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Annual Report

Indian Council of Medical Research

2024 - 25




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List of Abbreviations

Abbreviation	Full Form
AASH	Action Against Stunting Hub
AcSIR	Academy of Scientific and Innovative Research
AIIMS	All India Institute of Medical Sciences
AMR	Antimicrobial Resistance
ATCC	American Type Culture Centre
BMHRC	Bhopal Memorial Hospital and Research Centre
BSL	Biosafety Level
CCoE	Collaborating Centres of Excellence
CDSCO	Central Drugs Standard Control Organisation
CIBioD	Centre for Innovation and Bio-Design
CIRA	Centre for Information and Resource Assurance
CMC	Christian Medical College
CPC	Central Procurement Cell
CRISPR	Clustered Regularly Interspaced Short Palindromic Repeats
CRME	Centre for Research in Medical Entomology
DBT	Department of Biotechnology
DCGI	Drugs Controller General of India
DG	Deputy General
DHR	Department of Health Research
DoP	Department of Pharmaceuticals
DSIR	Department of Scientific and Industrial Research
DST	Department of Science and Technology
EID	Early Infant Diagnosis
ELISA	Enzyme-Linked Immunosorbent Assay
e-PMS	electronic Project Management System
EQA	External Quality Assurance
ERC	Enterovirus Research Centre
FACS	Fluorescence-Activated Cell Sorting
FHTS	Foundation of Healthcare Technologies Society
FIW	First in the World
FMR	Faculty of Medical Research
G6PD	Glucose-6-phosphate dehydrogenase
GARDP	Global Antibiotic Research and Development Partnership
GDM	Gestational Diabetes Mellitus
GeM	Government e Marketplace
GHSA	Global Health Security Agenda
GIWG	Government of India's Web Guidelines
GRC	Genetic Research Centre

Abbreviation	Full Form
H5N1	Highly Pathogenic Avian Influenza Virus
HAV–HEV	Hepatitis A & Hepatitis E
HBV	Hepatitis B
HCV	Hepatitis C
HIV	Human Immunodeficiency Virus
HMIS	Health Management Information System
HPC	High Performance Computer
HPV	Human Papilloma Virus
ICAR	Indian Council of Agricultural Research
ICDS	Integrated Child Development Services
ICEP-OH	Integrated Community Engagement Program for One Health
ICMR	Indian Council of Medical Research
ICMR-NIE	ICMR-National Institute of Epidemiology
ICPP	idiopathic central precocious puberty
IDDO	Infectious Diseases Data Observatory
Ig	Immunoglobulin
IHCI	India Hypertension Control Initiative
IIT	Indian Institute of Technology
IJMR	Indian Journal of Medical Research
INTENT	Indian Clinical Trial and Education Network
iPSC	induced Pluripotent Stem Cells
IRDLs	Infectious Disease Research and Diagnostic Laboratories
IRM	Institute of Reproductive Medicine
ISO	International Organization for Standardisation
ITR	Innovation and Translation Research
IVDs	In-vitro Diagnostics
IVU	ICMR Virus Unit
JIPMER	Jawaharlal Institute of Postgraduate Medical Education & Research
KGMU	King George's Medical University
LAMP Assay	Loop-mediated Isothermal Amplification Assay
LGBTQIA+	Lesbian, Gay, Bisexual, Transgender, Queer/Questioning, Intersex, and Asexual,
MCC	Microbial Containment Complex
MGIT	Mycobacteria Growth Indicator Tube
MoHFW	Ministry of Health and Family Welfare
mPRIDE	Product Ignition and Development Enabler
MSM	Men having Sex with Men
NABL	National Accreditation Board for Testing and Calibration Laboratories

Abbreviation	Full Form
NACP	National AIDS Control Programme
NARF-BR	National Animal Resource Facility for Biomedical Research
NCDIR	National Centre for Disease Informatics and Research
NCDs	Non-Communicable Diseases
NCVBDC	National Centre for Vector Borne Diseases Control
NDMC	National Disease Modelling Centre
NDQF	National Data Quality Forum
NGS	Next Generation Sequencing
NHRP	National Health Research Priorities
NIC	National Informatics Centre
NICH&DR	National Institute of Child Health & Development Research
NICPR	National Institute of Cancer Prevention and Research
NIH	National Institute of Health
NIIH	National Institute of Immunohaemotology
NIIRNCD	National Institute for Implementation Research on Non-Communicable Diseases
NIMR	National Institute of Malaria Research
NIN	National Institute of Nutrition
NIOH	National Institute of Occupational Health
NIRBI	National Institute for Research in Bacterial Infections
NIRDH&DS	National Institute for Research in Digital Health and Data Science
NIREH	National Institute for Research in Environmental Health
NIRRH	National Institute for Research in Reproductive Health
NIRT	National Institute for Research in Tuberculosis
NIRTH	National Institute for Research in Tribal Health
NITM	National Institute of Traditional Medicine
NITVAR	National Institute of Translational Virology and AIDS Research
NIV	National Institute of Virology
NiV	Nippah Virus
NJILOMD	National JALMA Institute for Leprosy & Other Mycobacterial Diseases
NJORT	National Joint Outbreak Response Team
NLEP	National Leprosy Elimination Programme
NOHM	National One Health Mission
NRAMRB	National Repository of Antimicrobial Resistant Bacteria
NRROID	National Registry for Rare and other Inherited disorders
NTEP	National Tuberculosis Elimination Programme
NVBDCP	National Vector Borne Disease Control Programme
PCOS	Polycystic Ovary Syndrome
PCR	Polymerase Chain Reaction

Abbreviation	Full Form
PEF	Poliovirus Essential Facility
PFMS	Public Financial Management System
PGIMER	Postgraduate Institute of Medical Education and Research
PKDL	Post–Kala-Azar Dermal Leishmaniasis
PM - ABHIM	Prime Minister's - *Ayushman Bharat* Health Infrastructure Mission
PPP	Public–Private Partnerships
QFAT	Q Filariasis Antigen Test
RCN	Reproductive, Child Health and Nutrition
RCT	Randomised Control Trials
RMIT	Royal Melbourne Institute of Technology
RMRC	Regional Medical Research Centre
RMRIMS	Rajendra Memorial Research Institute of Medical Sciences
RSV	Respiratory Syncytial Virus
SARS	Severe Acute Respiratory Syndrome
SEWA	Self-Employed Women's Association
SOP	Standard Operating Procedure
SPF	Specific-Pathogen-Free
STEMI-ACT	ST-Elevation Myocardial Infarction Acute Coronary Thrombosis
TB	Tuberculosis
TN-KET	Tamil Nadu-Kasanoi Erapilla Thittam
VCRC	Vector Control Research Centre
VIT	Vellore Institute of Technology
VRDL	Virus Research and Diagnostic Laboratories
WHO	World Health Organisation
WIEGO	Women in Informal Employment: Globalising and Organising

Message from the Director General

The year 2024–25 has been a milestone year in ICMR's path to scientific excellence, translational efficiency, and national impact. The research ecosystem of the Council continued to prove that when science, systems, and society come together, India is not just capable of reaching global standards but also in establishing new ones. ICMR's network of 28 centres and institutes fulfilled the entire spectrum of biomedical innovations, from discovery and verification to delivery and policy integration. The year saw a chain of "firsts" that highlighted India's increasing scientific self-sufficiency: ranging from homemade vaccine candidates and AI-based diagnostics to digital disease registries and mobile biosafety platforms. These developments have translated into concrete benefits for national health programmes, outbreak response, and disease surveillance.

Our close to complete utilisation of funds is also a reflection of not just fiscal restraint but also institutional responsibility and governance maturity. Every rupee spent has been connected with outcomes that can be measured, patents, publications, validated technologies, and lives touched. The signature programmes like the First in the World Challenge, NHRPs, Medical Innovation Patent Mitra, and MedTech Mitra reiterate ICMR's position as India's translational engine connecting innovation with implementation. Similarly, major changes have been made in research stewardship, data ethics, and open science. By aligning AI-capable data platforms, growing the INTENT clinical trial network, and implementing I-RISE for research infrastructure sharing, ICMR has fortified the pillars of scientific openness and collaboration. These initiatives have not only pushed the frontier of Indian biomedical science but have also facilitated global health readiness through One Health, pandemic preparedness, and environmental health approaches.

None of this would have been achievable but for the hard work of our scientists, staff, collaborators, and institutional partners in the public and private sectors. Together, their commitment has helped ICMR be a reliable bulwark of evidence-based policy and driver of innovation. As we step towards *Viksit Bharat* 2047, ICMR rededicates itself to converting India into a biomedical research leader of the world based on excellence, equity, and self-reliance. Together, we shall keep converting science into solutions and research into national health assets.

Rajiv Bahl

(Dr. Rajiv Bahl)

Director General

Indian Council of Medical Research

Executive Summary

FY 2024-25

Budget Utilised	Publications	Patents	Outbreak Investigations
99.99%	**3052**	**41**	**60**

The Indian Council of Medical Research (ICMR) sustained its leadership in biomedical innovation and public health advancement during FY 2024-25, delivering a series of nationally significant outcomes across diagnostics, medical devices, data analytics, clinical innovation, and programme support. With a network of specialised institutes working in synergy, ICMR's research ecosystem translated scientific discoveries into deployable public health solutions. The reporting period witnessed multiple national and global firsts, from the identification of new vector species and the validation of indigenous molecular kits to the creation of digital registries, AI-enabled health tools, and portable biosafety systems.

The development landscape of Indian biomedical science in FY 2024-25 reflects a nation in transition from dependence on imported technologies to an era of indigenous innovation, integrated data systems, and translational efficiency. This year's progress showcases how research and policy, innovation and implementation, and data and decision-making are converging to create a self-reliant, forward-looking health ecosystem.

