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What delisting-based exposure measures cannot see: country rankings, event artifacts, and the bibliographic visibility of Libya's national journals

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Research Article

Keywords: Predatory publishing, Research integrity, Open bibliographic data, DOI registration, National journal systems, Research evaluation

Posted Date: November 12th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-11362381/v1

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Additional Declarations: No competing interests reported.

Abstract

Studies that rank countries by exposure to questionable journals usually count publications in venues that an index has removed. We tested whether such measures agree. We classified 655,362 health-sciences articles and reviews by authors in 22 Arab League states (OpenAlex, 2000 to 2025) against the July 2026 Scopus source list and the Directory of Open Access Journals (DOAJ) with its 2014 to 2026 change log, and computed four exposure measures. The never-indexed ranking was not detectably related to the three delisting rankings (Spearman rho 0.07 to 0.16). Libya ranked first on never-indexed venues (33.4% of articles) and 18th on Scopus-discontinued venues (1.9%), while Syria and Iraq led the delisting measures. A journal can be delisted only after it has been listed, so delisting measures track a country's history of index access. Single events drove the DOAJ measure: one publisher's 2024 withdrawals, the removal of 2,859 journals in 2016 for a missed reapplication, and single dominant venues. Window start and readmission rules moved countries by up to six ranks. In Libya, 87.9% of 2020 to 2025 output appeared in venues not used before 2011, mostly domestic journals. We probed the 177 web addresses in Libya's ministry journal directory: 57.1% of journals had registered digital object identifiers (DOIs), 52.5% showed journal-level registration, 22.0% printed DOIs that were never registered, and eight appeared only as repository items. Composite indices should not pool delisting measures, and national counts from open bibliographic sources are lower bounds where journals do not register DOIs.

1 Introduction

Research evaluation systems count publications, and they count them more heavily as promotion rules tighten. That pressure has made venue quality a policy question. A consensus panel defined predatory journals as entities that put self-interest ahead of scholarship through false or misleading information, departure from editorial best practice, lack of transparency, or aggressive solicitation (Grudniewicz et al., 2019). Measuring how much of a country's output sits in such venues is harder than defining them. Shen and Björk (2015) estimated that articles in journals on Beall's list grew from about 53,000 in 2010 to about 420,000 in 2014, and later studies turned to country comparisons.

Country comparisons need an operational list, and most studies borrow one. Some matched output to Beall's lists (Macháček & Srholec, 2022), whose influence on how open access is judged has itself been examined critically (Krawczyk & Kulczycki, 2021). Others added the titles that Scopus discontinued for publication concerns (Marina & Sterligov, 2021), or mapped regional profiles of questionable publishing within Scopus (You et al., 2025). A lot rides on these choices. An earlier country-level analysis in this journal was retracted after publication (Macháček & Srholec, 2021), members of the journal's Distinguished Reviewers Board and Price Medal recipients publicly disagreed with the retraction (Abramo et al., 2023), and the authors later published a reworked analysis (Macháček & Srholec, 2022). The retraction note questioned whether the analysis supported statements about authors from particular regions.

Removal lists carry three properties that bear directly on that question. First, a journal can appear on a removal list only if an index once accepted it. A publishing system whose journals never entered Scopus or DOAJ cannot accumulate removals, however its journals behave. Second, indexes remove journals for

many reasons, and some of them are administrative. Third, removal is a status at a point in time, and journals return. Each property can reorder countries without any change in author behavior. Figure 1 sets out these transitions and the event that each measure records. A never-indexed venue is one that neither index has accepted; the label describes a journal's position in bibliographic infrastructure and, by itself, says nothing about its editorial practices.

A fourth problem sits upstream of the lists. Open bibliographic sources such as OpenAlex build their records from registered metadata, much of it deposited with Crossref (Priem et al., 2022), and coverage differs substantially across data sources (Visser et al., 2021). A national journal that runs its own website without registering digital object identifiers (DOIs) may be missing from these sources altogether. Any count of that country's output, flagged or not, then understates the national system.

Libya makes these problems concrete. Its biomedical output is small, 0.8% of the regional corpus analyzed here, and it grew several-fold after 2011 during a period of conflict. The Ministry of Higher Education and Scientific Research published its first classification of Libyan journals in an edition labeled 2024, through the Directory of Online Libyan Journals (DOLJ) (Directory of Online Libyan Journals, 2026). On 29 April 2025, Decision 393 of 2025 restricted promotion credit to journals approved in DOLJ, Scopus, or Web of Science (Ministry of Higher Education and Scientific Research, 2025). A recent study of ethics reporting in eleven accredited Libyan medical journals noted that the directory has not published the criteria behind its quartile assignments (Bredan, 2026).

We asked four questions. (1) Do four common exposure measures rank the same countries in the same order? (2) How far do administrative events and counting rules move the delisting-based measures? (3) What explains Libya's position on the one measure where it ranks first? (4) How much of Libya's ministry-recognized journal system can global bibliographic infrastructure see? The fourth question also tests the never-indexed measure itself, because open sources can count only the journals they can see. The answers bear on anyone who builds or uses country-level integrity indicators, and on national policies that rely on journal lists.

2 Data and methods

2.1 Publication corpus

We retrieved from OpenAlex all works published 2000 to 2025 with at least one author affiliated with an institution in one of the 22 member states of the League of Arab States, and a primary topic in the Health Sciences domain (filter primary_topic.domain.id:4; OpenAlex, 2026c). Membership in the League is a rule-based frame that avoids selecting countries by outcome. Two retrieval batches gave 763,254 records; removing 27,662 duplicates created by international co-authorship left 735,592 unique works, of which 655,362 were articles or reviews (Online Resource 1, Fig. S1). Abstracts were present for 77.3% of works. Each country's count matched the API count to within 0.02%. The Comoros returned no records for the period. We kept Djibouti and Mauritania, each with fewer than 1,000 works, in corpus totals and left them out of country rankings.

OpenAlex retired its polite pool, the faster service tier for requests that identified themselves with an email address, in February 2026; all our calls used an individual API key. Retrieval ran through a Google Colab notebook. Batch 1 was saved on 21 August 2026 and batch 2 on 22 August 2026. OpenAlex is updated continuously and publishes no versioned snapshot, so a later retrieval would return slightly different counts.

2.2 Reference lists

We used three reference records. (1) The Scopus source list, July 2026 edition, downloaded on 22 August 2026, with 74,473 ISSNs for current sources and 1,728 ISSNs for 1,172 discontinued titles (Elsevier, 2026). Elsevier overwrites this file monthly without an archive, so we retain the downloaded file for reproducibility. (2) The DOAJ journal export of 22 July 2026, with 23,239 journals and 35,587 ISSNs. (3) The DOAJ change log of added and withdrawn journals, which we assembled from the archived log (19 March 2014 to 31 January 2024) and the current log (from 1 February 2024 to 2 September 2026) (DOAJ, 2026). The merged log holds 7,464 withdrawal rows for 7,291 unique ISSNs and 23,403 addition rows. The archived record also contains a separate table for 9 May 2016, when DOAJ removed 2,859 journals that had not resubmitted an application under new criteria (DOAJ, 2017b).

