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Original Article

Others Section

Comprehensive Scientometric Analysis and Policy Impact Analysis of ICMR's Scopus-indexed Research Output from 2014 to 2024

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ABSTRACT

Introduction: The Indian Council of Medical Research (ICMR), India's apex biomedical and public health research organisation, plays a central role in generating evidence that informs national and international health policy. Despite its institutional significance, no comprehensive longitudinal scientometric evaluation using internationally standardised bibliometric platforms has been reported.

Aim: To conduct a comprehensive scientometric and policy impact analysis of ICMR's Scopus-indexed research output from 2014 to 2024 using Elsevier SciVal, encompassing publication growth, citation impact, journal quality, subject area distribution, SDG alignment, collaboration architecture, topic cluster prominence, online visibility, funding landscape, and policy influence.

Materials and Methods: Bibliometric data were retrieved from SciVal (Elsevier), sourced from the Scopus database. Indicators included annual scholarly output, Field-Weighted Citation Impact (FWCI), Field-Weighted Views Impact (FWVI), CiteScore quartile distributions, collaboration profiles, SDG-aligned output, topic cluster prominence percentiles, online views percentiles, and policy citation metrics. Global benchmarking compared ICMR's performance against low-to-middle income country (LMIC) research councils and high-income country (HIC) benchmarks.

Results: ICMR produced 11,978 Scopus-indexed publications (2014-2024), accumulating 396,907 citations and an overall FWCI of 2.04. Annual output grew at a compound annual growth rate (CAGR) of 6.63%, with the sharpest acceleration occurring during 2019-2021 (+64.6% over two years). Q1 journal publications constituted 44.5% (4943/11,097) of output. Internationally collaborative publications (25.1%) achieved an FWCI of 5.65. SDG 3 accounted for 79.5% of SDG-aligned output (FWCI=2.59). COVID-19 emerged as the leading topic cluster (FWCI=4.79; world prominence percentile=99.94). A total of 1,272 publications (10.6%) were cited in 6,506 policy documents across 546 policy bodies in 89 countries.

Conclusion: ICMR demonstrated sustained above-average global research impact with notable policy translation capabilities. Strategic priorities include expanding international collaboration, scaling non-communicable disease and planetary health research, and strengthening methodological quality within domestic research partnerships.

Keywords: Research evaluation; Bibliometric indicators; Evidence-based health policy; National health research systems; Research output assessment

INTRODUCTION

Scientometric analysis—the application of quantitative methods to measure and evaluate scientific output—has become an essential instrument for institutional research governance, resource allocation, and international benchmarking [1,2]. Foundational contributions by Price and Garfield established that scientific knowledge grows exponentially and that citation networks encode measurable knowledge structures [3,4]. Subsequent methodological advances, including the development of field-normalised citation indicators such as the Field-Weighted Citation Impact (FWCI), enable equitable comparison of institutions across disciplines, sizes, and time periods [5,6]. The Leiden Manifesto and the San Francisco Declaration on Research Assessment (DORA) further established normative frameworks for responsible use of bibliometric indicators, emphasising their role as supplements to, rather than replacements for, expert qualitative judgement [7,8].

India has emerged as a major global contributor to peer-reviewed scientific literature, consistently ranked among the world's top five nations in absolute publication output [9,10]. Within India's biomedical and public health landscape, the Indian Council of Medical Research (ICMR) occupies a uniquely central position. Established in 1911 under the Ministry of Health and Family Welfare (MoHFW), ICMR coordinates research across 26 constituent institutes spanning communicable diseases, non-communicable diseases (NCDs), nutrition, reproductive health, environmental health, and emerging infectious threats [11]. Its mandate explicitly bridges knowledge generation and health policy, with ICMR evidence informing clinical guidelines, vaccination programmes, and national disease control strategies.

The decade 2014-2024 was particularly consequential for ICMR, encompassing the adoption of the United Nations Sustainable Development Goals (SDGs, 2015-2030) [12], the unprecedented COVID-19 pandemic, a worsening global antimicrobial resistance (AMR) crisis [13], and rapid expansion of digital health infrastructure [14]. These developments reshaped institutional research priorities, collaboration networks, and the pathways through which scientific evidence informs public health practice.

The international scientometric literature on ICMR is sparse. Existing bibliometric studies of Indian biomedical research have focused on narrow disease domains [15], short time periods [16], or national-level aggregate analyses that obscure institutional dynamics [17]. Critically, no prior study has conducted a multi-indicator, decade-long scientometric evaluation of ICMR's research output using Elsevier SciVal—the most comprehensive research intelligence platform indexed from Scopus—which provides standardised, field-normalised metrics unavailable through earlier bibliometric platforms [18,19]. This evidence gap is significant given ICMR's pivotal role

in shaping India's health policy architecture and its growing global research footprint during a transformative decade for global health.