Scientific "Firsts" and the Expanding Frontier of Knowledge

The year 2024–25 marked a defining chapter in India's scientific and public health journey. Under the leadership of ICMR, new scientific discoveries, cutting-edge technologies, and cross-sector collaborations advanced the country's capacity for innovation, disease prevention, and preparedness. The year stood out not just for research output but for its successful translation of laboratory science into national health action.

Among the most remarkable achievements were several first-in-India and first-in-the-world discoveries. In the northeast, ICMR scientists identified *Aedes nr. Albopictus,* an *Aedes albopictus*-like mosquito species, making it only the third such discovery globally and the first in India. A new sibling species within the *Anopheles maculatus* group was molecularly confirmed for the first time in the world, and a morphologically fluviatilis-like but genetically *An. minimus* species was identified in Tripura. These findings redefined the landscape of malaria-vector taxonomy and have implications for future control strategies. The same region also recorded India's first detections of *Wolbachia* and *Sodalis* bacterial symbionts in *Anopheles* mosquitoes, which are important breakthroughs in understanding natural vector microbiomes that could pave the way for biological vector control.

Equally noteworthy was India's first climate-response profile of *Aedes aegypti*, developed by researchers in Bhopal, demonstrating the species' adaptability across temperatures ranging from 10°C to 40°C, vital information for predicting vector expansion under global warming scenarios. In infectious disease research, India reported its second human case of avian influenza (H9N2), the first Indian detection of Clade Ib mpox virus, and the country's first instance of vaccine-derived poliovirus spillover. Advances in genomics and immunology continued with the identification of an Indian-specific mechanism for RhD negativity, national neutrophil antigen frequency data, and new links between ACE/ACE2 genotypes and hypertension risk in malaria-endemic populations. Research into rare immunogenetic disorders revealed a novel IL12Rβdefect associated with susceptibility to visceral leishmaniasis, while an indigenous antifungal vaccine candidate against *Candida albicans* was patented, underscoring India's contribution to global biomedical science.

Transforming Diagnostics into Scalable National Assets

ICMR's diagnostics portfolio reflected a clear shift from research to impact. A major highlight was the transformation of indigenous diagnostic technologies into field-ready, affordable, and programmatically integrated tools. The National Institute of Virology (Pune) transferred rapid RT-LAMP assays for Monkeypox and Nipah to industry partners, validated and submitted field data on the Kyasanur Forest Disease (KFD) point-of-care assay to CDSCO, and readied a Chandipura IgG ELISA kit for transfer, all representing rapid, end-to-end translation from bench to bedside.

At Gorakhpur, a patent was filed for a TRL-4 Chikungunya point-of-care molecular diagnostic kit, and a one-tube CRISPR Cas12a Pan-Dengue assay was validated. In Chennai, researchers developed a carnosine nano-peptide tuberculosis (TB) drug-delivery system (patent filed) and built a robust diagnostics pipeline involving CRISPR, ddPCR, and tNGS platforms. Three TB diagnostic kits were validated in Bhubaneswar, where scientists also field-tested digital health applications such as the MAMA maternal-monitoring app and the e-simplified partogram to support safer deliveries.

The year also witnessed a strong focus on women's health. Three indigenous HPV screening platforms (Molbio, MyLabs, Genes2Me) were validated for use in the National Cervical Cancer Screening Programme, while NICPR developed and tested a multi-state HPV genotyping panel and two self-sampling kits to improve access to screening. A dual-specimen RT-PCR HPV kit (urine + swab) is under validation with industry partners, and an anti-HPV therapeutic cleared for Phase-I trials under Indo-US collaboration marks an important step toward preventive oncology.

In the domain of haematology and genetic disorders, the validation of a multiplex βthalassemia PCR kit reduced diagnostic costs by 60%. Two critical technologies, the qualitative point-of-care G6PD test and a multiplex PCR for minor blood groups, were licensed to MyLab Discovery Solutions, representing real commercial success for publicly funded innovation. Environmental diagnostics also progressed with a ₹ 25 field-tested strip for arsenic and fluoride detection and a patented nanohybrid biosensor for early cancer biomarkers. In addition, the 6-mercaptopurine paediatric liquid formulation (PREVALL), developed under CARE-CP, moved from patent to market, making essential therapy for childhood leukaemia available nationwide at one-tenth the conventional cost.

Through these efforts, India's diagnostic landscape has become more self-reliant, cost-effective, and responsive to national needs, aligning scientific innovation with public service delivery.

Medical Devices: The Rise of Indigenous Engineering in Healthcare

India's medical device ecosystem reached new heights through indigenous innovation supported by ICMR's translational platforms. The year's achievements ranged from high-tech biomedical engineering to low-cost, high-impact tools designed for field use.
The *Rudhira Ahara Yantra* (RAY), a portable artificial mosquito blood feeder developed at Bhopal, simplified vector research and was complemented by an AI-based mosquito species identifier, both of which received industrial design recognition. The neonatal health programme benefitted from a new AI-based low-cost bilirubin meter, while microfluidic sperm-sorting devices and digital colposcopes advanced women's reproductive health technologies. Other key innovations included wearable spinal posture monitors for healthcare workers, smart vaccine temperature loggers for primary health centres, and an automated mosquito-rearing device that reduced colony losses by 40%.

Collaborations with engineering institutions further strengthened device validation pipelines. ICMR-NARFBR (Hyderabad) successfully completed pre-clinical porcine testing of multi-material orthopaedic screws developed with IIT Delhi, demonstrating strong biocompatibility. The AiSteth GTX tele-stethoscope, the SindiColpo digital colposcope, and DBS-based TB drug-level assays reached clinical validation. Headquarters recorded three design patents: a portable breast cancer detector, a portable cancer diagnostic device, and a hybrid non-invasive digital BP device, symbolising the convergence of Indian engineering and biomedical science.

These devices, affordable and intelligent, embody the government's vision of *Atmanirbhar Bharat* in healthcare technology, empowering both community health workers and advanced medical facilities.

Clinical Innovation and Public Health Integration

Clinical research under ICMR continued to generate direct improvements in patient care and public health delivery. The use of machine learning in diagnostics and the deployment of AI-enabled risk assessment tools is now improving outcomes in real time. In haemophilia management, the low-dose Emicizumab prophylaxis regimen achieved zero bleeding events and was expanded into a multi-centre clinical trial. Machine-learning-based early diagnosis tools for scrub typhus and encephalitis improved outcomes in rural primary care settings, while mobile BSL-3 labs deployed during the 2024 Nipah outbreak ensured zero secondary transmission, an unprecedented feat in field biosafety.

Innovations in maternal and chronic disease care achieved measurable success. AI-assisted high-risk pregnancy screening covered over a thousand women, tele-colposcopy networks increased cervical cancer follow-up by 32%, and integrated diabetes-hypertension counselling improved adherence by 15% across 11 community health centres. Environmental and geriatric health tools further connected clinical data with community well-being, while field-tested models like the Modified Clean Cut surgical protocol and Immediate Kangaroo Mother Care reduced infection rates and improved neonatal survival in hospitals.

Together, these achievements demonstrate how evidence-driven interventions can bridge clinical research and service delivery, ensuring that innovation reaches those who need it most.

Data Systems and Digital Transformation

ICMR's digital transformation accelerated in 2024-25, making research data more accessible, interoperable, and policy relevant. Automated platforms such as ADARV and AI-VRDLN connected laboratories with disease surveillance networks, while MycoNet (1,667 ICU fungal cases) and *iRegVed* (2,052 venous thromboembolism patients) expanded the clinical evidence base for hospital care.

Long-term initiatives such as the Bhopal Gas Cohort and the Environmental Health Data Platform integrated genomics, pollution, and clinical data to support policymaking. Cancer and NCD divisions built digital dashboards visualising disease trends, while the CoWIN-style India Hypertension Control Initiative now tracks 4.2 million beneficiaries in real time across more than 220 districts. National Registry for Rare and other Inherited disorders (NRROID) and the COVID-19 Pregnancy Registry strengthened longitudinal data for precision policy, while AI tools such as DeepCXR and LPA-AI demonstrated the safe integration of machine learning into national health programmes.

These data systems have turned ICMR's research ecosystem into an agile, information-rich platform capable of supporting both scientific discovery and health governance.

Programme Support, Governance, and Fiscal Stewardship

Programme support remained the foundation of ICMR's role in national health governance. Research evidence guided reforms in the National TB Elimination Programme, cervical cancer screening, and maternal health. The *Sanjeevan* Mission in Madhya Pradesh, launched in April 2025, was built in collaboration with ICMR, while the *Sankalp* initiative, supported by the Bill & Melinda Gates Foundation, brought together multiple states to reduce neonatal mortality. The National One Health Mission (NOHM) allocated ₹23.78 crore for biosafety training and standardisation across 22 BSL-3 laboratories, reflecting ICMR's leadership in multi-sectoral coordination.

Beyond programmes, ICMR's fiscal management demonstrated exemplary transparency and efficiency. Intramural and extramural grants were disbursed and utilised on schedule, linked to deliverables, and closely monitored through milestone-based funding systems. Technology transfers such as the Monkeypox and Nipah Loop-mediated Isothermal Amplification (LAMP) assays, Glucose-6-phosphate dehydrogenase (G6PD) test, and multiplex RT-PCR for enteric viruses translated public funds into commercial and clinical assets, maximising societal return on investment.

The Council's outreach strategy also evolved into a powerful blend of digital communication and community engagement. Campaigns under Swachhata Hi Seva and Ek Ped Maa Ke Naam combined environmental awareness with preventive health, reaching thousands through walkathons, social media, and rural exhibitions. Over 21,000 frontline workers were trained under the National Sickle Cell Anaemia Mission, and the five-day VishanuYuddh Abhyas pandemic preparedness drill tested India's emergency coordination across 22 BSL-3 laboratories. These efforts reinforced that research and readiness go hand in hand.

