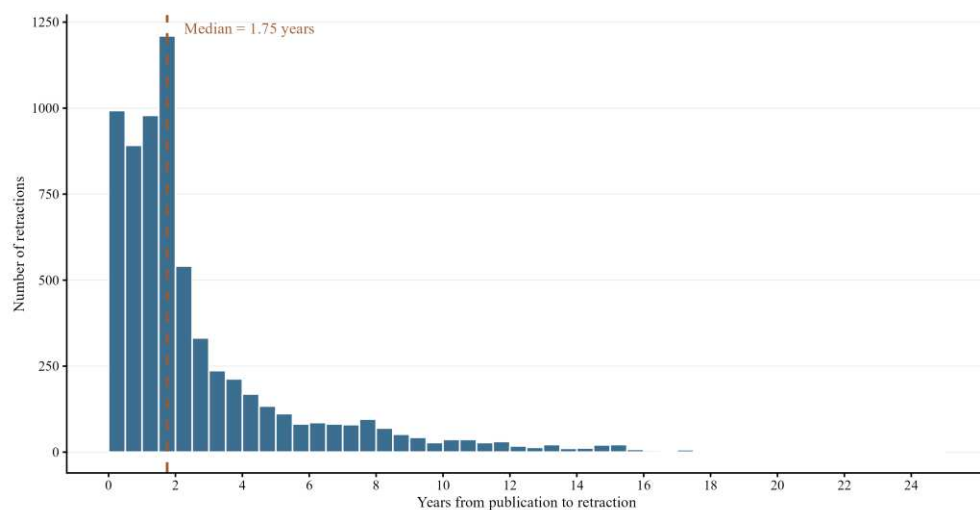
Figure 9. Annual proportion of Middle East retractions citing compromised peer review or rogue-editor activity.

3.4. Time from publication to retraction

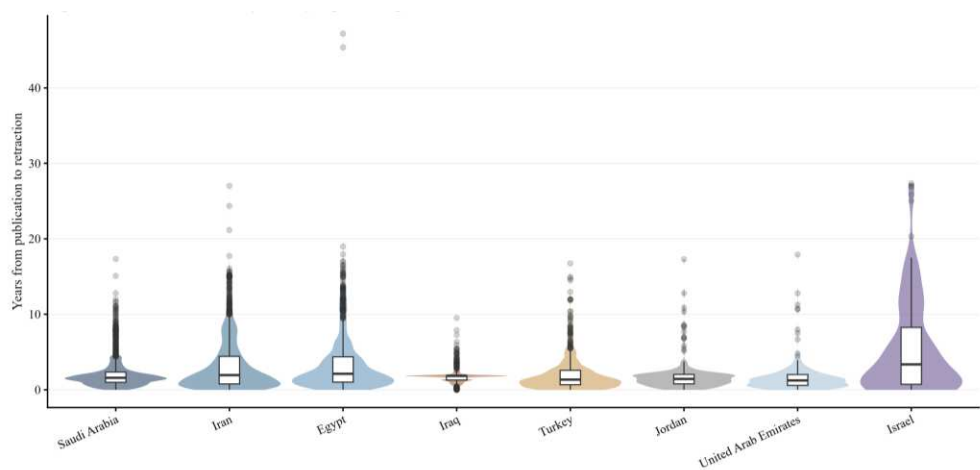
The median time from original publication to notice was 1.75 years (IQR, 0.87 to 3.18). The distribution was right-skewed, with a long tail of records that remained in the literature for more than 10 years before notice (Figure 10A). Country differences were statistically significant across the eight leading countries (Kruskal-Wallis chi-square=214.96; df=7; $p<0.001$). Median latency was shortest for the United Arab Emirates, Turkey, Saudi Arabia, Jordan, and Iraq, and longest for Israel. The country-specific violin plots and lag-bin heatmap show that Iraq and Saudi Arabia had the largest shares of

records issued within two years of publication, whereas Israel had the largest share issued after five years (Figure 10B and Figure 10C).

A



B



C

Figure 18. Distribution of time-to-retraction by country (% within country)

Eight leading countries; each column sums to 100%.