The present study addresses this gap by delivering a comprehensive scientometric analysis of ICMR's Scopus-indexed research output for the period 2014-2024, encompassing publication growth, citation impact, journal quality, subject area distribution, SDG alignment, collaboration architecture, topic cluster prominence, funding landscape, and leading author profiles.

Objectives: (i) To characterise temporal trends in ICMR's scholarly output, citations, and FWCI from 2014 to 2024; (ii) to evaluate journal quality through CiteScore quartile and Scopus source-percentile distributions; (iii) to assess SDG alignment and subject area concentration; (iv) to analyse collaboration architecture geographically, institutionally, and sectorally; (v) to identify prominent research topic clusters; (vi) to quantify online visibility through field-weighted views metrics; and (vii) to measure ICMR's policy influence through policy citation metrics, benchmarking all findings against LMIC and HIC reference norms.

MATERIALS AND METHODS

Data Source and Retrieval: All bibliometric data were retrieved from Elsevier's SciVal research intelligence platform (www.scival.com), which draws exclusively from the Scopus abstract and citation database [18-20]. Scopus indexes over 27,000 peer-reviewed titles from more than 7,000 publishers across science, technology, medicine, social sciences, and arts and humanities. Data were last updated on 1 April 2026 and exported on 11 April 2026. All publication types were included: articles, reviews, conference papers, letters, notes, editorials, and book chapters.

Study Entity and Scope: The study entity was defined as the Indian Council of Medical Research (ICMR), encompassing all affiliated institutes, centres, and publications in which at least one author carries an ICMR-affiliated institutional address as indexed in Scopus. The study period was January 2014 to December 2024, inclusive. Subject classification followed the All Science Journal Classification (ASJC) taxonomy. Self-citations were included as per the default SciVal configuration.

Bibliometric Indicators: The following indicators were extracted and analysed. (1) Annual scholarly output: total Scopus-indexed publications per year. (2) FWCI: ratio of citations received to citations expected for publications of the same document type, subject area, and publication year; FWCI=1.0 equals world average. (3) FWVI: analogous normalisation applied to Scopus article views [5,6]. (4) CiteScore quartile distribution: classification of publishing venues by CiteScore rank within each subject area. (5) Scopus source-percentile distribution: classification by CiteScore percentile rank (top 1%, 5%, 10%, 25%, 50%, 75%). (6) Collaboration profile: international, national-only, institutional-only, and single-authorship. (7) Sectoral collaboration by FWCI. (8) Regional and institutional collaboration networks. (9) SDG-aligned output using the Scopus SDG classification (2025 update). (10) Topic cluster prominence percentiles. (11) Online views percentiles. (12) Policy citation metrics sourced from the Overton policy database integrated within SciVal. (13) Funding agency linkages (2020-2024). (14) Top-500 author profiles.

STATISTICAL ANALYSIS

Temporal trends were characterised using absolute counts, year-on-year percentage changes, and compound annual growth rate (CAGR), calculated as: CAGR=[(Final/Initial)^(1/n) – 1]×100%, where n=number of years. For the primary output series, n=10 (initial year 2014; final year 2024).

FWCI comparisons across collaboration types assessed the citation premium of international versus domestic partnerships. Policy citation data were examined in absolute terms and as proportions of annual output[5]. SDG and topic cluster analyses evaluated thematic concentration and quality differentials. Global benchmarking drew on published norms for LMIC and HIC research councils from the scientometric literature. All analyses were descriptive.

RESULTS

Summary Bibliometric Profile

[Table/Fig-1] presents the comprehensive summary profile of ICMR's research output from 2014 to 2024. The institution produced 11,978 Scopus-indexed publications, accumulating 396,907 citations and an overall FWCI of 2.04—double the world norm of 1.0. The FWVI of 1.93 indicates above-average online discoverability. The policy influence profile is notable: 1,272 publications (10.6%) were cited across 546 policy bodies spanning 89 countries.

Parameter	Value
Institution	Indian Council of Medical Research (ICMR), New Delhi, India
Study Period	2014–2024 (11 years, inclusive)
Data Source	Scopus via SciVal (Elsevier); updated 1 April 2026
Total Scopus-Indexed Publications	11,978
Total Citations Received	396,907
Overall FWCI	2.04 (twice the world average of 1.0)
Citations per Publication	33.1
Field-Weighted Views Impact (FWVI)	1.93
Publications in Top 25% Scopus Sources (Q1)	4,943 (4943/11097=44.5%)
Policy-Cited Publications	1,272 (10.6% of total output)
Total Policy Citations Received	6,524
Citing Policy Documents	6,506
Policy Bodies Reached	546
Countries Hosting Policy Bodies	89
FWCI of Policy-Cited Publications	12.02 (5.9× higher than overall FWCI)
Collaborating Institutions Worldwide	4,318 institutions across 6 global regions
International Collaboration Share	25.1% of annual output
FWCI – International Collaborations	5.65 (6.6× national-only FWCI)
FWCI – National-Only Collaborations	0.85 (below world average)

