Supplementary information to:
These universities have the most retracted scientific articles

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Methodology note

Three companies – Scitility, Research Signals and Digital Science – independently analysed their own internal data sets on retractions and provided *Nature* with data on institutions' retractions, and retraction rates, for articles in 2014–24 and 2020–24.

These data sets support the firms' research-integrity products (Argos, Signals and Dimensions Author Check, respectively). The analyses were provided on the basis that the full data sets would not be made public.

The analyses look at the affiliations of all authors on a retracted research paper. An institution is assigned a retraction if it appears at least once in a paper's affiliations list.

Retraction records in each data set differ because:

- Each firm has built its own data set. They each use the same public Retraction Watch data set and subtract articles that lack DOIs. But the firms use different methods to find additional retracted papers and to cull papers from their lists. (And as of February 2025, Scitility says it has its own data pipeline of retractions, independent from Retraction Watch).
- The analyses were conducted at different times: December 2024 (Digital Science and Research Signals) and February 2025 (Scitility), and data sets will have changed in that time.
- The firms assign author addresses to institutions in different ways. To map institutional affiliations, Digital Science uses Dimensions, which relies on the private Global Research Identifier Database (GRID); while Research Signals and Scitility use OpenAlex, which relies on the public Research Organization Registry (ROR). Both GRID and ROR sometimes are missing particular institutions, or make different choices about how to aggregate affiliations to institutions. In particular, some analyses of retractions at Chinese universities included the retractions of Chinese hospitals affiliated with that university (indicated in the article graphics where appropriate).
- The firms also have different denominators – that is, total numbers of research, review and conference articles – when calculating retraction rates for an institution. Dimensions' numbers tend to be smaller than OpenAlex's.

Nature further analysed each data set and sense-checked with the numbers in the public Retraction Watch data set. This checking uncovered some errors in affiliation assignment and led to exclusion of some institutions that had been inappropriately aggregated together. *Nature* also chose to filter out institutions that had published fewer than 100 articles per year over the time period.

For the chart showing retraction rates by country, *Nature* filtered out countries that had fewer than 50,000 articles or fewer than 250 retractions over the period 2014–24. (In a 2023 *Nature* article showing national retraction rates according to the Retraction Watch database, countries with fewer than 100,000 articles over a decade were filtered out, which is why Ethiopia and Iraq did not appear in that list.)

The chart showing journals with highest retraction rates, from Scitility data, filters out journals with fewer than 1,000 articles over the period. (At the time of a 2024 *Nature* article about the topic, the data provided by Scitility omitted journals with fewer than 10,000 articles — so the charts are different.)