FY 2024-25 demonstrated how India's health research system can act as a complete translation pipeline, discovering, validating, and deploying technologies that address real public health challenges. From world-first vector discoveries to AI-driven diagnostics, from indigenous medical devices to large-scale vaccine trials, ICMR's work exemplified scientific excellence with national purpose.

Under its disciplined fiscal management and growing ecosystem of collaborations, every innovation, whether a field-tested TB assay, a low-cost cancer screening tool, or a space psychology AI platform, moved closer to serving citizens. ICMR's journey this year stands as a model of how scientific institutions can embody both innovation and accountability, advancing India's vision of health security, technological self-reliance, and equitable public health for all.

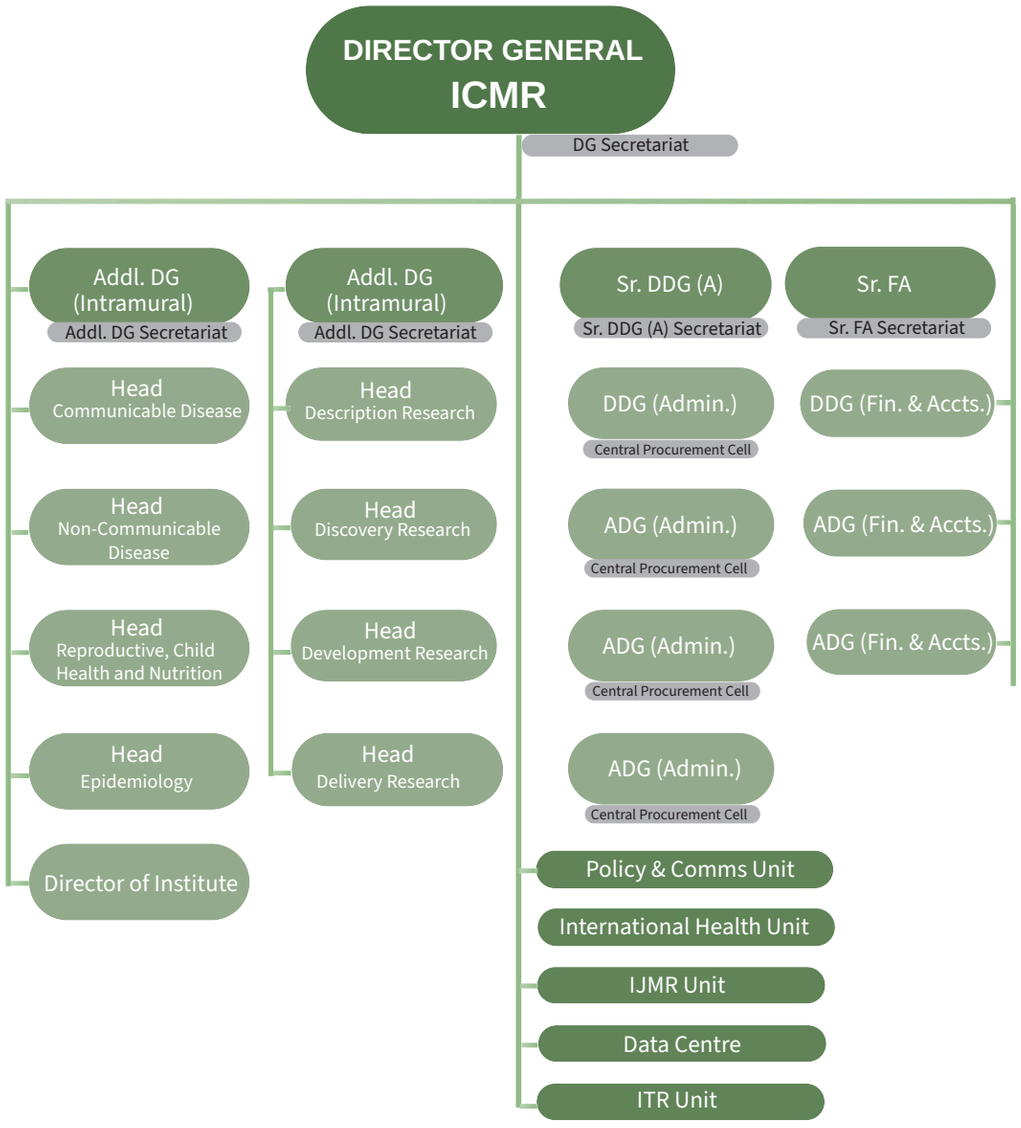
Section I
ICMR: The Organisation & its Mandate

Chapter 1: Indian Council of Medical Research

About the Organisation

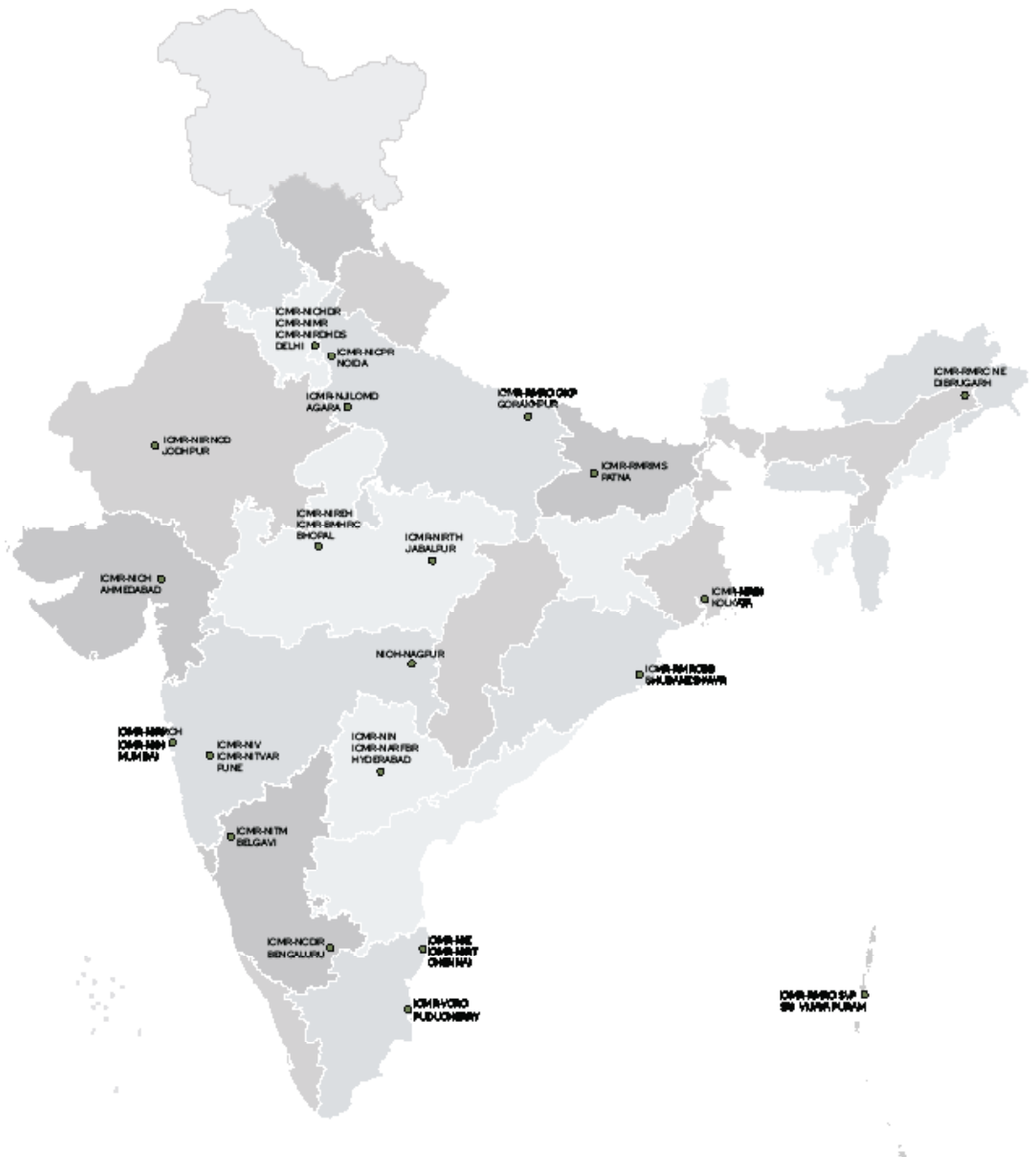
The Indian Council of Medical Research (ICMR), headquartered in New Delhi, is India's apex body for biomedical research. Established as one of the world's oldest medical research organisations (1911), ICMR functions under the Department of Health Research (DHR), Ministry of Health and Family Welfare. ICMR's research agenda aligns with national health priorities, covering communicable diseases, maternal and child health, nutrition and non-communicable diseases such as cancer, cardiovascular, diabetes etc. Recent initiatives are focused on the MedTech development and innovations and developing implementation models for the national programmes.

Figure 1: ICMR Organogram



ICMR plays a pivotal role in advancing biomedical science and public-health research in India. Through sustained capacity building, research funding, and national collaborations, ICMR continues to strengthen the country's scientific base in health. On the global front, ICMR has established partnerships across continents through Memoranda of Understanding (MoUs) with leading research organisations and international agencies. These collaborations focus on key health challenges such as cancer, diabetes, infectious diseases, antimicrobial resistance (AMR), and vaccine development, enabling joint projects, knowledge exchange, and scientific events including conferences, workshops, and training programmes.

