



Medical Research in India: Bridging the Gaps and Shaping the Future

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Medical research serves as the cornerstone of healthcare advancements, directly influencing patient outcomes and public health policies. India, home to over a billion people and facing a unique disease burden, holds enormous potential for pioneering transformative medical research. Yet, substantial gaps remain in fully harnessing this potential.¹ Here, we discuss the key areas where focused efforts can significantly enhance India's contribution to global medical research.

FUNDING GAPS: A PERSISTENT CHALLENGE

One critical impediment to India's medical research landscape is inadequate funding. India's expenditure on research and development (R and D) remains disappointingly low, around 0.7% of its GDP, far behind developed economies spending 2–3% or more.^{2,3} Alarmingly, public investment specifically directed toward health research is even lower, constituting merely 0.02% of GDP.¹

Additionally, a limited pool of dedicated researchers remains a persistent problem. India's researcher-to-population ratio remains disproportionately low—approximately 262 researchers per million people, in contrast to 4,300+ per million in the U.S. or 8,7000+ in South Korea—underscoring the need for a significant expansion of human resource capacity.⁴

Furthermore, much of India's medical research is industry-driven, biased toward commercially viable endeavors at the expense of fundamental and public health research. Recent initiatives, such as the establishment of the National Research Foundation (NRF), with a substantial budget allocation, promise to alleviate these constraints. Nevertheless, sustained advocacy and a strategic increase in public funding are urgently needed.

RESEARCH OUTPUT: QUANTITY VS QUALITY

India has made notable strides in research output, ranking third globally in scientific

publication volume and ninth in the field of medicine, with over 0.70 million medical publications to date.^{5,6} However, this expansion is tempered by a consistent gap in citation impact and presence in high-impact clinical studies. Indian publications average 15.5 citations per paper, significantly lower than the 36–37 citations per paper observed in the US and the UK.⁷ Furthermore, India accounts for only 2% of the world's top-cited medical research, despite having 20% of the global disease burden.⁷

This discrepancy underscores systemic issues, including smaller-scale studies, limited multicenter collaborations, and a tendency toward quantity-driven academic incentives.² Nevertheless, encouraging developments are underway. India is now the third-largest global hub for clinical trials, following the US and China, and has hosted over 5,800 trials as of 2024.⁸

Although signs of progress are evident, more Indian researchers should engage in collaborative, multicenter trials addressing pertinent national health concerns.^{9,10} Collaborative, hypothesis-driven research—particularly in domains such as noncommunicable diseases—can significantly improve the impact and visibility of Indian medical research.

EVOLVING POLICY FRAMEWORK AND INSTITUTIONAL SUPPORT

Institutions such as the Indian Council of Medical Research (ICMR), the Department of Biotechnology (DBT), and other key bodies, including the All India Institute of Medical Sciences (AIIMS), have played pivotal roles in transforming India's research ecosystem. ICMR's network of 27 national research centers and its leadership in COVID-19 vaccine development and disease surveillance illustrate India's growing scientific capacity. Recent policy reforms, such as the mandatory Basic Course in Biomedical Research (BCBR) for

postgraduate medical trainees and the expansion of ICMR's shared infrastructure, aim to nurture research capabilities across the country.¹¹ Furthermore, the Ayushman Bharat Digital Mission promises unprecedented opportunities for data-driven research.¹² Nevertheless, cohesive coordination between central bodies (ICMR, DBT, and AIIMS) and academic institutions must improve. Establishing regional centers of excellence, fostering robust interinstitutional collaborations, and streamlining regulatory pathways are imperative to scale and strengthen India's medical research footprint.

ENSURING ACADEMIC INTEGRITY

Academic integrity is foundational to credible and impactful medical research. India has historically struggled with plagiarism, predatory publishing, and ethical breaches in clinical research.¹³ Recent regulatory interventions—such as the University Grants Commission's stringent anti-plagiarism policies and the establishment of the CARE list to combat predatory journals—demonstrate a strong commitment to restoring integrity.^{14,15} Clinical trials are now governed by tighter protocols ensuring informed consent, participant safety, and ethical accountability, thereby aligning India more closely with international standards. Strengthening research governance at the institutional level and promoting responsible research conduct must remain a national priority.

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GLOBAL STANDING AND COMPARATIVE INSIGHTS

India's rise in medical research is evident across multiple global benchmarks, ranking ninth worldwide in publication volume and third in clinical activity. India's top medical bodies—ICMR, AIIMS Delhi, and the Postgraduate Institute of Medical Education and Research, Chandigarh—are playing pivotal roles. AIIMS is ranked among the top 150 global medical schools, and ICMR had the highest percentage of Q1 journal publications among Indian research bodies.

India's strengths include its position as the world's largest vaccine producer, a cost-effective trial environment, and growing public health research capacity. Yet, it remains underrepresented in landmark international trials, patents, and high-impact journal authorship.

FUTURE DIRECTIONS AND RECOMMENDATIONS

India stands on the cusp of significantly advancing its global medical research impact. To sustain and accelerate the trajectory, we recommend the following:

- *Increase and diversify funding:* Expand government allocations, enable philanthropic endowments, and incentivize public-private partnerships.
- *Enhance research quality:* Promote multicenter, collaborative, and hypothesis-driven studies with international partnerships.
- *Strengthen institutional frameworks:* Expand infrastructure, develop regional

centers of excellence, and harness digital health data for large-scale epidemiological research.

- *Foster global partnerships:* Encourage Indian investigators to lead international consortia, ensuring equitable representation in global guidelines and trials.
- *Promote a culture of integrity:* Embed ethics training in curricula, implement rigorous peer review, and support mentorship to build a future-ready research workforce.

CONCLUSION

India's medical research landscape is in a state of dynamic transformation. While impressive gains in output and infrastructure are evident, bridging the persistent gaps in quality, innovation, and global influence remains critical. With coordinated efforts by government agencies, academic institutions, clinicians, and the private sector, India can evolve from being a volume leader to a value- and innovation-driven powerhouse in global medical science.

This transformation will not only reshape healthcare delivery for over a billion Indians but also enable India to meaningfully contribute to solving global health challenges, reinforcing its position as a leader in equitable, affordable, and impactful research.

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