[Table/Fig-1]: Summary Bibliometric and Policy Impact Profile of ICMR

Annual Output, Citation, and FWCI Trends

[Table/Fig-2] presents the year-wise bibliometric profile. ICMR's annual output grew from 793 publications (2014) to 1,507 (2024), a CAGR of 6.63%. This exceeds India's national scientific output growth rate of approximately 5-6% per annum and the global biomedical literature growth rate of ~3-4%. The most dramatic acceleration occurred between 2019 and 2021, when output increased 64.6%. Output peaked at 1,557 publications in 2022, before stabilising at 1,473-1,507 during 2023-2024, indicating that pandemic-era capacity expansion has been structurally absorbed.

Year	Output	Total Citations	Cit./ Pub.	FWCI (All)	FWCI (Policy-Cited)	Intl. Collab. (%)	Top-1% Source Pubs (%)
2014	793	23,452	29.6	1.01	2.76	23.3	2.7
2015	789	20,477	26.0	0.93	2.29	22.3	2.0
2016	843	49,396	58.6	2.79	15.68	23.7	3.7
2017	787	56,941	72.4	3.02	17.68	22.7	4.4
2018	884	45,322	51.3	2.20	14.53	21.6	2.1
2019	859	19,522	22.7	0.99	2.19	23.3	2.5
2020	1,072	60,165	56.1	1.99	9.25	27.1	3.6
2021	1,414	47,663	33.7	2.10	10.71	26.0	3.2
2022	1,557	31,087	20.0	1.80	11.82	26.3	2.7
2023	1,473	23,927	16.2	1.95	13.89	27.4	2.8

2024	1,507	18,955	12.6	3.05	56.13	27.0	2.5
Overall/ Mean	11,978	396,907	33.1	2.04	12.02	25.1	2.9

[Table/Fig-2]: Year-Wise Scholarly Output, Citation Metrics, FWCI, and Collaboration Share of ICMR.

Citation volumes peaked in 2017 (56,941) and 2020 (60,165). The FWCI of policy-cited publications demonstrates progressive acceleration from 2.76 (2014) to a decadal high of 56.13 (2024), noting that the 2024 value partly reflects citation immaturity for very recent publications. The international collaboration share rose from 21.6% (2018) to 27.4% (2023).

Journal Quality and Source-Percentile Distribution

[Table/Fig-3] presents CiteScore quartile distributions alongside Scopus source-percentile tiers. Q1 journals consistently received the plurality of ICMR publications, with the Q1 share rising from 38.2% (2014) to a decadal peak of 50.9% (2023). Q4 publications accounted for only 6.2% overall and declined as a proportion of output. The top-1% Scopus source tier received 324 ICMR publications (2.9% overall), including contributions to The Lancet Global Health, Autophagy, The Lancet Healthy Longevity, and The BMJ.

Subject Area Distribution and Growth

[Table/Fig-4] presents subject area distribution, growth rates, and FWCI. Medicine dominates, accounting for 7,960 publications (66.5%), with an FWCI of 2.64. Infectious Diseases constitutes the largest Medicine sub-category (n=2,324), consistent with India's persistent burden of tuberculosis, malaria, dengue, and enteric diseases. Public Health, Environmental and Occupational Health (n=1,350, FWCI=1.36) and General Medicine (n=1,686, FWCI=7.36) are the next two largest sub-categories. Cardiology achieves the highest citations per publication of any sub-category (147.5).

Strategically important growth areas include Chemistry (285.7%), Engineering (285.7%), Neuroscience (242.9%), Environmental Science (188.5%), and Agricultural and Biological Sciences (160.7%).

SDG Alignment

[Table/Fig-5] presents ICMR's SDG-aligned output using the Scopus 2025 classification. SDG 3 (Good Health and Well-being) accounts for 6,852 publications (79.5% of SDG-aligned output), with an FWCI of 2.59 and 309,767 citations. This dominant concentration reflects both institutional mandate and the inherent classification structure, whereby most biomedical publications map to SDG 3.