ICMR conducts research in the domains of communicable disease, non-communicable diseases and reproductive, child health and nutrition epidemiology through its 28 national institutes and regional research centres. These institutes are guided by the respective scientific divisions at ICMR Headquarters through intramural research programmes. Intramural funding is awarded through a competitive grant mechanism encouraging innovative, high-quality proposals that address national and regional health priorities. This approach ensures that ICMR's research remains responsive to emerging public-health challenges and contributes directly to national health policy.



Additionally, ICMR also operates extramural researchdivisions that fund scientists and institutions outside its network under four thematic categories:

- **Descriptive Research:** These are aimed at having a deeper understanding of the condition or disease, which includes the burden, risk factors, and determinants.
- **Discovery Research:** These are aimed at identifying novel interventions (basic research) and validating them.
- **Development Research:** These are aimed at developing screening, diagnostic, preventative, and therapeutic interventions. Additionally, they help make existing interventions simpler, safer, efficacious or more affordable.
- **Delivery Research:** This implementation research is aimed at understanding the barriers to delivering effective interventions to people and ways to overcome them. This includes interventions that increase access to healthcare, successful implementation of national health programmes, and reducing health inequities.

Both intramural and extramural research divisions are supported by key Scientific Support Units at ICMR Headquarters, including the Policy and Communications, the Informatics & Data Centre, the Innovation and Translational Research (ITR), Indian Journal of Medical Research (IJMR), Central Procurement Cell and the International Health Division. These units ensure seamless coordination, data governance, international collaboration, and scientific communication across the Council's programmes.

1.1 ICMR's Collaborative Ecosystem[1]

Besides, its National Institutes, ICMR operates through an extensive collaborative ecosystem that connects premier national institutions, global research agencies, and strategic partners in both public and private sectors. Collaboration has remained central to ICMR's mission of advancing medical science, translating discoveries into health solutions, and ensuring evidence-based policy development.

At the national level, ICMR partners with ministries, scientific departments, and academic institutions to align research priorities with national health goals. Key partnerships include the Department of Biotechnology (DBT), Department of Science and Technology (DST), Indian Council of Agricultural Research (ICAR), DHR, Department of Scientific and Industrial Research (DSIR) and Ministry of Health and Family Welfare (MoHFW). Collaborative frameworks with IITs, AIIMS, and medical universities facilitate translation of innovations into diagnostics, vaccines, and medical technologies that address India's pressing public-health needs.

At the international level, ICMR engages with leading health and research organisations across continents. The Council's bilateral and multilateral collaborations such as those with the World Health Organisation (WHO), U.S. National Institutes of Health (NIH), and the Global Health Security Agenda (GHSA) support joint projects, capacity building, and knowledge exchange. Currently, ICMR hosts WHO Collaborating Centres and represents India in multiple global consortia on One Health, pandemic preparedness, and antimicrobial resistance.

[1]Detailed accounts of national, international, and public–private collaborations are presented in Chapter 13: Collaborations and Networks

Through Public–Private Partnerships (PPP) and innovation platforms, ICMR encourages co-development of affordable technologies with Indian industry and startups. These partnerships foster a robust ecosystem for translational research, licensing, and commercialisation.

1.2 Collaborative Initiatives of National Importance

1.2.1 National One Health Mission (NOHM)

NOHM aims to seamlessly integrate the efforts of various Ministries/Departments lead by Principle Scientific Advisor to India, forging a comprehensive pandemic preparedness and disease control programme encompassing humans, livestock, wildlife, ecosystem and plants. The National Institute for One Health is being established at Nagpur under the Prime Minister's - Ayushman Bharat Health Infrastructure Mission (PM - ABHIM). National Institute for OneHealth will anchor the coordination of the activities of NOHM and build a joint governance framework with participation from all the key stakeholders. DHR - ICMR is the nodal agency for the coordination of the one health mission.

1.2.2 Med-Tech Mitra

It is a joint initiative by ICMR and Central Drugs Standard Control Organisation (CDSCO) launched in December 2023. Over 400 innovators, start-ups, and industry partners have been engaged through this platform helping them overcome challenges in the process of developing regulation compliant products, their clinical validation, and scaling-up. Since its inception, Medtech Mitra has provide support to the MedTech innovators as enumerated below:

- 461 queries received from start-ups, companies, institutes, and individuals
- 344 queries addressed through 30 Technical Advisory Committee (TAC) meetings and 67 queries concluded as per MedTech Mitra standard operating procedures (SOPs).
- 24 technologies received test license as a step for regulatory approval processes.
- 24 technologies recommended for testing support in compliance with standards at ICMR-CAR-AMTZ centre
- 41 technologies recommended for clinical study protocol drafting and/or clinical evaluation
- 9 technologies recommended for Health Technology Assessment.

1.2.3 Medical Innovations Patent Mitra

Launched in 2025, this initiative supports medical innovators with end-to-end guidance on patent filing, intellectual property management, and technology transfer to industry. It aims to accelerate commercialisation of public-funded biomedical innovations and strengthen India's medical innovation ecosystem. ICMR's collaborative ecosystem spanning Centres of Excellence, clinical trial networks, inter-ministerial scientific partnerships, and international engagements form a robust platform that amplifies biomedical research impact. This integration of institutional expertise, innovation hubs, and strategic alliances ensures alignment with national health objectives and propels India's position in global health research and innovation.

1.2.4 National Health Research Priorities (NHRPs)

Developed jointly with partner ministries and research councils, the NHRPs serve as the national blueprint for directing research investments and ensuring equitable distribution of scientific attention across diseases and regions. Total of 30 NHRPs have been funded in several important domain with an objective to contribute to the national programmes.

1.2.5 ICMR - Indian Clinical Trial and Education Network (INTENT)

ICMR - INTENT was initiated to establish a robust ecosystem for clinical trials by integrating institutions, investigators, and resources across India to conduct high-quality, multicentric, regulatory-compliant trials with 45 sites and later expanded to 75 institutions, including public and private medical colleges, hospitals, research institutes, and ICMR institutions. A total of 11 clinical trials (5 Phase I, 5 Phase III, and 2 Phase IIa) on therapeutics, vaccines, cell and gene therapy and 7 clinical investigations/evaluation on the medical have been initiated.

1.2.6 ICMR - Collaborating Centres of Excellence (ICMR - CCoE)

Launched to recognise outstanding research groups nationwide, ICMR - CCoEs foster collaboration between ICMR institutes and eminent research entities. Selected through a competitive process, these centres serve as hubs for capacity building, advanced training, and multidisciplinary research, focusing on priority health issues. As of 2024-25, 44 centres were recognised for a five-year term, reinforcing the network without direct financial funding but through shared expertise and resources.

In synergy, the ICMR-DHR Centres of Excellence at IITs exemplify ICMR's push towards healthcare innovation through Make-in-India initiatives. These centres, established at premier IITs, collaborate with medical and industry partners to develop scalable health technologies addressing unmet needs under national programmes like *Ayushman Bharat* and the National Health Mission. The initiative aligns with government priorities of product development, commercialisation, and startup promotion.

1.2.7 Ayush - ICMR Centre for Integrative Health Research

A joint initiative between the Ministry of Ayush and ICMR to generate robust scientific evidence on integrative and traditional medicine approaches through collaborative research, clinical studies, and policy guidance.

1.2.8 Some of the new and ongoing collaborative initiatives are

i. National Programmes and Public Health Scale-Up

The IHCI jointly implemented by MoHFW, WHO-India, Resolve to Save Lives, and ICMR expanded to 154 districts, integrating over 22,000 health facilities and enrolling ~5.1 million patients, with 47% achieving BP control. This large-scale programme standardised treatment protocols, ensured drug supply forecasting, and built digital monitoring systems. In Ludhiana, ICMR piloted the IHCI - ESI industrial model, where 22,790 workers were screened and 7,452 hypertensives managed through NCD desks in 12 ESI hospitals within six months.

ii. Acute and Chronic Care Networks

Through STEMI-ACT, ICMR operationalised a tele-ECG-enabled heart-attack network connecting medical-college hubs with district hospitals across Punjab, Himachal Pradesh, Andhra Pradesh, Uttar Pradesh, and Rajasthan. Door-to-

needle time dropped to 17–21 minutes, and thrombolysis rates rose from 0% to 70–90%. The drug Reteplase was formally included in Rajasthan's RGH scheme following this evidence. Similar multicentric cardiovascular and stroke registries engaged 19–45 centres each, producing India-specific data for evidence-based guidelines.

iii. National Research Consortia and Translation

The ICMR - CARE network linked AIIMS New Delhi, ACTREC, TMH, and HBCH Varanasi to develop child-friendly oncology formulations such as liquid 6-mercaptopurine and isotretinoin, yielding multiple patents, SOPs, and 10+ publications. The NHRP Emergency Care Model connected five major institutions (AIIMS Bhopal, AIIMS Bhubaneswar, Parul University, JIPMER, and CMC Ludhiana) to design integrated emergency care systems.

iv. Community-Embedded Platforms

Model Rural Health Research Units (MRHRUs) matured as permanent research rails. A new MRHRU at Silvassa was commissioned with DHR support and five approved projects. The SMRUTHI dementia prevention CMRCT integrated four MRHRUs; Una (HP), Khumulwng (Tripura), Sirwar (Karnataka), and Bhanpur Kalan (Jaipur), into a unified platform under AIIMS coordination. NICPR's MRHRUs in Noida and Karnal advanced cervical and oral cancer implementation studies, AMR surveillance, and One Health investigations.