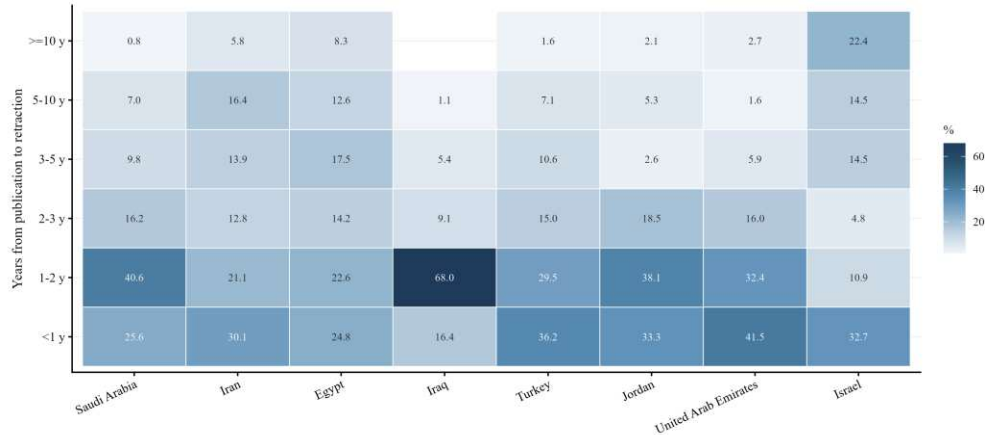


Figure 10(A). Distribution of time from original publication to notice. (B). Time-to-notice by country (violin and box plots), eight leading countries. (C). Distribution of time-to-notice across discrete lag bins by country (% within country), eight leading countries.

3.5. Journals, publishers, subject areas, and notice accessibility

Records were concentrated in a small number of journals. The Gini coefficient of record counts across journals was 0.66. The top 5 journals accounted for 14.7% of records, the top 10 for 21.8%, the top 25 for 34.5%, and the top 50 for 45.3%; 67 journals were needed to cover half of all records. The journals with the largest absolute number of Middle East-affiliated records were AIP Conference Proceedings, PLOS ONE, Journal of Intelligent & Fuzzy Systems, Cureus, and BioMed Research International. At publisher level, Elsevier, Hindawi, Springer, Springer Nature Publishing Group, Wiley, and AIP Publishing carried the largest shares. The subject-area footprint was concentrated in Health Sciences, Physical Sciences, Basic Life Sciences, and Business and Technology, whereas Humanities and Social Sciences were comparatively rare (Table 3).

Table 3. Leading journals, publishers, and subject areas of Middle East-affiliated Retraction Watch Database records

Rank	Journal	Journal records, n (%)	Publisher	Publisher records, n (%)	Subject area	Mentions, n (%)
1	AIP Conference Proceedings	298 (4.43)	Elsevier	1,287 (19.14)	HSC	5,012 (27.9)
2	PLOS ONE	245 (3.64)	Hindawi	824 (12.26)	PHY	4,511 (25.1)
3	Journal of Intelligent & Fuzzy Systems	155 (2.31)	Springer	783 (11.65)	BLS	4,147 (23.1)
4	Cureus	146 (2.17)	Springer Nature Publishing Group	399 (5.93)	B/T	2,999 (16.7)
5	BioMed Research International	141 (2.10)	Wiley	380 (5.65)	ENV	673 (3.7)
6	Scientific Reports	115 (1.71)	AIP Publishing	313 (4.66)	SOC	533 (3.0)
7	Heliyon	95 (1.41)	Taylor and Francis	300 (4.46)	HUM	106 (0.6)
8	Environmental Research	94 (1.40)	PLOS	251 (3.73)	--	--
9	Computational Intelligence and Neuroscience	90 (1.34)	IOS Press	155 (2.31)	--	--
10	E3S Web of Conferences	89 (1.32)	Cureus	146 (2.17)	--	--
11	New Microbes	82 (1.22)	SAGE	145 (2.16)	--	--