Indicator	Overall	2014	2016	2018	2020	2021	2022	2023	2024
Q1 Publications (n)	4,943	284	315	302	428	630	721	698	655
Q1 Share (%)	44.5	38.2	39.3	37.1	43.6	47.2	50.1	50.9	48.7
Q2 Publications (n)	3,450	244	272	241	347	428	417	410	404
Q3 Publications (n)	2,020	157	141	199	156	216	217	198	219
Q4 Publications (n)	684	59	73	73	50	62	84	65	68
Top 1% Sources (n)	324	20	30	17	35	43	39	39	34
Top 1% Sources (%)	2.9	2.7	3.7	2.1	3.6	3.2	2.7	2.8	2.5
Top 5% Sources (n)	1,086	69	86	67	89	146	147	178	100
Top 5% Sources (%)	9.8	9.3	10.7	8.2	9.1	10.9	10.2	13.0	7.4
Top 10% Sources (n)	2,056	113	147	146	189	277	241	305	185
Top 10% Sources (%)	18.5	15.2	18.4	17.9	19.3	20.7	16.7	22.2	13.7

[Table/Fig-3]: CiteScore Quartile Distribution and Scopus Source-Percentile Profile of ICMR Publications.

Subject Area	Output	Citations	Cit./Pub.	FWCI	Growth (%)
Medicine (Total)	7,960	319,494	40.1	2.64	98.8
Infectious Diseases	2,324	40,225	17.3	1.01	72.1
Public Health and Occupational Health	1,350	26,777	19.8	1.36	152.6
General Medicine	1,686	175,397	104.0	7.36	205.3
Microbiology (medical)	945	16,285	17.2	0.92	74.3
Cardiology and Cardiovascular Med.	92	13,569	147.5	3.42	550.0
Neurology (clinical)	101	9,229	91.4	8.95	125.0
Endocrinology, Diabetes and Metab.	258	6,320	24.5	1.37	125.0
Biochem., Genetics and Molecular Biology	2,995	59,941	20.0	0.95	56.4
Immunology and Microbiology	2,552	42,572	16.7	0.94	50.3
Pharmacology, Toxicol. and Pharmaceutics	938	16,512	17.6	0.94	87.9
Agricultural & Biological Sciences	902	13,686	15.2	0.92	160.7
Chemistry	475	10,173	21.4	1.00	285.7
Environmental Science	456	8,589	18.8	1.02	188.5
Neuroscience	188	4,936	26.3	1.38	242.9
Social Sciences	289	4,216	14.6	1.11	104.8

[Table/Fig-4]: Subject Area Distribution of ICMR Publications by Output, Citations, and FWCI.

SDG Category	Output	FWCI	Citations
SDG 3: Good Health and Well-being	6,852	2.59	309,767
SDG 2: Zero Hunger	332	5.01	26,364
SDG 5: Gender Equality	286	6.57	20,754
SDG 6: Clean Water and Sanitation	191	6.06	54,910
SDG 10: Reduced Inequalities	173	6.01	13,620
SDG 16: Peace, Justice & Institutions	132	17.77	16,927
SDG 8: Decent Work & Economic Growth	91	6.55	12,401
SDG 9: Industry, Innovation & Infra.	90	1.71	2,232
SDG 11: Sustainable Cities	123	3.19	3,726
SDG 12: Responsible Consumption	73	4.48	12,582
SDG 1: No Poverty	66	3.27	2,239
SDG 4: Quality Education	50	8.76	3,663
SDG 7: Affordable and Clean Energy	48	4.22	2,250
SDG 13: Climate Action	39	1.65	665
SDG 15: Life on Land	51	1.57	1,017
SDG 14: Life Below Water	24	1.28	912
Total (cumulative SDG-mapped records)	8,621	2.52	484,029

[Table/Fig-5]: ICMR Publications Mapped to UN Sustainable Development Goals with FWCI and Citation Counts

SDG 16 (Peace, Justice and Strong Institutions) achieves the highest FWCI at 17.77 from 132 publications. SDG 4 (Quality Education, FWCI=8.76) and SDG 5 (Gender Equality, FWCI=6.57)

similarly demonstrate high-impact profiles despite modest volumes. SDG 13 (Climate Action, FWCI=1.65), SDG 14 (Life Below Water, FWCI=1.28), and SDG 15 (Life on Land, FWCI=1.57) have the lowest volumes in the portfolio.

Collaboration Architecture

[Table/Fig-6-7] present ICMR's overall collaboration profile and regional breakdown. International collaborations represent 25.1% of total output but account for 67.9% of all citations received (269,498 of 396,907). The FWCI of internationally collaborative publications (5.65) is 6.6 times that of nationally-only collaborative output (0.85) and 10.1 times that of single-authored work (0.56).

Collaboration Type	Output	Share (%)	Citations	Cit./Pub.	FWCI
International	3,009	25.1	269,498	89.6	5.65
National-Only	7,178	59.9	104,941	14.6	0.85
Institutional-Only	1,483	12.4	20,396	13.8	0.76
Single Authorship	308	2.6	2,072	6.7	0.56
Total	11,978	100.0	396,907	33.1	2.04

[Table/Fig-6]: Collaboration Profile of ICMR Publications by Type.