1.3 Infrastructure Development and Research Capacity Enhancement (2024)

This year, the ICMR advanced a series of critical infrastructure projects across multiple zones, designed to strengthen national virology capacity in the form of BSL3 laboratories, ensure preparedness for emerging and re-emerging pathogens, and promote research excellence. These infrastructure investments reflect a strategic alignment with national health priorities and global commitments under the One Health and pandemic preparedness frameworks. ICMR institute-initiated training for researchers across the country for use of Mathematical modelling in control of infectious diseases are as follows:

1.3.1 High-Performance Computing Facility

A flagship initiative during the year was the establishment of a High-Performance Computing (HPC) Facility at ICMR - NIV, Pune (Dr. Ambedkar Road Campus). Its mandate is to create a centralised next-generation sequencing (NGS) hub, enabling high-throughput genomic analysis for viruses of public health significance. Beyond facilitating genomic surveillance, the HPC centre also provides training, troubleshooting, and a repository for national-level genomic data. Considerable progress has been made, with HPC codes developed and the platform implemented for diverse NGS data analysis needs. This positions the network to respond rapidly to viral threats with computational strength and scientific rigor.

1.3.2 Vector Biology Infrastructure

In the domain of entomology and vector research, significant facilities were consolidated at VCRC. A fully functional insectary facility has been completed to rear mosquitoes of public health relevance, conduct vector-related experiments, and perform behavioural assays, including the pooling of field-caught mosquitoes. Complementing this, a dedicated molecular laboratory was completed to facilitate the detection of viral

pathogens in vectors through RT-PCR and allied molecular techniques. Together, these laboratories provide a robust platform for integrated vector research, surveillance, and pathogen discovery.

1.3.3 Biosafety Facilities in Kerala

The Kerala unit of ICMR-NIV achieved critical milestones with the completion of several laboratories and associated infrastructure. A BSL-2 facility, commissioned in 2018, has been operationalised for diagnostics and research, while a BSL-3 facility, also completed in 2018 under NOHM, ensures high-containment research capabilities for zoonotic and pandemic-prone pathogens. In addition, an animal house, completed in 2016, supports experimental research in compliance with biosafety and ethical standards. To facilitate visiting scientists and research collaborations, a guest house was established in Alappuzha in the same year. These assets collectively reinforce Kerala's role as a regional hub for virology and One Health research.

1.3.4 National Zonal Virology Expansion

A major highlight of the year was the expansion of zonal virology infrastructure across four zones, creating a distributed network of state-of-the-art virology laboratories with BSL-2, BSL-3, and in one case BSL-4 capabilities.

i. **South Zone (Bengaluru, Karnataka):** Construction of the South Zone building commenced in January 2024 with joint support from DHR and PM-ABHIM. Approximately 65% of the physical construction has been completed. The facility will house advanced virology laboratories equipped with BSL-2 and BSL-3 infrastructure, serving as a southern hub for diagnostics, training, and research.

ii. **East Zone (Dibrugarh, Assam):** Initiated in October 2023, this project aims to create a high-containment facility with both BSL-3 and BSL-4 laboratories. Supported by DHR and PM-ABHIM, the East Zone centre is envisioned as a frontline institution for handling high-risk pathogens and supporting national preparedness strategies.

iii. **North Zone (Jammu, Jammu & Kashmir):** Work began in December 2023 to establish a BSL-2 and BSL-3 laboratory. Once complete, this unit will strengthen research and surveillance capacities across northern India, which is particularly significant given the region's ecological vulnerability to emerging zoonoses.

iv. **Central Zone (Jabalpur, Madhya Pradesh):** Also launched in October 2023, this project will deliver advanced virology laboratories with BSL-2 and BSL-3 capacity. The Central Zone hub will provide critical support to central Indian states in terms of outbreak investigation, diagnostics, and capacity building.

Collectively, the zonal expansion marks a transformative step in decentralising high-end laboratory capacity, enabling rapid response and regional specialisation in virology research.

1.3.5 Poliovirus Essential Facility (PEF)

At the ICMR - NIV Pashan Campus, Pune, work progressed on PEF, established in 2022 under ICMR funding. This facility is mandated for the containment of polioviruses, as per international commitments, and supports surveillance and monitoring research. An interim containment certification audit has been successfully completed, with final certification currently awaited. This development ensures that India maintains full compliance with the Global Polio Eradication Initiative and safeguards against accidental release.

The year under review has been one of rapid and strategic infrastructure growth for biomedical research and virology in India. From the establishment of high-performance computing for genomic surveillance to the commissioning of high-containment laboratories across the country, these initiatives form a comprehensive architecture of preparedness. Funded through ICMR, DHR, and PM-ABHIM, these investments not only strengthen national resilience but also contribute to global scientific capacity. With many projects already completed and others progressing steadily, the ICMR is firmly positioned to meet present and future public health challenges with scientific excellence, safety, and regional equity.

Chapter 2: Budget and Human Resource

ICMR, India's apex body for biomedical research, continues to exemplify scientific stewardship and fiscal prudence. During the financial year 2024–25, the Council achieved near-total fund utilisation while upholding the standards of transparency and efficiency. In a sector where absorptive capacity often limits progress, ICMR's ability to anticipate needs, recalibrate resources dynamically, and execute expenditures precisely reaffirms its standing as a model for performance-driven, publicly funded research governance in India.

ICMR's FY 2024–25 financial framework prioritised sustaining human resources across 28 institutes and advancing biomedical research through balanced intramural, extramural, and infrastructure investments, reflecting institutional maturity and strategic fiscal management.

2.1 Research Funding Mechanis

ICMR operates a multi-tiered funding framework designed to support the full spectrum of India's biomedical research, from early discovery to large-scale translational science that aligned with the national goal of scientific self-reliance.

Intramural Grants remain the foundation of ICMR's institutional research ecosystem, strengthening innovation within its network of 28 institutes. The Early-career Small Research Support (Ignition) Grant enables young investigators to undertake high-risk, high-reward projects, while standard intramural grants sustain core programmes aligned with ICMR's research roadmap. Their flexibility allows rapid reprioritisation during public health emergencies.

The Extramural Research Programme extends ICMR's reach to universities, medical colleges, and research organisations nationwide through a tiered grant structure:

- **Small Grants**: Intended for proof-of-concept studies, these grants provide funding up to ₹ β crore that can be carried out over a four-year period.
- **Intermediate Grants:** Intended for studies built on established preliminary data, these grants provide ₹ β–8 crore over a four-year period.
- **Centres for Advanced Research (CAR) Grants:** Intended for comprehensive, multi-disciplinary studies that address critical healthcare challenges, these grants provide funding up to ₹ β5 crore over five-year period.

Together, these mechanisms ensure inclusive, scalable, and outcome-oriented growth of India's biomedical research endeavour.

In addition to Extramural and Intramural projects, a separate programme to fund projects on NHRP has been created and this will be monitored directly at the level of DG, ICMR. Currently 29 NHRPs are being coordinated by ICMR.

2.2 Transformative Funding Initiatives

In FY 2024–25, ICMR introduced two pioneering funding mechanisms aimed at redefining India's biomedical innovation landscape. Foremost among them was the First in the World Challenge, a bold initiative designed to fund unprecedented global-first biomedical innovations. This high-risk, high-reward programme empowers researchers to pursue transformative ideas beyond conventional paradigms, positioning India as a first-mover in global health technologies and signalling its commitment to frontier science.

Complementing this, the MedTech Development Grants were launched with a funding ceiling of ₹ ß crores per project, dedicated to advancing indigenous medical device development. By supporting design, prototyping, validation, and scale-up, the scheme directly contributes to the *Atmanirbhar Bharat* vision, reducing reliance on imported technologies and accelerating domestic commercialisation pathways.

2.3 Financial Performance (FY 2024–25)

The financial year 2024–25 was marked by effective planning, timely disbursement, and near-complete absorption of funds. The allocations were distributed across three principal heads: Grant-in-Aid (Salaries), Grant-in-Aid (General), and Grants for Creation of Capital Assets. Each of these heads played a specific role in balancing institutional continuity with research innovation.

Table 1: ICMR Expenditure, FY 2024–25 (₹ßn Crore)

Expenditure Report as on 31-03-2025 as per TSA Report under ICMR Grants for the F.Y. 2024-25

₹ in Crores.

Sl. No.	Head	SBC 2024-25	RE 2024-25	Grant Received	Expenditure as on 31-03-2025	% of Exp. in w.r.t RE as on 31-03-2025 / Balance w.r.t Grant Received	Balance w.r.t. Grant Recieved
1	Grant-in-Aid (Salaries)	619.99	606.27	606.27	605.85	99.93% / 0.42	0.42
2	Grant-in-Aid (General)						
	(A) Intramural Grants	720.14	867.84		867.84	100%	
	i) Intramural Research Grant	88.59	40.78		40.78	100%	
	ii) Institutional Running Expenses	631.55	827.06	2106.72	827.06	100%	

Sl. No.	Head	SBC 2024-25	RE 2024-25	Grant Received	Expenditure as on 31-03-2025	% of Exp. in w.r.t RE as on 31-03-2025 / Balance w.r.t Grant Received	Balance w.r.t. Grant Recieved
	(B) Extramural Research Grants	1252.00	1238.88		1238.88	100%	
	Total	1972.14	2106.72	2106.72	2106.72	100%	
3	Grants for Creation of Capital Assets						
	(A) Equipment	140.00	157.00	157.00	81.51	100%	
	(B) Major Works/Constructions				75.49		
	Total	140.00	157.00	157.00	157.00		
	Grand Total	2732.13	2869.99	2869.99	2869.57	99.99% / 0.42	**0.42**

Note: Rs. 42 Lacs surrendered in the head Grant-In-Aid (Salaries) (NER) as on 10th March, 2025.