Matching used ISSNs only. Arabic titles in the archived log render with reversed glyphs and could not be matched by name. We built a crosswalk of print and electronic ISSN pairs from the DOAJ export and the Scopus list, and matched every measure on this common basis.

2.3 Venue tiers

Each article or review received one of five venue tiers (Table 1). The repository-only tier separates works that OpenAlex attributes to a repository, such as Zenodo, from works in journals that lack an ISSN.

Table 1
Venue tiers and their shares of the corpus

Venue tier	Definition	% of articles and reviews
Indexed	Venue ISSN in the Scopus source list (July 2026) or in DOAJ (22 July 2026 export), and not in either removal record	75.32
Delisted	Venue ISSN on the Scopus discontinued-titles sheet or in the DOAJ withdrawal log, and not currently indexed	4.16
Never indexed	Venue has an ISSN but appears in none of the Scopus lists or DOAJ records	15.28
Repository-only	Work hosted by a repository source (for example Zenodo) with no ISSN-L	4.12
Unclassifiable	No ISSN and no repository source	1.11
Total	655,362 articles and reviews, 22 Arab League states, 2000 to 2025	**100.0**

DOAJ, Directory of Open Access Journals. ISSN-L, linking ISSN. Shares are for 655,362 articles and reviews on the common ISSN-matching basis.

2.4 Exposure measures

We computed four country-level measures, each as the share of a state's articles and reviews: (1) never indexed; (2) in Scopus-discontinued venues; (3) in venues ever removed from DOAJ; and (4) in venues whose DOAJ status at the publication year was removed. For measure 4, a work counts only if it appeared after the venue's most recent removal and before any logged readmission. For 575 withdrawn ISSNs of currently listed journals whose records kept their original addition date after readmission, the readmission date is unknown. Our primary (strict) rule does not count works in these restored journals as exposed; a loose rule counts them. The 2016 removal of 2,859 journals is excluded from the numerators of measures 3 and 4 and analyzed separately, because its stated reason was a missed reapplication.

We compared rankings with Spearman rank correlations across the 19 ranked states, and we report how far ranks move between variants of the DOAJ measure that differ in window start, window end, and rule for restored records. Unless a table states otherwise, ranks are among the 19 retained states, with rank 1 marking the highest share.

2.5 Venue supply in Libya

To test whether Libya's never-indexed share reflects a change in author choices or a change in the venues available, we took the first year in which each venue appears in the corpus. We decomposed Libyan output for 2020 to 2025 into venues already used in 2000 to 2010 and venues that were new, and compared the never-indexed share within each group. We also compared never-indexed shares between domestic-only papers and papers with at least one foreign co-author. The first year in the corpus is a lower bound on a journal's age, because OpenAlex coverage of small journals expanded over the same period.

2.6 Study design (supplementary analysis)

We also asked whether funding constraints, read through study design, explain venue choice. A rule-based classifier sorted abstracts into designs with a high resource ceiling (trials, cohorts, laboratory work) and a low one (record reviews, questionnaire surveys, case reports). We checked the rules against independent labels for a stratified random sample of 200 abstracts, half of them Libyan, and fixed in advance the agreement required for use in the main analysis. Agreement fell in the intermediate band that the pre-specified rule assigns to supplementary reporting: the three-class kappa was 0.43 against the author's labels for 50 abstracts and 0.55 against a second labeling of all 200. Rule-based high-ceiling labels were least accurate for Libyan abstracts, mainly because the rules counted reviews that mention laboratory work as high-ceiling studies. The classification, its validation, and the descriptive results therefore appear only in Online Resource 1.

2.7 Visibility of the ministry journal system

The frame was the set of 177 web addresses that DOLJ listed in its 2026 edition when we captured it in August 2026. The directory page for the 2026 edition, viewed on 29 September 2026, lists 175 numbered

entries: 7 in tier 1, 15 in tier 2, 55 in tier 3, 87 in tier 4, and 11 accepted and awaiting classification. The 2025 edition lists 173 entries and the 2024 edition 140 (Directory of Online Libyan Journals, 2026). Counts vary with the capture date and the counting unit; one published analysis reported 161 journals in mid-January 2026, 143 of them assigned to quartiles (Bredan, 2026). We keep the 177 addresses as the frame because the probe tested them.

For each address a probe requested the home page, expanded platform roots running Open Journal Systems once, opened up to two article pages, and extracted ISSNs and printed DOIs. It resolved each DOI through the Handle system, identified the registration agency, and queried Crossref for works under each ISSN, with fixed time limits per request and per journal. All reported results come from version 2.3, run on 28 September 2026; two earlier versions stalled on live sites and were discarded. The probe returned 179 rows. One row was a platform root, which the probe expanded into its two journals, and one journal appeared under two addresses; we removed the root row and the second address, leaving 177 journal rows.

We verified 24 journals by hand, drawn from suspected borrowed ISSNs, shared DOI prefixes, the largest reported volumes, and a random draw of journals the first probe had classed as invisible. DOI status came from the Handle API (response code 100 means not registered), the Crossref and DataCite REST APIs (Crossref, 2026; DataCite, 2026), and the ISSN Portal. After the run we resolved by hand the journals the probe could not classify: six blocked by site protection, one unreachable, and one whose newest DOI was unregistered although earlier volumes were registered. We excluded Crossref work counts above 10,000 for a single ISSN (nine rows had picked up ISSNs of foreign journals from reference lists) and six year ranges misread as ISSNs. No statistic uses counts of works per ISSN.

We call a journal registered when a sampled DOI resolves or when Crossref holds works under its own ISSN. Journal-level registration is the Crossref-registered subset plus any journal whose repository DOIs appear in OpenAlex with a journal source and an ISSN-L. We queried OpenAlex by DOI for journals registering with DataCite, and by ISSN for the 92 journals in the Crossref classes with a usable ISSN, through the source endpoint (OpenAlex, 2026a, 2026b), on 29 September 2026.

2.8 Statistics, software, and tools

We report shares with Wilson 95% confidence intervals where samples are small, Spearman rank correlations with percentile bootstrap intervals (10,000 resamples of states) and asymptotic p values, the Cochran-Armitage test for trend across ministry tiers, and Kendall’s tau-b as a check. To separate Libya’s rise from fixed differences between states and from shocks common to all, we fitted weighted least squares to country-period never-indexed shares (19 states, four periods, weights equal to the number of works) with country and period fixed effects and a Libya term for each period after 2000 to 2010. We judged Libya against a placebo distribution made by giving each state the same treatment in turn; with 19 states the smallest attainable p value is 1/19 = 0.053. Analyses used Python (pandas, NumPy, SciPy).