Region	Institutions	Co-authored Pubs.	% of Intl. Output
Asia Pacific	1,536	7,970	93.4%
Europe	1,259	1,523	17.8%
North America	695	1,521	17.8%
Africa	333	488	5.7%
Middle East	304	405	4.7%
South America	191	310	3.6%
Worldwide Total	4,318	8,530	—

[Table/Fig-7]: Regional Distribution of Collaborating Institutions and Co-authored Publications

Sectoral Collaboration

[Table/Fig-8] presents sectoral collaboration FWCI. Academic-Government collaboration dominates ICMR's sectoral profile (64.3% of publications, overall FWCI=2.75). Academic-Medical collaborations achieve an overall FWCI of 9.65 and 148.8 citations per publication. Academic-Corporate collaborations, despite modest volume (249 publications, 2.1%), achieve an overall FWCI of 37.20, driven by high-profile regulatory submissions, multicentre trial reports, and vaccine development publications.

Sector	Output	Cit./Pub.	FWCI	FWCI (2024)
Academic–Government	7,697	44.5	2.75	3.91
Academic–Medical	1,564	148.8	9.65	16.65
Academic–Corporate	249	533.2	37.20	112.02
Academic–Other	554	370.0	24.36	49.46
Classified Total	11,978	-	-	-

[Table/Fig-8]: Sectoral Collaboration FWCI of ICMR Publications by Partnership Type.
*Note: The remaining 1,914 publications (16.0%) fall outside these academic-partnership categories and comprise the following non-academic collaboration types: (i) single-authored publications with no co-affiliated partner (ii) Medical/Hospital-only collaborations.

Top Institutional Partners

[Table/Fig-9] presents ICMR's top institutional collaborators. AIIMS New Delhi leads (799 co-authored publications, FWCI=11.37). The Ministry of Health and Family Welfare (485 publications, FWCI=12.83) represents the direct government-research partnership underpinning ICMR's policy citation performance.

Research Topic Cluster Analysis

[Table/Fig-10] presents ICMR's top topic clusters by scholarly output, FWCI, and world prominence percentile. COVID-19 leads with 682 publications, a world prominence percentile of 99.94, and FWCI of 4.79. Four communicable disease clusters—Dengue/Zika

Institution	Sector	Co-pubs.	Citations	Cit./Pub.	FWCI
AIIMS, New Delhi	Government	799	133,149	166.6	11.37
National Institute of Nutrition	Academic	729	35,453	48.6	2.00
National Institute of Cholera & Enteric Diseases	Government	624	19,729	31.6	2.72
National Institute of Malaria Research	Academic	605	8,391	13.9	0.81
Ministry of Health and Family Welfare	Government	485	58,009	119.6	12.83
National Institute for Research in Tuberculosis	Academic	428	17,959	42.0	5.41

[Table/Fig-9]: Top Six Institutional Collaborators with ICMR by Co-authored Publications.

Topic Cluster	Output	FWCI	Prominence %ile	Growth (%)
COVID-19, Its Impact, and Vaccination	682	4.79	99.94	+432.1
Dengue and Zika Virus Dynamics	454	0.80	76.72	–28.9
Malaria – Genetic Diversity and Treatment	409	0.76	58.47	+65.8
Tuberculosis Treatment and Diagnostics	398	0.95	71.16	+84.5
Vector Control – Malaria and Filariasis	324	0.82	33.29	–20.8
Macrophage Responses in Tuberculosis	193	1.13	79.07	+85.0
Hypertension and Dietary Sodium Impact	139	12.24	83.78	+163.0
Antibiotic Resistance (AMR)	126	1.16	96.40	+85.3
Zoonotic Tick-Borne Diseases	147	0.88	74.36	+326.1
Respiratory Virus Infections and Immunity	135	1.97	75.34	+331.8
Diabetes Management and Monitoring	77	11.26	94.38	+82.5
Air Pollution Health Impacts	59	12.73	95.23	+117.2
Gut Microbiota and Health	68	1.09	99.22	–24.8
Antioxidants and Medicinal Potential	88	1.40	97.71	–44.1
Antibiotic Stewardship and Resistance Mgmt.	55	4.69	53.11	+91.5

[Table/Fig-10]: Top Research Topic Clusters at ICMR by Scholarly Output, FWCI, and World Prominence Percentile