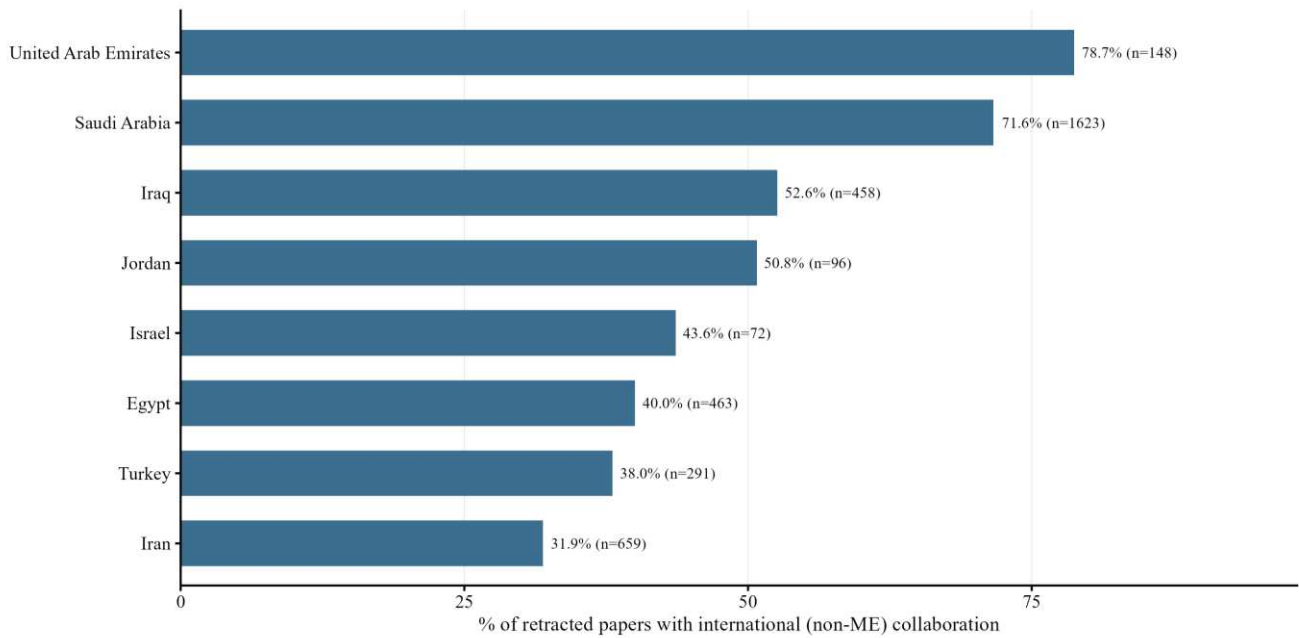
Rank	Journal	Journal records, n (%)	Publisher	Publisher records, n (%)	Subject area	Mentions, n (%)
	and New Infections		Publications			
12	Engineering Analysis with Boundary Elements	67 (1.00)	MDPI	128 (1.90)	--	--
13	Security and Communication Networks	67 (1.00)	IEEE	125 (1.86)	--	--
14	Environmental Science and Pollution Research	64 (0.95)	Frontiers	108 (1.61)	--	--
15	Applied Nanoscience	64 (0.95)	EDP Sciences	104 (1.55)	--	--
16	Journal of Healthcare Engineering	61 (0.91)	--	--	--	--
17	Journal of Fundamental and Applied Sciences	55 (0.82)	--	--	--	--
18	Computational and Mathematical Methods in Medicine	53 (0.79)	--	--	--	--
19	Journal of Molecular Liquids	52 (0.77)	--	--	--	--
20	The Journal of Maternal-Fetal & Neonatal Medicine	51 (0.76)	--	--	--	--

Abbreviations: BLS, Basic Life Sciences; B/T, Business and Technology; ENV, Environmental Sciences; HSC, Health Sciences; HUM, Humanities; ME, Middle East; PHY, Physical Sciences; SOC, Social Sciences. Percentages for journals and publishers use all Middle East-affiliated RWDB records as the denominator. Subject-area values are based on subject-area mentions; a single record may have more than one subject area.