2.4 Research Grant Utilisation

Effective grant utilisation remains a key indicator of ICMR's operational strength and governance maturity. During FY 2024–25, the Council demonstrated exemplary efficiency in disbursing and utilising both intramural and extramural research grants, ensuring optimal deployment of public funds for maximum scientific impact.

Weekly review meeting by the competent authority and mid-year recalibration of allocations ensured an effective balance between core running expenses and project funding, reflecting ICMR's financial agility and commitment to continuous productivity. Through timely disbursal and close monitoring, the Council ensured that grant utilisation remained high, reinforcing ICMR's reputation for fiscal discipline, transparency, and scientific accountability.

2.5 Financial Systems, Reforms and Transparency

A series of reforms during 2024–25 enhanced accountability and digital efficiency across ICMR institutions:

- Public Financial Management System (PFMS) was fully operational in all ICMR institutes, ensuring electronic release of grants and instant reconciliation of utilisation certificates.
- e-Procurement and Government e Marketplace (GeM) platforms replaced manual tenders for most purchases above the threshold limit, shortening procurement

cycles and increasing transparency.

- Internal audit and compliance mechanisms were strengthened through periodic audit inspections and a new risk-based review template adopted from MoHFW guidelines.
- Digital integration with Human Resources Management System (HRMS) and e-Office synchronised Financial and HR workflows, enabled automated salary processing, leave encashment, and budget posting approvals in real time.

2.6 Human Resources

ICMR's human resource base comprises scientific, technical, and administrative personnel across its 28 institutes and headquarters. The workforce is bifurcated into regular staff, forming the operational backbone, and project staff executing time-bound research projects. FY 2024–25 marked expansion of the scientific cadre, particularly in specialised roles aligned with national health priorities including pandemic preparedness, viral diagnostics, epidemiology, digital health, and public health genomics.

ICMR recruited regular scientists such as Scientist-B, Scientist-C, and Scientist-E, with dedicated roles for Virus Research and Diagnostic Laboratories (VRDLs). Administrative and technical appointments were also bolstered through national-level competitive processes, ensuring a diverse and mission-ready workforce.

2.6.1 Appointments made during 2024-25

- Director - 02 positions
- Scientist-C - 07 positions
- Scientist-D - 10 positions

2.7 Research Capacity Building through Faculty of Medical Research (ICMR-FMR)

ICMR signed a Memorandum of Agreement with the Academy of Scientific and Innovative Research (AcSIR) on 13th December 2023 and the Faculty of Medical Research was established under this agreement. AcSIR, established by an act of parliament as an Institution of National Importance (INI) under the guidance and strengths of the Council of Scientific and Industrial Research (CSIR) with ~8000 PhD students has achieved a respectable 9th rank in 'Research Institutions' category as per NIRF 2024. With an aim to strengthen inter-disciplinary collaborations instead of creating another academy, ICMR allied with AcSIR, and the primary goal of this collaboration is to drive innovation and improve the quality of health research. Stringent criteria have been set for the selection of supervisors, and the coursework has been designed to prepare PhD students for future challenges. A thriving PhD programme has already been established across all ICMR institutes, with around 280 scientists recognised as faculty and 160 students currently enrolled under their guidance. The MD-PhD programme for young faculty members at 28 top medical institutes has also been launched, providing substantial funding for their research.

2.7.1. New Initiatives

ICMR-Industry Internship programme for providing PhD students with hands-on industrial experience in biomedical and health sciences is initiated. Additionally, two master's courses (MSc Sports Nutrition and MSc Applied Nutrition) at ICMR-NIN have been initiated and more are planned for future affiliation. Contingency support of ₹3.2 Lakh per year for up to 5 years is introduced for PhD students enrolled under AcSIR-ICMR-FMR

2.7.2. Workshops, Training and Seminars Organised:

As part of the ongoing collaboration between ICMR and AcSIR, several scientific meetings and capacity-building initiatives have been planned and implemented to nurture young researchers and promote interdisciplinary research.

i. Workshop on Population Health Research and Practice, organised byICMR-National Institute of Malaria Research in collaboration with the Foundation of Healthcare Technologies Society (FHTS) on 7th -10th January 2025 formedical scientists of all the 28 ICMR institutes.

ii. Hands-on training on Molecular Biology techniques under the Basic Laboratory Skills Course for medical scientist enrolled for PhD under FMR, 24th-25th March 2025 at ICMR-NIMR.

iii. AcSIR and the Royal Melbourne Institute of Technology (RMIT) University, Australia, formalised a joint PhD agreement during a ceremony held in Melbourne on 27th July 2017. Under this programme, students are enrolled at both institutions, and the majority of their research is conducted at the AcSIR host institute in India, followed by a research period of up to 12 months at RMIT University under the guidance of an RMIT co-supervisor. The seminar conducted by Professor Suresh Bhargava informed the students and faculty about the structure, opportunities, and benefits of the AcSIR–RMIT Joint PhD programme that fosters international collaboration, knowledge exchange, and global exposure for Indian researchers.

iv. As part of the ongoing collaboration, a large RMIT team visited India to further strengthen academic and research ties with ICMR institutes. The visit aimed to explore new areas of collaboration, identify potential joint research projects, and engage with researchers and students.

These visits provided an excellent platform for strategic engagement, mutual understanding, and long-term collaboration between ICMR institutes and RMIT University. The discussions held during the visit will contribute to expanding joint research programmes, co-supervised doctoral projects, and knowledge-sharing initiatives between India and Australia.

Section II
Intramural Research: Advancing the Frontiers of Health Science

INTRAMURAL RESEARCH HIGHLIGHTS

Table 2: Communicable Disease Research

Metric	Value
Publications	**1420**
Technologies Developed or Validated	**46**
Workshops & Training	**58,500⁺ participants nationwide**
Outbreaks Investigated	**60 distinct outbreaks / clusters**

INITIATIVES OF NATIONAL IMPORTANCE

Communicable Disease Research Highlights

1. National One Health Mission (NOHM): Creation of India's BSL-3 Network and *Vishanu Yuddh Abhyas*

Under NOHM, a national BSL-3 laboratories network comprising 22 laboratories was established to harmonise standard operating procedures (SOPs) and biosafety practices across human and animal health sectors. It operationalises India's first integrated outbreak-response architecture linking ICMR, ICAR, DBT, MoHFW & MoEFCC for pandemic response. The initiative also included the national pandemic preparedness drill, *Vishanu Yuddh Abhyas*, to strengthen intersectoral coordination and readiness for future health emergencies.

2. Phase III Dengue Vaccine Trial across 18 States

ICMR and Panacea Biotech launched India's first phase III dengue vaccine efficacy trial enrolling 10,335 participants at 19 sites nationwide. It is India's largest vector-borne vaccine trial, a step toward indigenous licensure reducing dependence on imports and enabling endemic-region immunisation.

3. CRISPR-based and AI-enabled TB Diagnostics Validated for National Programme

ICMR validated multiple Make-in-India tools PathoDetect™, Quantiplus®, DeepCXR, LPA-AI, and CRISPR assays for inclusion in National Tuberculosis Elimination Programme (NTEP). These shorten diagnosis-to-treatment time, expand field reach, and mark India's transition to indigenous molecular and AI-driven public-health diagnostics.

4. Tamil Nadu-Kasanoi Erapilla Thittam (TN-KET): Emergency Triage Model, Tamil Nadu

ICMR-NIE evaluated the Tamil Nadu-KET model for emergency triage in government hospitals, improving response times and patient survival through simplified heuristics and algorithmic triage. It introduces a replicable, data-driven emergency-care architecture adopted by the State Health Department, an empirical model for national ER system reform.

5. Chandipura Virus Encephalitis Response and Vaccine Initiative

ICMR-NIV led India's largest *Chandipura-virus* outbreak investigation and began developing an inactivated vaccine using new isolates. It is first national field-to-lab translation linking outbreak surveillance to vaccine pipeline, strengthening India's encephalitis preparedness.

6. Indian Mutation Catalogue 2024 for Drug-Resistant TB

ICMR-NIRT released Indian Mutation Catalogue v2.0, analysing ~9,000 *M. tuberculosis* isolates for 15 anti-TB drugs. It is India's first dynamic genomic-mutation database for real-time TB surveillance and regimen optimisation, transforming national precision treatment strategy.

7. Indigenous Medical-Device Validation Using Animal Models

At ICMR-NARFBR, IIT-Delhi's orthopaedic multi-material fracture screws were validated in pig models, showing superior biocompatibility and bone healing. It demonstrates India's pre-clinical translation ecosystem linking IITs, ICMR, and BIRAC which has been critical for Atmanirbhar medical-device innovation.

8. National One Health Rabies and Animal-Bite Survey

Led by ICMR-NIE, with support of other collaborating ICMR institutes, a nationwide survey (2022-23) estimated 9.1 million animal bites and 5,726 annual human rabies deaths every year in India. It provides first evidence base for 2030 rabies-elimination roadmap, aligning human-animal surveillance and mass dog-vaccination strategy.

9. National survey for Sexually transmitted infection (STI) among high-risk group population

Led by ICMR-NITVAR, the survey was done among high-risk population which included female sex workers, men having sex with men, intravenous drug users and migrants. The survey included 43 Targeted Intervention (TI) sites across 11 states. This study highlighted prevalence of different sexually transmitted infection. This will help the National AIDS Control Programme to design the further policies for the control of STI and RTIs.

10. Operational research for assessing the feasibility of alternate approaches to traditional HIV VL testing in Government of India's free ART program

The GeneXpert platform available at district level was used for HIV Viral load testing and use of Dried blood test for HIV viral load (VL) testing was done and inputs have been given to the National AIDS Control Programme (NACP). Adoption of either of these approaches will help to diagnose HIV drug resistant at the earliest and in order to achieve 3rd target of 95-95-95 strategy.