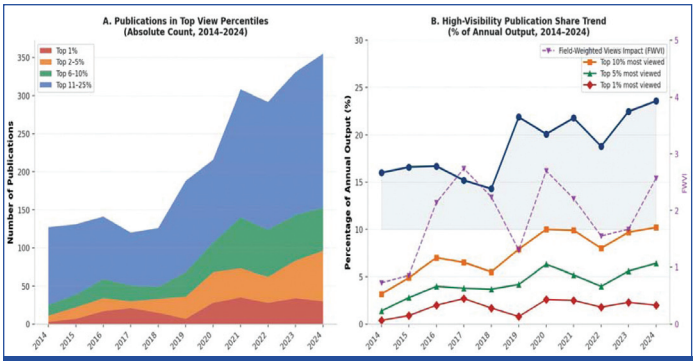
(n=454), Malaria Genetic Diversity (n=409), Tuberculosis Treatment and Diagnostics (n=398), and Vector Control for Malaria and Filariasis (n=324)—reflect India's persistent communicable disease burden. Hypertension and Dietary Sodium (FWCI=12.24) is the highest-FWCI cluster; Air Pollution Health Impacts (FWCI=12.73) and Diabetes Management (FWCI=11.26) also demonstrate high per-publication impact.

Online Visibility and Field-Weighted Views Impact

[Table/Fig-11]. presents the FWVI increased from 0.73 (2014) to 2.57 (2024), with peaks in 2017 (2.74) and 2020 (2.70). Publications in the top-1% most-viewed category grew from 3 (2014) to 34 (2023), and the top-25% most-viewed share increased from 16.0% (2014) to 23.6% (2024).

Policy Impact Analysis

[Table/Fig-12] presents ICMR's comprehensive policy impact profile. The overall policy citation rate of 10.6% exceeds the LMIC institutional benchmark of 3-8% and approaches the rates achieved by high-income research councils (10-20%). The six-fold FWCI premium of policy-cited publications (12.02) overall output (2.04) is consistent with findings that methodologically rigorous,



[Table/Fig-11]: Online visibility and discoverability of ICMR publications (2014–2024).

Metric	Value	Significance
Policy-Cited Publications	1,272	10.6% of total output
Total Policy Citations Received	6,524	Avg. 5.1 citations per policy-cited publication
Citing Policy Documents	6,506	Near 1:1 ratio
Policy Bodies Reached	546	Multi-sectoral: WHO, national ministries, regulatory bodies
Countries of Policy Bodies	89	Transcontinental reach across 5 continents
FWCI – Policy-Cited Output	12.02	5.9× above overall FWCI (2.04)
Peak Policy Citations Year	2017 (n=1,031)	Reflects translation of pre-pandemic infectious disease evidence
Peak Citing Policy Docs Year	2021 (n=800)	COVID-19 emergency translation pathway
% Publications Policy-Cited (Peak)	15.1% (2015)	Above-average pre-pandemic relevance

[Table/Fig-12]: Comprehensive Policy Impact Profile of ICMR Publications.

policy-relevant research attracts both academic citations and policy adoption.

Two temporally distinct policy translation pathways are identifiable: the 'graduated pipeline' (characteristic of pre-pandemic infectious disease research) drove the 2017 peak in policy citations (n=1,031), while the 'emergency translation' pathway (triggered by COVID-19) drove the 2021 surge in citing policy documents (n=800).

Funding Agency Analysis

[Table/Fig-13] presents the top 10 funding bodies by linked publications (2020-2024). The Ministry of Health and Family Welfare dominates (n=2,918, 43.1% of top-10 corpus). Three domestic science agencies (DST: n=774; DBT: n=674; CSIR: n=382) collectively contributed 1,830 linked publications. The National Institutes of Health, USA (n=563), Bill and Melinda Gates Foundation (n=322), Wellcome Trust (n=295), and UKRI (n=282) collectively represent 1,462 internationally co-funded publications (21.6% of the top-10 corpus).

Funding Body	Linked Publications	Share of Top-10 Corpus (%)
Ministry of Health and Family Welfare (India)	2,918	43.1%
Department of Science and Technology (DST), India	774	11.4%
Department of Biotechnology (DBT), India	674	10.0%
Council of Scientific and Industrial Research (CSIR)	382	5.6%
National Institutes of Health (NIH), USA	563	8.3%
Bill and Melinda Gates Foundation	322	4.8%
Wellcome Trust, UK	295	4.4%
UKRI, UK	282	4.2%
Ministry of Education (MoE), India	266	3.9%
DBT West Bengal	291	4.3%

[Table/Fig-13]: Top 10 Funding Bodies by Linked Publications for ICMR.

Top Authors

[Table/Fig-14] presents ICMR's top 10 authors by scholarly output. Dr. Soumya Swaminathan leads citation impact with an FWCI of 18.19, 38,164 citations from 107 publications, and an h-index of 71, consistent with her role as former WHO Chief Scientist. Dr. Sanghamitra Pati leads in publication volume (349, h-index=45, FWCI=3.57).