3.6. International collaboration

International collaboration patterns differed across the eight leading countries. The United Arab Emirates and Saudi Arabia had the highest proportions of records with at least one non-Middle-East co-author (78.7% and 71.6%, respectively), whereas Iran and Turkey had the lowest proportions (31.9% and 38.0%, respectively) (Figure 11A). Among records with international collaboration, the top non-Middle-East collaborator countries were India (n=954; 30.3% of internationally collaborating papers), China (n=651; 20.7%), Pakistan (n=639; 20.3%), the United States (n=425; 13.5%), and Malaysia (n=282; 9.0%). The largest pairwise cells were Saudi Arabia-India (n=596), Saudi Arabia-Pakistan (n=519), Saudi Arabia-China (n=366), Saudi Arabia-United States (n=151), and Iraq-India (n=200) (Figure 11B). These patterns identify where retracted collaborative papers are concentrated, not where responsibility for the integrity problem lies.

A



B

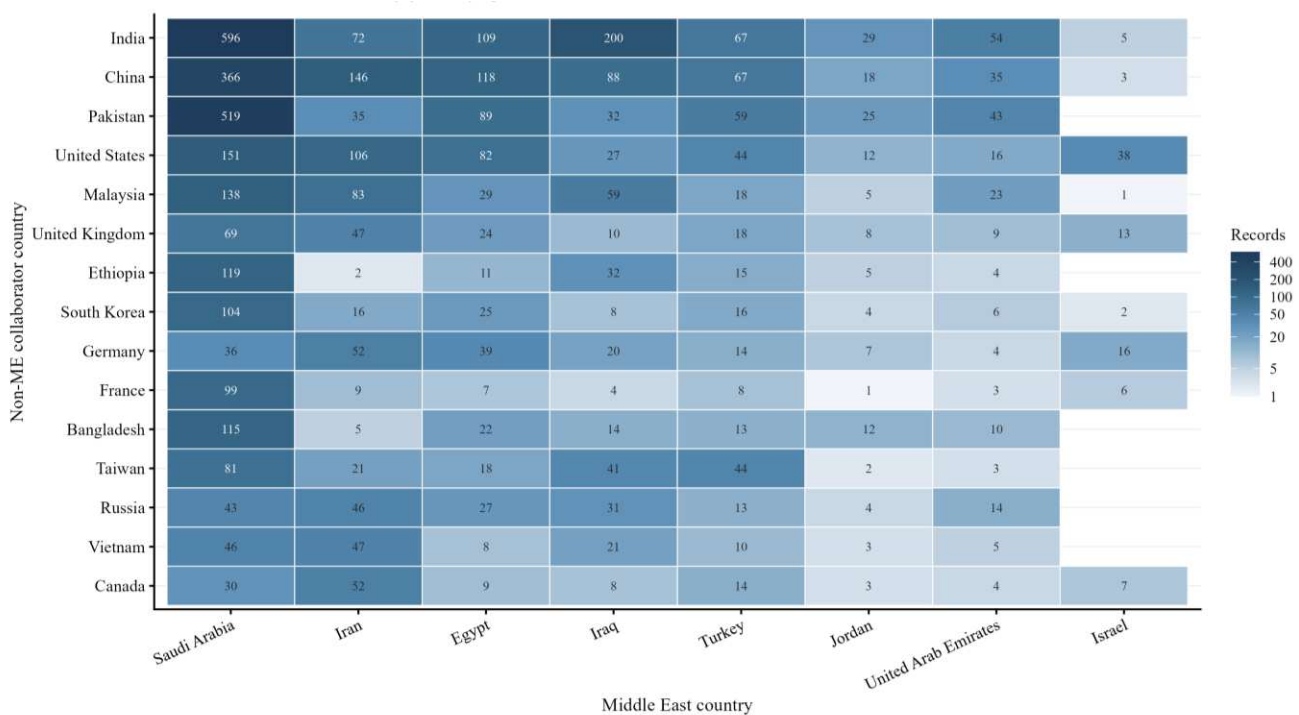


Figure 11(A). Proportion of retracted papers with at least one non-Middle-East co-author, by country (eight leading countries). (B). Joint distribution of Middle East affiliation by non-Middle-East collaborator country (eight Middle East countries by the top 15 non-Middle-East collaborators). Cell counts are records carrying both affiliations.