3 Results

3.1 Corpus composition

Output is concentrated. Egypt (27.2%), Saudi Arabia (21.0%), and Morocco (7.6%) account for 55.7% of the 728,031 country-level counts of articles and reviews, and Libya for 0.8% (6,040 works). Pooled regional means therefore describe Egypt and Saudi Arabia, and every comparison below is made country by country. Across the corpus, 75.32% of articles and reviews appeared in indexed venues and 15.28% in never-indexed venues (Table 1). The unclassifiable share varies by country, which makes it an uneven denominator. Recomputing all four measures over ISSN-bearing works changes the rank of no state by more than one (Spearman rho = 0.998 for each measure), and Libya keeps ranks 1, 18, 17, and 16; its never-indexed share becomes 36.2%.

3.2 Four measures, four orderings

The measures disagree on almost every country that matters (Table 2; Fig. 2a). Libya has the highest never-indexed share, 33.4% (Wilson 95% CI 32.3 to 34.6), and ranks 18th on the Scopus-discontinued measure at 1.9%. Somalia follows at 31.4% (30.1 to 32.7). These binomial intervals ignore the clustering of works within venues. A bootstrap that resamples venues widens them to 26.9% to 41.6% for Libya and 26.0% to 37.1% for Somalia, and the difference of 2.1 points has an interval of − 7.0 to 11.7, so the first two places cannot be separated. Iraq ranks 1st on the Scopus measure and 5th on never-indexed. Syria ranks 2nd on the Scopus measure, 1st on the DOAJ status-at-year measure, and 14th on never-indexed. No state holds the same position on all four measures. Lebanon is last on two (never indexed and Scopus discontinued) but 16th and 14th on the two DOAJ measures, and Tunisia (16th to 18th) and Sudan (3rd to 5th) vary least. Rank correlations across the 19 states confirm this (Table 2). The never-indexed ranking is not detectably related to the Scopus-discontinued ranking (rho = 0.16, 95% CI − 0.40 to 0.66, p = 0.50), the DOAJ ever-removed ranking (rho = 0.14, 95% CI − 0.40 to 0.59, p = 0.58), and the DOAJ status-at-year ranking (rho = 0.07, 95% CI − 0.41 to 0.51, p = 0.78). With 19 states the intervals are wide, and the data cannot exclude a moderate positive relation (Fig. 2b). The Scopus-discontinued ranking agrees moderately with the two DOAJ rankings (rho = 0.59, 95% CI 0.18 to 0.83, p = 0.008; rho = 0.58, 95% CI 0.18 to 0.85, p = 0.009), and the two DOAJ rankings agree closely with each other (rho = 0.95, 95% CI 0.81 to 0.99, p < 0.001), as expected from measures built on the same removal log.

The three profiles differ in kind. Libya’s output sits in journals that never entered either index. Iraq’s and Syria’s authors published at scale in journals that entered an index and later left it. If these measures were pooled into one composite, the three countries would sit close together and the difference that each measure reveals would be hidden.

Table 2
Exposure of 19 Arab League states under four measures (articles and reviews, 2000 to 2025)

State	Articles and reviews (n)	Never indexed, % (rank)	Scopus discontinued, % (rank)	DOAJ ever removed, % (rank)	DOAJ status at year, % (rank)
Algeria	17,883	11.80 (11)	2.80 (13)	4.41 (19)	1.81 (19)
Bahrain	6,421	14.76 (8)	3.01 (12)	15.81 (3)	10.23 (2)
Egypt	197,867	19.39 (6)	4.06 (6)	8.28 (15)	2.94 (17)
Iraq	51,453	20.80 (5)	12.49 (1)	10.69 (12)	5.22 (11)
Jordan	28,021	8.84 (17)	3.64 (7)	12.01 (9)	6.28 (8)
Kuwait	16,089	12.87 (10)	2.53 (15)	10.86 (10)	5.79 (10)
Lebanon	27,340	6.81 (19)	1.89 (19)	7.67 (16)	4.18 (14)
Libya	6,040	33.43 (1)	1.92 (18)	6.95 (17)	3.64 (16)
Morocco	55,104	18.45 (7)	3.40 (10)	13.42 (5)	6.75 (7)
Oman	12,597	9.60 (16)	1.96 (17)	9.01 (13)	4.16 (15)
Palestine	7,670	13.83 (9)	5.01 (3)	12.78 (6)	8.72 (4)
Qatar	32,942	10.31 (15)	3.53 (9)	8.97 (14)	4.75 (12)
Saudi Arabia	152,552	11.12 (13)	4.78 (5)	17.75 (2)	8.92 (3)
Somalia	4,765	31.37 (2)	2.67 (14)	10.72 (11)	6.07 (9)
Sudan	12,496	22.98 (3)	4.89 (4)	14.90 (4)	8.07 (5)
Syria	6,412	10.73 (14)	11.24 (2)	21.65 (1)	18.29 (1)
Tunisia	50,678	7.44 (18)	2.28 (16)	6.17 (18)	2.59 (18)
United Arab Emirates	34,505	11.56 (12)	3.61 (8)	12.57 (7)	7.52 (6)
Yemen	6,485	22.79 (4)	3.11 (11)	12.41 (8)	4.46 (13)

Ranks are among the 19 retained states (1 = highest share). Values are percentages of each state's article and review counts on the five-tier classification (Table 1); n is the country-level count, in which a work with authors in several states counts once for each state. The DOAJ columns follow the rules in Section 2.4 (strict rule for restored records). All four columns come from one classification pass. Both DOAJ columns use the complete change log to 2 September 2026 with the 2016 purge excluded; the status-at-year column equals Table 3, row 5, and the archived-log variants in Table 3 rows 2 to 4 differ from it by window. Djibouti and Mauritania (fewer than 1,000 works each) and the Comoros (no records) are not ranked.

3.3 Delisting measures follow administrative events

Three kinds of event dominate the DOAJ measure. First, single publishers: eleven journals from one publisher, MDPI (Multidisciplinary Digital Publishing Institute), withdrawn from DOAJ in September and October 2024 with the logged reason "Journal not adhering to best practice," supply 4,396 of the 13,630 articles (32%) flagged under the log that begins in February 2024. Second, single venues: in the ever-removed measure, one journal accounts for 44.2% of Bahrain's flagged works and 25.6% of Saudi Arabia's, and the top three venues account for 72.8% of Syria's flagged works, 58.9% of Morocco's, and 44.0% of Libya's. Third, bulk administrative removals: the 2016 reapplication purge accounts for 2,859 of the 8,131 DOAJ removals between March 2014 and January 2024 (35.2%; the archived log records the other 5,272, and the purge sits in a separate table). Adding it to the archived-log measure moves Kuwait from 11th to 4th and Libya from 16th to 13th among the 19 ranked states (Table S6).