11. Kyasanur Forest Disease (KFD) vaccine development

ICMR published expression of interest and committee decided the private partners. ICMR-NIV, Pune in collaboration with Indian Immunologicals Limited, Hyderabad developed an inactivated KFD vaccine candidate, which showed promising potential in preclinical studies. This indigenously developed vaccine candidate aligns with the Make in India policy of the country and has the potential to be a key prevention strategy in the endemic areas.

12. Development of Nipah monoclonal antibody

ICMR-NIV, Pune in collaboration with industry partner is developing monoclonal antibodies, which can then be utilised for the treatment of Nipah virus infection in future outbreaks in India. The efforts will strengthen the Nipah virus outbreak preparedness of the country.

Non-Communicable Disease Research Highlights

1. India Hypertension Control Initiative (IHCI) Expansion

The first, nationwide, data-driven chronic-disease control model jointly run by MoHFW, ICMR, WHO-India and States. It was scaled across 154 districts with 5.1 million hypertensives enrolled and 47% BP control: integrated digital monitoring (NCD App) and a private-sector pilot in Ludhiana ESI hospitals.

2. ST-Elevation Myocardial Infarction Acute Coronary Thrombosis (STEMI-ACT)

India's first operational integration of pre-hospital stroke care with the national 108 system, has set a replicable emergency care standard. The MSU-108 integrated stroke pathways enabled on-site clotting time of 8-10 minutes with 100% eligible thrombolysis. It also achieved 70-90% thrombolysis and door-to-needle in less than 21 minutes via the hub-and-spoke networks.

3. Indian Stroke Clinical Trial Network (INSTRuCT)Phase II

Expanded from 30 to 58 centres, over 4,100 patients enrolled in intrinsic and allied Randomised Control Trials (RCT), including mobility and stenosis, which establishes India's largest coordinated clinical-trial grid for stroke, creating scalable infrastructure for multi-centre pharmacological and digital health research.

4. National Rare Donor & Haemophilia Diagnostic Platforms

Built molecular rare-donor registry with >300 antigens genotyped and validated rapid haemophilia A & von Willebrand's Disease kits (now DCGI-approved for commercialisation).It provides India's first comprehensive blood-group and bleeding-disorder diagnostic infrastructure, reducing import dependence and enabling self-sufficiency in transfusion medicine.

5. High-Risk Autopsy & National Biorepository

Operationalised BSL-3/4 autopsy suite with >28,000 biospecimens that is linked to the Brain Bank Network at AIIMS Bhubaneswar & PGIMER Chandigarh (Postgraduate Institute of Medical Education and Research). National institute of Mental Health and Neuro Sciences (NIMHANS) created national readiness for pathogen research and outbreak response. This is critical long-term infrastructure that integrates MoHFW, DBT, and state health systems.

6. National Cancer Registry Programme

Expansion of cancer surveillance through a robust nationwide network of over 600 registry sites enabling data collection, standardised reporting, and evidence-based planning for cancer control at national and subnational levels.

7. National Stroke Registry Programme

Expanded a stroke surveillance system through a nationwide network of close to 100 reporting sites, facilitating data capture, uniform reporting standards, and evidence-driven planning for stroke prevention and management at both national and regional levels.

8. National Sickle Cell Mission

Under the NHM-MP partnership, ICMR-NIRTH trained 21,570 health workers, including CHOs, ASHAs, ANMs, and *Anganwadi* staff on Sickle Cell disease care and screening. It represents the largest tribal-health workforce mobilisation under a disease-specific mission, advancing equitable genetic disorder control in India's tribal belt.

Reproductive, Child Health & Nutrition Research Highlights

1. Cost-Effective Screening for Sickle Cell Disease

ICMR validated four indigenous point-of-care (POC) diagnostic kits (HemoTypeSC, Sickle Scan, HPOS, Gazelle), proving their cost-effectiveness under ₹300 per test. NHM adopted these for national procurement, thus revolutionising screening under the National Sickle Cell Anaemia Elimination Mission.

2. Validation of Indigenous HPV Tests

Three made-in-India cervical cancer screening tests, HPV-Q (Genes2Me), PathoDetect (Mylab), and Truenat HPV-HR (Molbio) were validated by ICMR and WHO-IARC partners. This supports *Atmanirbhar Bharat* goals in women's health diagnostics and was showcased before the Hon'ble Science Minister.

3. National Programme Redesign of Anaemia Mukt Bharat

Evidence reviews and guideline development for intravenous ferric carboxymaltose (IC FCM) in pregnancy, adopted by NHM for national use.

4. High-Impact Research on Polycystic Ovary Syndrome (PCOS)

The national multi-centric ICMR-PCOS cohort covering clinical, genetic, and environmental factors. Findings informed PCOS guidelines, a Yoga-based intervention module, and national awareness initiatives, shaping women's health policy across India.

Chapter 3: Communicable Diseases: Safeguarding National Health Security

Communicable diseases continue to test the strength and resilience of India's public health system. From controlling long-standing infections to responding to new and re-emerging threats, the work in this area remains central to ICMR's mission. This chapter brings together the key achievements, field studies, and innovations that shaped India's response to communicable diseases during the year. It traces how coordinated research, laboratory networks, and surveillance systems are helping translate scientific evidence into real-world disease control. Readers will see how every study, discovery, and intervention contributes to a stronger and more prepared nation.

Overview of Research Priorities

ICMR's communicable disease research continued to focus on national health priorities such as tuberculosis, malaria, dengue, chikungunya, influenza, antimicrobial resistance (AMR), HIV, and zoonotic infections. The research approach integrated laboratory science with field epidemiology and data analytics to support both national and global health-security objectives.

During 2024–25, emphasis was placed on developing rapid diagnostics, improving surveillance through the Viral Research and Diagnostic Laboratory (VRDL) network, and strengthening platforms under the One Health Mission for early detection of zoonotic diseases.

ICMR also expanded genomic sequencing for emerging viral pathogens through its network of institutes, with NIV Pune and NIE Chennai leading coordinated surveillance studies in collaboration with State Health Departments and WHO partners.

3.1 Tuberculosis (TB): Core Focus Area

Tuberculosis remained ICMR's central communicable disease focus in 2024–25, with diagnostics advancing from validation to national recommendation. The PathoDetect™ MTB RIF & INH Test achieved 98.1% sensitivity for *Mycobacterium tuberculosis* and surpassed Truenat® in detecting rifampicin and isoniazid resistance, leading to its adoption under NTEP. The Quantiplus® MTB FAST Detection Kit, the world's first open RT-PCR assay, showed 85.9% sensitivity and 96.3% specificity at Christian Medical College (CMC) Vellore, King George's Medical University (KGMU) Lucknow, and ICMR - NIRT Chennai. Together, these validated diagnostics addressed speed, scalability, and cost-effectiveness, marking a transformative shift in India's ability to deliver timely TB detection and treatment initiation within national programmes.

ICMR - NIE is providing lead technical support in planning, implementation, monitoring, and operational research in differentiated TB care (Tamil Nadu, Delhi State TB Cells). It is called as Tamil Nadu Kasanoi Erappila Thittam (TN-KET in Tamil Nadu, since April 2022 and ongoing) and Delhi Triage and Treat TB (D-TAT in Delhi, 2024, completed).

i. TN-Kasanoi Erapila Thittam in 2024

In 2024, of 53,793 adults with TB diagnosed from public facilities, 52,603 (98%) were triaged and 6687 (12%) were triage-positive (eligible for referral). Of 6687 eligible, 6208 (93%) were referred, comprehensively assessed and confirmed as severely ill at nodal inpatient facilities. Of 6208 confirmed, 6059 (98%) were admitted for inpatient care and 5580 (92%) were successfully discharged for ambulatory directly observed treatment. The median admission duration was seven days, and when compared to Apr-Jun 2022 cohort, in the Apr-Jun 2024 cohort, 21 districts have documented at least 20% reduction in TB death rate.

Since October 2024, updated TN TB DM box has been added in routine health system settings (paper-based) to capture glycaemic control status (cFBG) and insulin use at TB diagnosis, 2 months and end of TB treatment.

The state of Tamil Nadu now has the status of glycaemic control for all public notified TB-DM patients and appropriate action is being taken including prioritising insulin for those with cFBG>250 mg/dl/. A TB-DM module has been added to existing Severe TB Web Application (TB SeWA of TN-KET) to capture this information.

TN-KET, TB-DM and TB SeWA (the e-tool) are part of routine NTEP activities in Tamil Nadu indicating policy and practice uptake.

ii. Artificial Intelligence & Imaging in TB Control

Artificial intelligence became a defining element of ICMR's TB innovation strategy. The DeepCXR platform, trained on 75,000 chest X-rays from 12 states and 17 sites, demonstrated 92.2% sensitivity and 77.4% specificity, classifying 92 lesion types and gaining formal NTEP recommendation as a screening tool.

Additionally, handheld chest X-ray devices like Mine 2IN, MyBeam, and Prorad Atlas were validated for remote use, collectively creating a mobile, AI-integrated diagnostic network for decentralised TB detection and management.

iii. Programme-Oriented TB Research and Surveillance

A multicentric prospective study assessing the daily drug regimen's effectiveness under NTEP was completed in December 2024, analysing cure rates, recurrence, and treatment failures to refine therapeutic strategies. Concurrently, sentinel surveillance initiated in 2023 continued in Uttarakhand and Aligarh, Uttar Pradesh, generating community-level burden and resistance data to complement programmatic reporting.

iv. Comprehensive Intervention Strategy to Improve Retention in TB Infection

A cascade of care in high-risk groups through a person-centred approach is being implemented across Bhutan, India, Indonesia, Nepal, and Sri Lanka. The study focuses on improving TB screening and treatment in high-risk groups to accelerate progress toward ending TB by 2030. ICMR is also supporting SEAR nations with 'Made in India' products such as handheld X-rays, Cy-TB kits, and molecular diagnostic tools.