4. Discussion

This bibliometric study provides a broad regional view of RWDB records involving Middle East-affiliated authors across 2000-2025. Three findings are central. First, the regional trajectory was steep, particularly after 2020. The overall APC of 25.4% per year is substantially higher than the worldwide all-cause retraction APC of approximately 11-12% reported in earlier bibliometric work (Sebo & Sebo, 2025b). By 2025, papers with at least one Middle East affiliation accounted for approximately one quarter of all RWDB records. This does not necessarily mean that the region has a higher underlying rate of misconduct than other regions, because retractions and related notices are shaped by detection, publisher policies, batch investigations, discipline mix, and publication volume. However, the magnitude and acceleration of the pattern indicate that research-integrity systems in the region are now exposed to the same large-scale threats seen globally, and in some countries more intensely.

Second, the most rapidly growing integrity signal was compromised peer review. This cluster includes fake-reviewer schemes, rogue-editor activity, and paper-mill-related editorial manipulation. The post-2020 rise suggests that recent retraction waves are not simply continuations of older patterns of plagiarism and duplication. Instead, many recent notices reflect industrialised or system-level vulnerabilities in the publication process, especially in high-volume special issues and venues where editorial controls were insufficient. The prominence of paper-mill and compromised-review flags in Saudi Arabia and Iraq is consistent with global concern that output-based incentives, rapid promotion requirements, and weak verification of reviewer identities may create opportunities for manipulation (Christopher, 2021; Else & Van Noorden, 2021; Fontaina et al., 2025).

Third, undeclared computer-generated content emerged as a distinct post-2022 signal. The RWDB reason code for computer-aided or computer-generated content appears after the rapid public diffusion of large-language-model tools and is likely to undercount the true scale of the problem. Retraction notices usually rely on indirect signs, such as tortured phrases, incoherent methods, anomalous citations, or overlap with other suspect manuscripts, rather than definitive proof of a specific tool. This makes the signal important but conservative.

The country profiles argue against a single regional explanation. Egypt and Israel had relatively prominent image-related signals, suggesting a need for image-forensics training, laboratory data archiving, and automated screening of microscopy, western blot, and figure-panel content. Iraq and Saudi Arabia were dominated by compromised peer review and paper-mill-related patterns, suggesting a need to audit special-issue publication pathways, promotion criteria, guest-editor appointments, and institutional incentives that reward publication count over transparent research practices. Iran and Turkey had lower international-collaboration rates and more domestically oriented profiles, which may require stronger national post-publication review capacity and clearer institutional pathways for investigating allegations.

International collaboration requires careful interpretation. The concentration of retracted collaborative papers involving India, China, Pakistan, the United States, and Malaysia may partly reflect broader transnational publication networks, including paper-mill markets that have been repeatedly described in the research-integrity literature (Mhamdi, 2026; P. R. et al., 2026). Collaborative papers often involve multiple institutions, unequal author contributions, outsourced analyses, guest authorship, and

corresponding authors located outside the Middle East. In wealthier Middle Eastern countries, publication-based promotion criteria and financial or career incentives may create demand for rapid, high-volume publication. These pressures can make some authors vulnerable to low-quality publication brokers, authorship-for-sale schemes, honorary collaboration, or paper-mill products marketed as “international collaboration.”(Alsulami et al., 2023; Verma & Sharma, 2024) The policy response should not be to discourage international collaboration, which remains essential for scientific development, but to strengthen the governance of collaboration: contributorship verification, transparent data provenance, institutional approval of external collaborations, author-level responsibility statements, and cross-border mechanisms for investigating suspected paper-mill activity.