Recorded reasons confirm that removal does not track quality alone. One national medical journal left DOAJ in August 2020 because its website address no longer worked, which flags 2,992 Saudi and 216 Iraqi works. Two journals left in January 2019 as having ceased publication, although both continue under commercial imprints. Removal is also impermanent. Of the withdrawn ISSNs, 7.9% reappear as additions after their withdrawal, and 50 ISSNs were withdrawn in both the archived and the current log. Of the 1,549 withdrawn venues present in the corpus, 268 (17.3%) are listed in DOAJ today, and they carry 21.8% of the works flagged as ever removed; for journals removed in the 2016 purge the share is 34.4%. Withdrawals also vary sharply by year, from 160 in 2014 to 1,372 in 2017 and 966 in 2025. The 2017 peak coincides with the close of DOAJ's reapplication project: DOAJ reported a final push in 2017 to process the outstanding reapplications, processed the last of them at the end of October, and rejected 2,058 of the 6,359 it received (DOAJ, 2017a, 2017b). We did not use the series over time.

Counting rules move countries further (Table 3). On the archived log, restricting the count to works published while the venue stood removed discards 56.2% of the 59,842 flagged works under the strict rule (26,211 remain) and 49.9% under the loose rule (29,989 remain), and still moves countries by up to six ranks (Yemen from 7th to 13th; Lebanon from 17th to 14th; Online Resource 1, Table S6). Extending the log to September 2026 changes the ranking less than the readmission rule does: the extension moves no state by more than two ranks, whereas the strict and loose treatments of restored records move Yemen by four ranks (13th to 9th) and no other state by more than one. The measure is stable at its recent end and unstable at its start and in its treatment of readmissions.

Table 3
Sensitivity of the DOAJ-based measure to window and counting rule

DOAJ measure variant	Works flagged	Highest-ranked state	Libya: rank (%)
Withdrawals logged from 1 February 2024 (current log only)	13,630	Saudi Arabia (3.70%)	18th of 19 (0.91)
Ever removed, 2014 to January 2024 (archived log), 2016 purge excluded	59,842	Syria (20.48%)	16th of 19 (6.09)
As above, 2016 purge included	71,395	Syria (21.94%)	13th of 19 (9.17)
Status at publication year, archived log only (to January 2024), strict rule	26,211 (from 59,842)	Syria (14.55%)	17th of 19 (2.28)
Status at publication year, complete log to 2 September 2026, strict rule	35,042	Syria (18.29%)	16th of 19 (3.64)
As above, loose rule for restored records	39,240	Syria (18.75%)	17th of 19 (3.86)

Works flagged are unique articles and reviews; each percentage is the share of the state's articles and reviews, and ranks are among the 19 ranked states. Rows 1 to 3 count a work if its venue was removed in the period shown, whatever the year of publication. Rows 4 and 5 use the strict rule, under which works in journals restored to DOAJ with an unknown readmission date are not counted as exposed; row 6 uses the loose rule, which counts them. The 2016 purge is excluded unless stated. Rows 5 and 6 are the measures in Table 2, which gives Libya 3.64% (16th) under the strict rule and 3.86% (17th) under the loose rule.

The Scopus measure behaves differently and still misses Libya. Across the corpus, 4.43% of works (29,037) appeared in 531 Scopus-discontinued venues. Libya's share stayed between 0.44% and 3.53% in every period, while the regional share rose from 1.23% to 5.94%. The Scopus-discontinued share exceeds the delisted tier in Table 1 (4.16%) because the exposure measures count every work in a removed venue whatever its status today, whereas the delisted tier holds only venues that neither index lists now; some Scopus-discontinued journals are currently in DOAJ.

3.4 Libya: growth of a domestic journal system

Libya's never-indexed share rose from 2.4% in 2000 to 2010 to 37.8% in 2015 to 2019, peaked at 44.3% in 2019, and then held between 35.5% and 41.1% (Table 4). Measured against the regional pattern, where every group rose as open access and OpenAlex coverage grew, Libya's increase between the first and last periods (35.0 percentage points) exceeded that of the other conflict-affected states (Iraq, Somalia, Sudan, Syria, and Yemen; 18.0 points) by about 17 points and that of the Gulf states (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates; 7.5 points) by about 27 points. A country fixed-effects model gives the same ordering. Relative to 2000 to 2010 and to the other states, Libya's never-indexed share was 8.6 percentage points higher in 2011 to 2014, 24.3 higher in 2015 to 2019, and 24.0 higher in 2020 to 2025. In a placebo test that gave each of the 19 states the same treatment, Libya's estimate was the largest in

every period (p = 0.053, the smallest value 19 states allow); the next largest for 2020 to 2025 were Somalia (18.4 points) and Morocco (17.5). The result held without weights and without Egypt and Saudi Arabia (Online Resource 1). The placebo comparison is a ranking argument: it shows that no other state rose as far as Libya, and the group contrasts above do not depend on it.

Venue supply accounts for the rise. Of 4,070 Libyan articles and reviews from 2020 to 2025, 3,577 (87.9%) appeared in venues that Libyan authors had not used in 2000 to 2010, and 42.5% of these were in never-indexed venues. The 493 works in venues used before 2011 included none in a never-indexed venue. The rise therefore came entirely from venues new to Libyan authors.

The rise did not come from a change in collaboration. The share of Libyan papers with a foreign co-author was 41% in 2000 to 2010 and between 47% and 54% in each later period. Domestic-only papers were more often in never-indexed venues than internationally co-authored ones (41.8% against 24.5%, a ratio of 1.7), a gap seen in Sudan (36.5% against 15.7%), Egypt (25.2% against 9.8%), Saudi Arabia (14.8% against 8.4%), and Iraq (22.9% against 14.5%). Tunisia reverses it (5.9% against 10.7%). We have no explanation for the Tunisian pattern and report it as found.

Table 4
Libyan articles and reviews by period

Libyan articles	**2000 to 2010**	**2011 to 2014**	**2015 to 2019**	**2020 to 2025**
Articles and reviews, n	451	397	1,122	4,070
In never-indexed venues, %	2.4	15.6	37.8	37.4
In Scopus-discontinued venues, %	0.44	3.53	1.52	2.04

Libyan output rose from a mean of 41 works per year in 2000 to 2010 to 99 per year in 2011 to 2014 and 472 per year from 2015 to 2025, reaching 1,280 in 2025.