Global Benchmarking

[Table/Fig-15] situates ICMR's performance within a global comparative frame. The FWCI of 2.04 places ICMR above the LMIC norm and substantially above the world average of 1.0, while remaining below the 2.5-5.0 range typical of leading high-income research councils. Most significantly, the policy citation rate (10.6%) approaches the high-income benchmark (10-20%), constituting ICMR's greatest comparative advantage globally.

Author	Output	Citations	Cit./ Pub.	FWCI	h-Index	Scopus ID
Swaminathan, Soumya	107	38,164	356.7	18.19	71	7102380757
Pati, Sanghamitra	349	24,122	69.1	3.57	45	55441302100
Mukhopadhyay, Asish Kumar	127	2,529	19.9	0.90	49	57203072856
Dutta, Shanta	259	4,522	17.5	1.09	43	57210101987
Ghosh, Kanjaksha K.	139	1,679	12.1	0.52	42	7201768639
Yadav, Pragya Dhruv	219	4,873	22.3	1.83	41	22236042800
Murhekar, Manoj Vasant	142	2,959	20.8	1.44	40	35551594800
Singh, Harpreet Lokendro	118	1,508	12.8	0.87	35	57210460215
Gupta, Nivedita	152	5,030	33.1	2.61	37	57191958239
Panda, Samiran	107	3,656	34.2	3.02	32	35597892700

[Table/Fig-14]: Top 10 ICMR Authors by Scholarly Output

Indicator	ICMR (2014–2024)	LMIC Research Councils	HIC Research Councils	Assessment
Total Pubs (11 yr)	11,978	2,000–5,000	20,000–50,000	Above LMIC norm
Annual CAGR in Output	6.63%*	4–6%	3–5%	Competitive
Overall FWCI	2.04	0.8–1.5	2.5–5.0	Above world average
FWCI – Policy-Cited	12.02	2–5	8–15	World-class
Q1 Publication Rate	4943/11097 (44.5%)	25–35%	55–70%	Above LMIC; below HIC
Top 1% Source Rate	2.9%	0.5–1.5%	5–10%	Competitive
Intl. Collaboration Rate	25.1%	15–25%	35–55%	Moderate
Policy Citation Rate	10.6%	3–8%	10–20%	Near HIC benchmark
FWVI	1.93	0.8–1.2	2.0–4.0	Above LMIC norm
SDG 3 Concentration	79.5%	~75–85%	~70–80%	Health-dominant

[Table/Fig-15]: Global Benchmarking of ICMR Performance Against LMIC and High-Income Country Benchmarks

DISCUSSION

Research Growth Trajectory and the COVID-19 Structural Shift

ICMR's publication CAGR of 6.63% substantially exceeds both the global average annual growth rate of peer-reviewed biomedical literature (~3-4%) and India's national science output growth (~5-6%)[21-24].

The most dramatic acceleration occurred between 2019 and 2021 (+64.6%), driven by global research mobilisation around COVID-19. The COVID-19 cluster achieved an FWCI of 4.79 and world prominence percentile of 99.94. The Q1 publication share crossing 50% in 2022-2023 validates that volume growth did not dilute quality. ICMR's pandemic contributions spanned basic virology, seroepidemiological surveys, clinical trial design, and—most prominently—co-development of Covaxin, a nationally developed inactivated whole-virion COVID-19 vaccine, underscoring the institution's capacity for translating research into public health outcomes [25-28]. The post-pandemic stabilisation of output at approximately 1,500 publications per year indicates that the surge in capacity has been structurally absorbed into ICMR's research ecosystem.

The International Collaboration Citation Premium: Magnitude and Mechanisms

The 6.6-fold FWCI advantage of internationally collaborative publications over nationally-only collaborative publications (5.65 versus 0.85) is among the most strategically actionable findings of this study, and is consistent with evidence from comparable LMIC research institutions [29,30]. Three mechanisms underpin this premium. First, international collaborations typically engage researchers from complementary institutions, enabling larger and more generalisable study designs. Second, co-authorship expands the dissemination network of each publication, increasing citation probability [29]. Third, international co-authors provide access to high-impact journal editorial networks that accelerate citation accumulation [30].

The persistently below-world-average FWCI of national-only collaborations (0.85) signals a structural quality deficit in domestic research partnerships [31]. This demands systemic solutions, including standardised multicentre clinical trial platforms, harmonised biorepository networks, and structured biostatistical mentorship programmes. Evidence from comparable settings suggests that dedicated collaboration infrastructure—such as India's Clinical Trial Registry and proposed national biobank frameworks—can materially improve domestically produced research quality within five to ten years.