Israel deserves a separate interpretation because it showed both the slowest APC and the longest median time from publication to notice (similar to European countries). This pattern should not be interpreted as evidence of the absence of misconduct. A more cautious explanation is that Israel differs structurally from several neighbouring research systems: it has high R&D expenditure relative to GDP, high researcher density, and a long-established biomedical and technology research base (OECD, 2026; World Bank, 2026a, 2026b). In such systems, the denominator for total publications and the disciplinary distribution may differ substantially from those in countries experiencing rapid recent expansion in publication output. Longer retraction lags and a larger image-related component may therefore reflect older biomedical records, retrospective image scrutiny, and mature post-publication review pathways, whereas the shorter-lag patterns in Iraq and Saudi Arabia are more compatible with recent batch investigations of compromised peer review and paper-mill-linked special issues.

For high-collaboration systems, institutional due diligence should focus on contribution transparency, corresponding-author accountability, raw-data custody, and the integrity of external analysis or writing services. For systems with highly compromised review signals, the priority is verification of reviewer identity, guest-editor oversight, special-issue audit trails, and promotion systems that reward quality and reproducibility rather than article count. For systems with prominent image or data signals, the priority is laboratory records, image-screening workflows, data repositories, and training in research data management. These interventions are complementary and should be coordinated through regional and international collaborations rather than framed as punitive country-level comparisons.

Our findings are consistent with, but extend, earlier work. Liu and Lei analysed Middle Eastern retractions from 1999 to 2018 and reported 563 records, with plagiarism and duplication as the dominant categories (Liu & Lei, 2021). Our larger, longer dataset confirms the importance of these older categories but shows that they have been overtaken in the post-2020 period by concerns about compromised peer review, paper-mill activity, and computer-generated content. Mhamdi analysed retractions involving Saudi-Arabia-affiliated authors from 2014 to 2023 and reported a sharp increase from 2020 onward; our Saudi-specific APC of 43.7% per year corroborates that pattern (Mhamdi, 2026). A recent multi-country analysis by Sebo and Sebo also identified Saudi Arabia and several other Middle Eastern countries as having high retraction rates relative to their worldwide publication output (Sebo & Sebo, 2025b). Our study extends the regional time window, explicitly separates crude population context from output-normalised interpretation, and highlights international collaboration patterns that may be important for cross-border integrity governance.

Limitations

Several limitations should be considered. First, RWDB depends on visible notices; silent withdrawals, non-English notices, and low-readership venues may be under-represented (Center for Scientific Integrity, 2026; Sebo & Sebo, 2025a). Second, affiliation strings are sometimes ambiguous, and our decision to include any record with a Middle East affiliation may count multinational collaborations that are not primarily Middle East-led. Third, country-attributed totals are not mutually exclusive, and primary-affiliation analyses may oversimplify multinational authorship. Fourth, 2024 and 2025 estimates may change as RWDB updates and batch investigations continue. Fifth, publisher reason coding is heterogeneous, and our thematic clusters are pragmatic summaries rather than mutually exclusive causal categories. Sixth, the dataset includes a small number of expressions of concern, corrections, and reinstatements in addition to full retractions; although full retractions represented 90.2% of records, this should be considered when interpreting absolute counts. Seventh, population denominators provide only demographic context; output-normalised denominators, such as retractions per indexed article, per field-specific article, per researcher, or per R&D expenditure, would be needed to distinguish high retraction counts from high publication volume (OECD, 2026; World Bank, 2026a, 2026b). Finally, this cross-sectional bibliometric design cannot establish causal effects of national policies, institutional incentives, collaboration pathways, or publisher practices.

5. Conclusions

Retraction-related records involving Middle East-affiliated research increased sharply between 2000 and 2025 and constituted approximately one in four RWDB records by 2025. Full retractions accounted for the vast majority of the dataset, but interpretation should remain denominator-aware and sensitive to country-attributed counting. The recent regional surge is driven less by older patterns of plagiarism and duplication than by compromised peer review, paper-mill activity, and post-2022 concerns about undeclared computer-generated content. Because the country profiles differ substantially, interventions should be tailored: image-forensics capacity where image issues are prominent, special-issue and reviewer-identity controls where peer-review compromise dominates, and institutional incentive reform across the region. International collaboration should be treated as a governance opportunity rather than a basis for blame, with shared standards for authorship, data provenance, raw-data custody, and cross-border institutional communication.

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