Most of the new venues are Libyan university and professional journals. Their own pages and registry records show that first appearance in OpenAlex overstates novelty for some. Of the twelve venues with the most Libyan articles and reviews among those first seen in the corpus from 2011 onward, nine began publishing after 2011: the Misurata Medical Sciences Journal (2014), the Lebda Medical Journal (2015), the Libyan International Medical University Journal (2016), the Libyan Journal of Dentistry, the AlQalam Journal of Medical and Applied Sciences, the Khalij-Libya Journal of Dental and Medical Research, and the Libyan Journal of Medical Sciences (all 2017), the Libyan Journal of Medical and Applied Sciences (2023), and the Attahadi Medical Journal (2024). Three predate it: the Libyan Journal of Medical Research (2005), the Scientific Journal of the University of Benghazi (already at volume 24 in 2011), and the Libyan Medical Journal (earlier the Jamahiriya Medical Journal, already at volume 14 in 2022). The lag between founding and first appearance in OpenAlex reaches nine years for the Libyan Journal of Medical Research (2005 and 2014), six for AlQalam (2017 and 2023), and three for Khalij-Libya (2017 and 2020). OpenAlex attributes 26 journals to Libya, nine of them first seen in 2020 to 2025, against 175 entries in the ministry's 2026 directory; the gap reflects both journals missing from OpenAlex (Section 3.5) and journals that OpenAlex

holds without a country. Libyan authors kept their earlier venues and added domestic journals, some newly founded and some newly visible to open bibliographic sources.

3.5 Visibility of the ministry-recognized journals

Of the 177 journals, 101 (57.1%) were registered in at least one DOI system and 93 (52.5%) showed journal-level registration (Table 5). The remaining 76 (42.9%) had no registered DOI: 39 (22.0%) printed DOIs that the Handle system reported as unregistered, and 37 (20.9%) showed no DOI on the pages checked. Five journals that the probe classed as blocked by site protection proved, on manual checking, to be Crossref-registered through a single service provider, and the one unreachable address was a stale staging site for a Crossref-registered journal. The sixth blocked address, a journal on a university platform, showed neither a DOI nor an ISSN on two articles that we read as PDFs (2021 and 2025), and counts as no DOI seen. A probe that treats blocked or unreachable sites as unregistered therefore undercounts registration.

Table 5
Registration status of 177 ministry-recognized journals (probe version 2.3, 28 to 29 September 2026)

Group	Probe classification	n	% of 177	Evidence level
Registered	Crossref-registered (sampled DOI resolves)	69	39.0	DOI
	Crossref holds works under the journal's own ISSN; no DOI seen on pages checked	23	13.0	ISSN
	DataCite-registered (Zenodo DOIs)	9	5.1	DOI
Not registered	DOI printed, not registered	39	22.0	DOI
	No DOI seen on pages checked	37	20.9	Page scrape
Total		**177**	**100.0**	

Registration falls with each step down the ministry classification (Table 6; Fig. 3). All seven tier 1 journals were registered, against 80% in tier 2, 60% in tier 3, and 49% in tier 4 (Cochran-Armitage $z = -3.29$, $p = 0.001$; Kendall tau-b = -0.21, $p = 0.004$). Tiers 3 and 4 print unregistered DOIs at similar counts (18 and 19 journals); they differ in journals that show no DOI at all, 31 of 98 in tier 4 against 5 of 57 in tier 3. One journal appears in the ministry list twice, at tiers 3 and 4; assigning it to either tier leaves the tests unchanged in direction and significance. The gradient cannot serve as independent validation of the tiers. The directory's inclusion criteria, as displayed on 29 September 2026, require a DOI in every published article (criterion 12) and article metadata in XML or Crossref format (criterion 19) (Directory of Online Libyan Journals, 2026), and the criteria behind tier assignment have not been published (Bredan, 2026). Tier 4 here includes the 11 journals that the 2026 edition lists as accepted and awaiting classification, which the probe frame coded as tier 4. The gradient does not depend on them: without them it remains significant whether all 11 are assumed registered (Cochran-Armitage $z = -3.92$, $p < 0.001$; Kendall tau-b = −0.27) or none ($z = -2.60$, $p = 0.009$; tau-b = − 0.16).

Table 6
Registration status by 2026 ministry tier

Tier	n	Registered, n (% [95% CI])	Journal-level, n (%)	Printed, unregistered	No DOI seen
1	7	7 (100 [65–100])	7 (100)	0	0
2	15	12 (80 [55–93])	12 (80)	2	1
3	57	34 (60 [47–71])	30 (53)	18	5
4	98	48 (49 [39–59])	44 (45)	19	31
All	**177**	**101 (57.1)**	**93 (52.5)**	**39**	**37**

Eight failure modes explain how journals appear registered when they are not, or unregistered when they are (Table 7). Because these are findings about infrastructure rather than editorial practice, examples that concern a fault are coded by letter; the key is available to editors and reviewers on request. Seventeen of the 39 unregistered journals print DOIs under an institutional prefix that is active for other journals in the list; the institution holds an account, and the journal's own DOIs were never deposited. One ISSN, whose ISSN Portal record carries the title of one journal (journal C in Table 7), also carries Crossref deposits from a journal at another university with a similar title, so any ISSN-based count credits one journal with the other's work.

Table 7
Failure modes observed in the sampling frame

Failure mode	Mechanism	Example	Journals affected
Borrowed or shared ISSN	A journal is credited with a sibling journal's ISSN, or two institutions hold one ISSN	Journals A and B share one ISSN; journals C and D share another	at least 4 pairs
Third-party unused prefix	Printed DOIs carry a prefix owned by an unrelated organization with no deposits	Journal E: the printed prefix belongs to an unrelated organization in Tripoli, with zero deposits	1
Institutional prefix, DOIs not deposited	The university prefix is active for other journals; this journal's DOIs were never deposited	Journal F: DOIs under its university's prefix	17 of 39 printed-unregistered share such a prefix
Latest volume not deposited	Earlier volumes are registered; the newest sampled DOI is not	Journal D, volume 28	1 confirmed
Service-provider prefix	One provider deposits for several journals under its own member ID	Five journals under Crossref member 3407	5
DataCite registration	DOIs sit in a repository record that Crossref tools cannot see	Nine journals with Zenodo DOIs	9
Site protection	Bot checks block automated probes, hiding registered journals	Five journals later confirmed as registered	5
Stale ministry address	Listed address is a staging site	Journal G	1

Registration with DataCite did not make journals visible as journals. Nine journals register DOIs with DataCite, mostly as Zenodo records. Eight of them appear in OpenAlex only as articles in the Zenodo repository source, with no ISSN-L, indexed through DataCite alone (Table 8). One, the Sharwes Scientific Journal, appears with a journal source and an ISSN-L, and Crossref also holds 20 works under its ISSN. The Crossref classes behaved in the opposite way. All 92 journals tested exist in OpenAlex as sources typed as journals; the median ratio of OpenAlex works to Crossref works was 1.0, and ten journals held fewer than half of their Crossref works in OpenAlex. The DataCite records carried further defects: in one the journal name is entered as first creator, which OpenAlex reproduces; one places the full author list in a single creator field; and one names the journal as publisher while OpenAlex assigns the article to Zenodo.