Online Visibility: Mechanisms and Implications

The increasing FWVI from 0.73 (2014) to 2.57 (2024) reflects a combination of improved publication quality—publications in higher-impact journals are inherently more viewed—and enhanced digital discoverability through open-access platforms and growing international collaboration networks that amplify each publication's readership footprint [31]. India's open-access policy framework creates a structural incentive for ICMR publications to be openly accessible, contributing to the steadily improving FWVI documented in this study.

Policy Impact as ICMR's Global Competitive Advantage

ICMR's policy citation profile—10.6% policy-cited publications, 6,524 policy citations, 546 policy bodies, 89 countries—constitutes its most globally distinctive bibliometric attribute. The six-fold FWCI premium of policy-cited publications aligns with the empirical literature demonstrating that research quality and policy uptake are complementary: policy-makers preferentially cite methodologically rigorous, well-powered, peer-reviewed evidence [32-34].

The time-lag between publication and policy citation varies substantially by translation pathway. The graduated pathway (typical of pre-pandemic infectious disease evidence) may involve lags of three to seven years [33], while the emergency pathway (as observed during COVID-19) may compress this to weeks. This structural time-lag should be accounted for in comparisons of annual policy citation rates. The cross-national policy reach of 89 countries establishes a measurable dimension of India's global health diplomacy and positions ICMR as a source of authoritative evidence for low- and middle-income country health systems [34]. Formalising these translational pathways through structured evidence-to-policy liaison mechanisms and systematic engagement with WHO regional offices would amplify ICMR's policy impact.

Thematic Portfolio Analysis: Strengths and Strategic Gaps

Three strategic gaps are identifiable. First, NCD research: despite achieving world-class FWCI in niche areas—Hypertension (12.24), Diabetes Management (11.26), NCD publication volumes remain insufficient given India's accelerating epidemiological transition, characterised by a rising double burden of communicable and non-communicable diseases [26]. Second, planetary health and climate-sensitive disease: SDG 13 (39 publications, FWCI = 1.65) and SDGs 14-15 (combined 75 publications) account for less than 2% of total output, representing a significant gap given India's documented climate-health vulnerabilities [32]. Third, digital health and artificial intelligence: the AI-related sub-category is nascent; India's digital health infrastructure, anchored by the Ayushman Bharat Digital Mission, creates opportunities for ICMR to lead evidence generation for digital health interventions at scale.

Comparison with Global Research Councils and Future Trajectory

ICMR's overall FWCI of 2.04 places it above comparable LMIC research councils in Brazil, South Africa, and WHO-supported regional networks, while remaining below mid-tier HIC research councils [34]. In the policy impact dimension, ICMR's 10.6% policy citation rate already approaches several HIC research councils [33]. Bibliometric benchmarking studies of analogous national research institutes indicate that sustained FWCI improvement requires a combination of structural reforms: expanding international collaboration share, improving domestic co-authorship quality through multicentre platforms, and incentivising publication in higher-impact journals through institutional reward frameworks [27,34]. The achievable aspiration of a sustained FWCI of 3.0 within the next decade would require approximately 50% of publications to be internationally co-authored and structural quality reforms in domestic partnerships [27].

Limitation(s)

This study has several limitations. First, Scopus incompletely indexes regional-language and grey literature, potentially underestimating ICMR's full research output. Second, FWCI values for 2023-2024 are preliminary, as citation accumulation for recent publications is ongoing, which may explain the unusually high FWCI values observed for 2024 policy-cited publications (56.13). Third, the Overton policy database may undercount non-English-language policy documents, potentially underestimating ICMR's policy impact in domestic and regional contexts. Fourth, the time-lag structure between publication and policy citation varies by domain and translation pathway, complicating year-wise policy citation comparisons. Sixth, self-citations were included as per the default SciVal configuration; future analyses should examine self-citation-excluded FWCI values.

CONCLUSION(S)

This comprehensive scientometric and policy impact analysis of ICMR for the decade 2014-2024 establishes the institution as a globally competitive, policy-influential national research body. ICMR demonstrates sustained above-average citation impact (FWCI=2.04), a growing majority of publications in Q1 journals, and a policy citation rate approaching high-income research council norms—reflecting exceptional evidence-to-policy translation capabilities spanning 89 countries and 546 policy bodies.

Three strategic imperatives emerge: (i) expanding international collaboration toward approximately 40% of annual output to leverage the documented 6.6× FWCI advantage; (ii) scaling NCD, planetary health, and digital health research to volumes commensurate with their demonstrated quality potential; and (iii) implementing structural reforms to elevate the quality of national-only collaborative research through multicentre trial infrastructure and biostatistical capacity building.

Future research should disaggregate performance by constituent institute, gender-stratify authorship metrics, assess qualitative mechanisms of specific evidence-to-policy pathways, and benchmark ICMR against designated comparators in Brazil, South Africa, China, and South Korea.

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