Table 8
Journals registering DOIs with DataCite: OpenAlex and Crossref status

Journal	ISSN	OpenAlex source type	OpenAlex ISSN-L	DOI in Crossref	Crossref works under ISSN
Journal C (see Table 7)	coded	repository	none	no	36
Sharwes Scientific Journal	3079–6040	journal	3079–6040	no	20
Libyan Journal of Informatics	3080–6674	repository	none	no	0
Mediterranean J. of Medical Research	3080–7735	repository	none	no	0
Maaref Medical Journal	3136 –0777	repository	none	no	0
Academy J. for Basic and Applied Sci.	3080–9533	repository	none	no	0
Mediterranean J. of Medicine and Med. Sci.	3107 –2720	repository	none	not run	not run
J. of the Libyan Geographical Society	2790 –0150	repository	none	not run	not run
Tripoli veterinary journal	3080–7069	repository	none	not run	not run

3.6 Movement between ministry tiers

Keyed by journal web domain (112 domains across the three editions, captured in August 2026), 13 journals moved up and 5 moved down between the 2024 and 2025 editions, and 15 moved up and 1 moved down between 2025 and 2026. The grading therefore moves in both directions, and a comparison of the 2024 and 2026 editions alone would hide the five demotions of the first transition.

4 Discussion

4.1 What delisting measures measure

The four measures rank countries differently because they record different events. A never-indexed share records where a country's journals sit relative to two indexes. A Scopus-discontinued share records whether a country's authors used journals that Scopus accepted and later dropped, which requires that such journals were accessible to them in the first place. A DOAJ removal share records, to a large degree, which commercial platforms a country's authors used when those platforms met an administrative event. Libya ranks low on both delisting measures because its journals rarely entered either index, and first on the never-indexed measure because that is where its system lives. Its position is consistent across the measures once each measure is read for what it records.

Two consequences follow for indicator builders. If delisting and never-indexed shares were averaged into one composite, the result would combine incompatible constructs and could not be interpreted. And any delisting-based ranking should report, for each country, how much of its signal comes from the few largest venues and from bulk removal events. In our data one publisher's withdrawals supplied 32% of the DOAJ signal logged since February 2024, and one logged removal date supplied 35.2% of a decade's removals. These concentrations move countries by several ranks, which is the scale at which country comparisons are usually read.

A delisting count can grow only where journals were first admitted, and the logs we used record administrative events alongside quality decisions. Any publishing system that sits largely outside index coverage, whether for reasons of language, cost, or political disruption, should therefore look clean on delisting measures and exposed on never-indexed ones, in any region. Our corpus covers one region and one field, so the size of the effect elsewhere remains untested.

4.2 Libya's never-indexed share

The literature treats a high never-indexed share as a warning sign. In Libya most of it records a domestic journal system that grew and became visible after 2011. Authors did not abandon indexed venues: the 493 works from 2020 to 2025 in venues used before 2011 included none in a never-indexed venue. They added mostly university-based journals that had not yet reached indexing, some newly founded and some newly visible to open sources. The shift occurred without a change in collaboration, and most of it happened between about 2013 and 2019. The ministry classification arrived later, with an edition labeled 2024. The state graded a system that had already formed.

A single never-indexed share cannot separate a domestic journal system from drift into offshore venues that sell acceptance. A journal-level instrument, such as a national list, can.

4.3 Registration and visibility

Three states need separating in national counts: a DOI printed on a page, a DOI registered with an agency, and a work that bibliometric tools recognize as a journal article. About 43% of Libya's ministry-recognized journals do not reach the second state, and eight more reach it only through a repository that OpenAlex treats as a repository. OpenAlex creates its source records from works that arrive from Crossref, DataCite, the Microsoft Academic Graph, PubMed, and repository feeds (OpenAlex, 2026b; Priem et al., 2022). Journals without registered DOIs can still reach OpenAlex through PubMed or a repository, so we did not test their absence directly; but a journal that deposits with none of these channels has no route in, and Libyan figures derived from OpenAlex, including the never-indexed share, are best read as lower bounds. The failure modes in Table 7 also show that a printed DOI prefix proves little: a prefix may belong to a third party that has never deposited, or to an active institution that never deposited this journal.

The practical remedy is inexpensive relative to the cost of invisibility. A journal that deposits article DOIs with Crossref under its own ISSN appears in OpenAlex as a journal in every case we tested. National directories that already require DOIs could verify registration through the Handle system at the time of classification, which would convert criterion 12 from a statement on a website into a checked condition.

4.4 Decision 393 and the national list

Decision 393 of 2025 credits for promotion only output published in DOLJ-approved journals, in Scopus, or in Web of Science. The signed resolution names the directory as DOLJ, the Directory of Online Libyan Journals at dolj.ly; a legal-database transcription reads “DOLI” (Ministry of Higher Education and Scientific Research, 2025). The decision closed a route that publishers of questionable venues could exploit, because output in those venues no longer counts toward promotion, while leaving open a domestic route that does count. We did not measure the effect of the decision on author behavior, so this protective function is an interpretation.

The Libyan list also answers the measurement problem in Section 4.1 better than the international lists do. It is the only instrument in our data that separates a domestic journal system from offshore venues, and its tiers track DOI registration, although partly because registration is one of its criteria. A list of this kind is only as useful as its checks. Publishing the tier criteria, verifying DOI registration, and recording the reasons for demotion would let outside researchers use it.

4.5 Limitations

The corpus covers health sciences only, and OpenAlex misses journals that do not register DOIs, which is the problem the visibility study documents. Our rankings are descriptive. The country fixed-effects model in Section 3.4 removes fixed differences between states and shocks common to all, but with 19 states it rests on a placebo test, it does not model why Libya’s rise occurred, and it supports no causal reading. A rule-based classification of study design agreed only moderately with independent labels, so we report it in Online Resource 1 and draw no conclusion from it here. The Scopus source list is a single snapshot that Elsevier overwrites each month: it shows which titles stood discontinued in July 2026, not when Scopus dropped them, and it can miss titles that changed name or ISSN. The visibility probe is a single cross-section taken over two days; it read at most two article pages per journal, and its OpenAlex test of the Crossref classes matched on ISSN, so it cannot detect a journal credited with another journal’s works under a shared ISSN. First appearance in OpenAlex is not a founding date. Matching to Scopus and DOAJ relied on ISSNs and paired print and electronic ISSNs, so a journal that changed its ISSN, or that a list records under a different ISSN, may be misclassified. The author is a faculty member at a Libyan university subject to Decision 393 and publishes in Libyan journals.

5 Conclusions

Delisting-based exposure measures rank countries by their history of index access and by the administrative events that indexes record, and they cannot see publishing systems whose journals were never indexed. Four common measures give four different rankings of Arab League states, the never-indexed ranking is not detectably related to the other three, and single events and counting rules move countries by several ranks. Libya’s high never-indexed share records a domestic journal system that grew and became visible after 2011, and about 43% of that system’s ministry-recognized journals showed no registered DOI in our probe. Country-level integrity indicators should report their measures separately,

disclose the venues and events behind each country's value, and treat counts from open bibliographic sources as lower bounds wherever national journals do not register DOIs. Tests in other fields and regions, where DOI registration and index coverage differ, would show how far these patterns extend.

Declarations

Competing interests.

Financial interests: the author declares no financial interests. Non-financial interests: the author is employed by a Libyan public university whose promotion rules follow Decision 393 of 2025 and has published in Libyan journals.

Ethics approval.

Not applicable. The study used bibliographic metadata and public web pages and involved no human participants.

Funding.

No funding was received for conducting this study.

Author Contribution

A.M.A. conceived and designed the study, retrieved and curated the data, performed the analyses, prepared the figures and tables, and wrote and revised the manuscript. A.M.A. reviewed and approved the final manuscript.

Data Availability

The OpenAlex metadata, venue tier assignments, country tables, the merged DOAJ change log, the design-validation sample with its labels and key, and the rule file described in Online Resource 1 are available at Zenodo (Abusneina, 2026; version 1.2, https://doi.org/10.5281/zenodo.23337022; all versions, https://doi.org/10.5281/zenodo.23164658) under a CC BY 4.0 licence, except the DOAJ-derived change-log files, which carry DOAJ's CC BY-SA 4.0 licence. Journal-level probe results are deposited with each journal identified by a random code and without URLs, ISSNs, or names, so that every count in Tables 5 to 7 can be recomputed; the key to the codes is available to editors and reviewers on request, and any journal may ask the author to correct its entry. The Scopus source list is available from Elsevier; the July 2026 edition used here is retained by the author because Elsevier does not archive earlier editions. The tiering and analysis scripts, the figure scripts, the study-design rule file, the retrieval notebooks and the visibility probe (version 2.3) are in the same repository.

Code availability.

The tiering and analysis scripts, the figure scripts, and the study-design rule file are in the same repository. The retrieval notebooks and the visibility probe (version 2.3) will be added to it.

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Figures

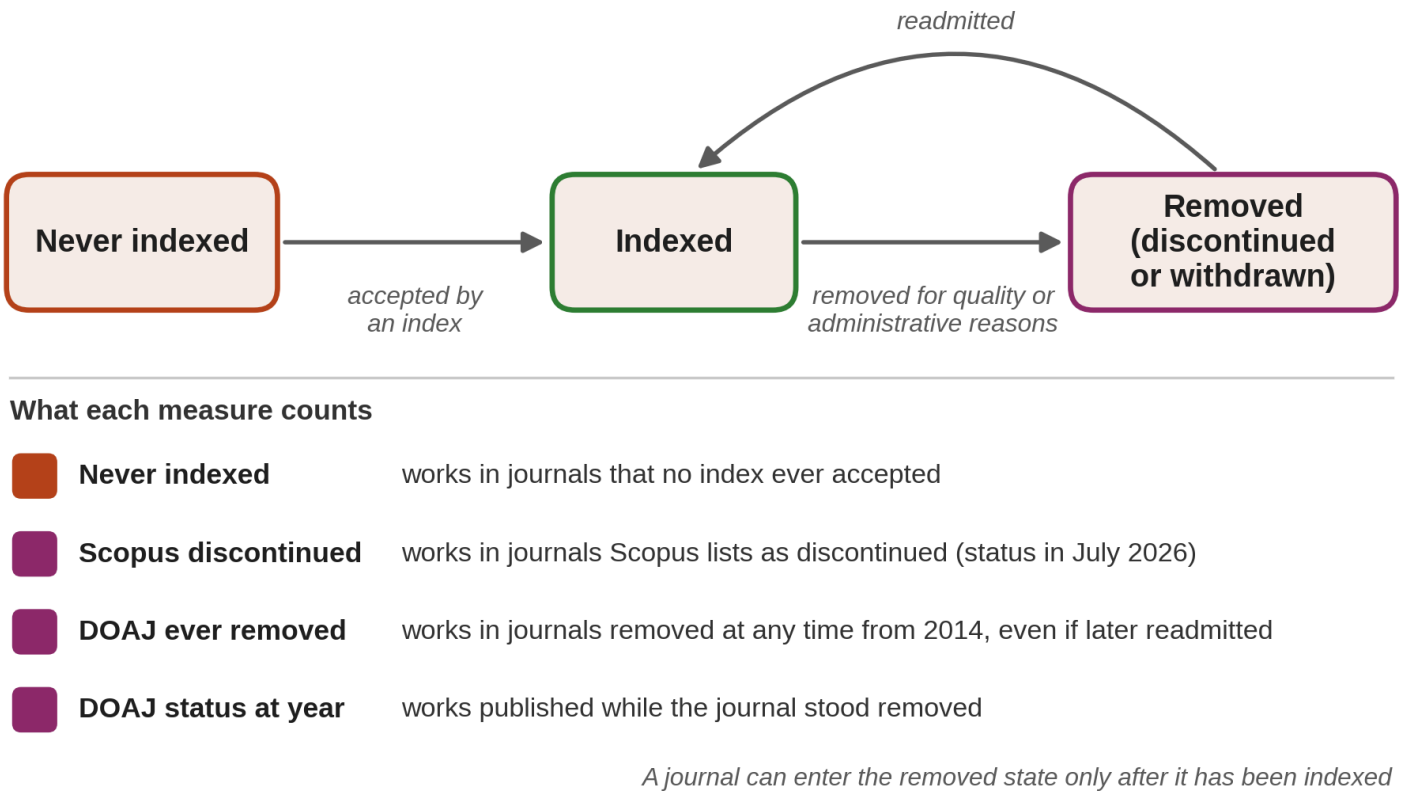


Figure 1

Journal states and the four exposure measures. A journal moves from never indexed to indexed when an index accepts it, and from indexed to removed when the index discontinues or withdraws it; some removed journals are readmitted. Each measure counts works in a different state, and only journals that an index once accepted can contribute to the three delisting measures

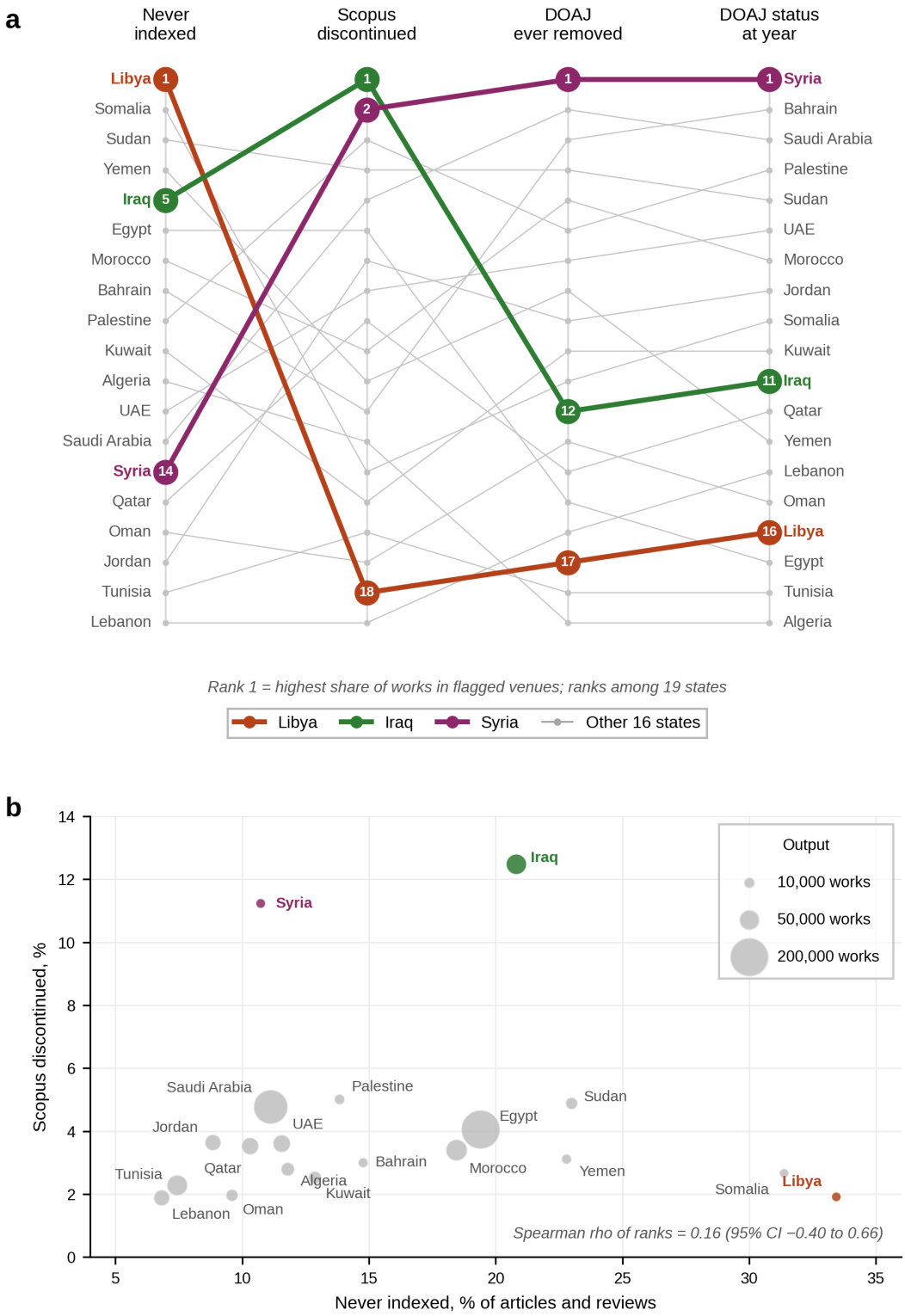


Figure 2

Exposure of 19 Arab League states on four measures. (a) Ranks on never indexed, Scopus discontinued, DOAJ ever removed, and DOAJ status at publication year; lines connect each state across measures, rank 1 marks the highest share of a state's articles and reviews in flagged venues, and Libya, Iraq, and Syria are highlighted. (b) Never-indexed share against Scopus-discontinued share; bubble area is proportional to the state's articles and reviews. Values are those of Table 2

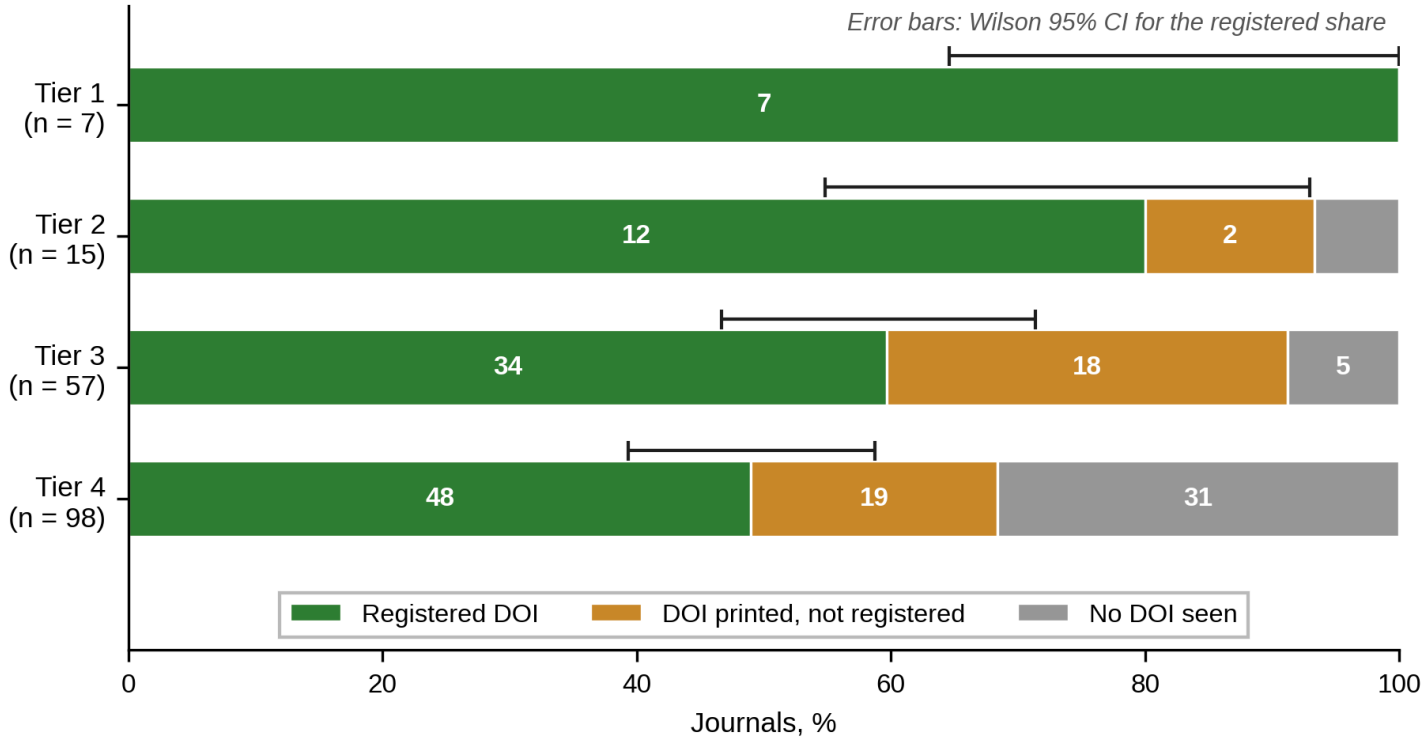


Figure 3

DOI registration status of 177 ministry-recognized journals by 2026 tier. Numbers in the bars are journal counts; error bars are Wilson 95% confidence intervals for the share of journals with a registered DOI. Values are those of Table 6

Supplementary Files

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