A project was initiated with an objective of strengthening & capacity building for dengue diagnostics and evaluation of commercially available Dengue Point of Care kits in Nepal – under Indian Prime Minister - Ayushman Bharat Health Infrastructure Mission (PM-ABHIM)

3.2 Dengue – Vaccine Development Milestone

A landmark in India's vaccine research, the DengiAll tetravalent dengue vaccine entered Phase III clinical trials on 14 August 2024, spanning 19 sites across 18 states and union territories. The trial enrolled 10,335 healthy adult volunteers, achieving 65% enrolment completion during the reporting year. It aims to establish the vaccine's safety, immunogenicity, and efficacy for national rollout. The effort was supported by ICMR–NITVAR, which provided essential biorepository and trial infrastructure. Representing India's most advanced dengue vaccine effort to date, DengiAll's Phase III trial marks a major milestone toward reducing dengue morbidity and mortality through indigenous vaccine innovation.

3.3 HIV Research

ICMR's 2024–25 HIV and emerging pathogen portfolio yielded crucial operational and immunological evidence. Multicentric Phase IV Study to evaluate safety, tolerability, and effectiveness of Dolutegravir 50mg tablet along with other antiretrovirals among HIV-1 infected subjects was conducted by ICMR. Additionally, antiretroviral drug resistance and HIV genotypes among HIV-infected female sex workers and people who inject drugs in Mizoram were carried out.

Network structure and dynamics among hard-to-reach Men having Sex with Men (MSM) in India were explored through a multi-centric study. 1141 participants, hidden MSM were reached who were not listed with programme.It identified challenges and opportunities to improve HIV/AIDS interventions. Continued efforts to address stigma, enhance community engagement, and build on study outcomes are essential for achieving the 95-95-95 targets and eliminating HIV/AIDS in India.

3.4 Translational Readiness and Policy Integration

ICMR's communicable disease achievements translated directly into policy and programmatic adoption in 2024–25. PathoDetect™, Quantiplus®, DeepCXR, and LPA-AI were all recommended under NTEP, establishing a robust model of laboratory-to-field translation. Integration of AI diagnostics with the Ni-kshay portal exemplified real-time digital health connectivity for TB case management. The HIV self-testing findings guided national strategies under NACP, while Mpox and Cervavac® studies advanced India's outbreak and immunisation preparedness. By validating portable devices, expanding multicentric vaccine trials, and ensuring digital integration, ICMR strengthened its role as both scientific innovator and public health strategist, ensuring nationwide translational readiness.

i. **Mpox Virus:** ICMR launched India's first sentinel surveillance for Mpox, identifying 14 IgG-positive individuals, establishing baseline immunity data for outbreak preparedness. The Mpox sentinel survey, conducted among high-risk groups, detected 14 IgG-positive participants (no IgM), indicating past exposure and establishing India's first baseline immunity profile for Mpox.

ii. **Pan India ARI and SARI Surveillance for Respiratory Viruses:** ICMR and ICMR NIV Pune coordinated respiratory surveillance using 72 VRDLS. The pan-India Influenza Like Illness (ILI)/Severe acute respiratory infection (SARI) surveillance currently captures the trends of 3 major respiratory viruses -influenza, SARS-CoV-2 and Respiratory Syncytial Virus (RSV), across 72 sites in the country from community as well as hospital settings using an in-house low-cost multiplex PCR kit.

iii. **Cervavac® Single-Dose Immunogenicity Trial:** The Cervavac® vs. Gardasil® immunogenicity study, launched in November 2024 among 500 girls aged 9–14, assessed single-dose responses, reinforcing ICMR's focus on accessible immunisation strategies for endemic and emerging infections.

iv. **Hospital Wastewater Surveillance for Monitoring of AMR Signatures:** ICMR has initiated a pioneering programme in collaboration with the Tata Institute for Genetics and Society (TIGS), Bengaluru, to study the AMR genes in hospital wastewater across the country through the VRDLs. This initiative will involve molecular detection of known pathogens and metagenomic analysis of wastewater samples from 60 VRDLs to identify AMR signatures, develop targeted detection assays, and compare findings with clinical antibiogram data.

v. **Development of Vaccine Candidates Against the Highly Pathogenic Avian Influenza Virus (H5N1):** Due to continuous spillover of H5N1 to non-poultry/non-bird hosts, the pathogen is viewed as a potential threat for the next pandemic. ICMR collaborated with industry partners for developing indigenous vaccine candidates against the H5N1. There are three different vaccine candidates on different technology platform vis-a- vis inactivated vaccine, recombinant Virus-Like Particle (VLP) based vaccine and mRNA-based vaccine by Serum Institute of India, Ribbonate Technologies Pvt. Ltd. and Gennova Biopharmaceuticals, respectively.

vi. **Development of Inactivated Vaccine for Kyasanur Forest Disease (KFD):** There is no effective vaccine available prevent cases of KFD. ICMR has collaborated with Indian Immunologicals to develop an inactivated vaccine. With support of ICMR - NIV, Pune, the candidate vaccine has been developed successfully and protocol for the phase I clinical trials is under preparation

vii. **Initiation of Syndromic Surveillance for ARI/SARI and Acute Encephalitis Syndrome (AES):** ICMR has developed a list of priority pathogens for acute syndromes namely respiratory illness, encephalitis, fever and diarrhoea. Syndromic surveillance for ARI/SARI has been rolled out across 73 sites wherein multiplex testing for Influenza A (H1N1&H3N2) & B (Victoria & Yamagata); SARS-CoV-2, RSV, HMPV and Nipah virus. Two different spillovers events of H7N9 and H5N1 in India have been picked up by this network. AES surveillance includes 24 pathogens (13 viruses, 9 bacteria and 1 fungal and parasitic pathogen).

viii. **Initiation of Surveillance at Animal-Human Interface:** Surveillance has been initiated across 11 slaughterhouses in Assam, Telangana and Punjab to detect spillovers of infections from animals to humans in slaughterhouse settings. Similarly, surveillance in 13 bird sanctuaries has been initiated in Sikkim, Tamil Nadu and Maharashtra to detect spillovers from migratory birds to humans.

ix. **Establishment of Infectious Disease Research and Diagnostic Laboratories (IRDLs):** ICMR has shortlisted and partially funded six IRDLs in various parts of the country in State/Central Government run institutes and medical colleges with functioning VRDLs, with the view of strengthening the verticals of diagnostic bacteriology, mycology and parasitology. These institutes are meant to serve as regional referral level labs for diagnosis and research on infectious diseases and will be supported by ICMR with funding for equipment, infrastructure, manpower and consumables. IRDLs have the mandate of quality assured advanced diagnostic testing of infectious diseases, outbreak investigation, syndromic surveillance of infectious diseases, biorepository maintenance, Proficiency Testing Panel preparation and in-vitro diagnostic kit evaluation.

x. **Development of draft In-Vitro Diagnostics (IVDs) Performance Evaluation Protocols:** Licensure of IVDs under Medical Devices Rules 2017 requires a detailed evaluation protocol for the performance evaluation of IVDs to evaluate their quality and performance. To facilitate this process, ICMR and CDSCO have come together to draft standard evaluation protocols for use by IVD manufacturers and/or IVD evaluating labs in India. These protocols outline laboratory criteria for diagnostic kit validation, performance characteristics benchmarks, and statistically significant sample sizes and sample panel composition for evaluation (including a robust cross-reactivity panel). ICMR has drafted 15 such standard protocols for evaluating IVDs detecting Dengue, Chikungunya, Zika virus and Human Metapneumovirus in clinical samples across various test formats and placed them in the public domain for stakeholder comments. This initiative is likely to improve the quality of IVD evaluations in India and raise the benchmark of IVD quality.

xi. **Development of a Cost Matrix for IVD Evaluation in ICMR:** ICMR has consistently evaluated IVDs through its institutes and affiliated laboratory network, however, there is no formal fee structure for sustaining this activity.

xii. **External Quality Assurance (EQA) for ICMR-affiliated Laboratories:** To further strengthen the quality of testing in these laboratories, ICMR has rolled out an EQAs by training 17 laboratories (VRDLs and ICMR institute labs) in proficiency testing panel preparation with help from the World Health Organisation and National (Serology) Reference Laboratory, Australia. These 17 laboratories now prepare PT panels for 19 analytes across various sample types. Round 1 of EQA was conducted in 2024; 95-100% of VRDLs qualified EQA in in the first round, which is a major step towards ISO:15189 accreditation of this network.

3.5 Projects Status

3.5.1 Ongoing projects

Ongoing 67 ICMR projects under ICMR's communicable disease research were dominated by diagnostics and biomarker development (22.4%) and drug resistance and therapeutics research (20.9%), reflecting a strong focus on programmatic priorities. Epidemiology and surveillance (17.9%) and vaccine development (14.9%) further underscored the Council's dual emphasis on prevention and evidence-based control strategies. Vector-borne disease studies, clinical trials, and molecular research together provided targeted advances, while investments in novel biomarker discovery (6%) highlighted ICMR's commitment to future-ready innovation.

3.5.2 New intramural funded projects

ICMR's communicable disease projects in 2024–2025 were dominated by Descriptive studies (50%), reflecting emphasis on surveillance, monitoring, and intervention assessment. Development projects (25%) advanced translational innovations, including AI tools and implementation strategies. Discovery research (12.5%) contributed to host-directed therapy exploration, while Delivery projects (12.5%) demonstrated real-world implementation through bidirectional TB–silicosis screening.

3.6 ICMR Institutes: Initiatives of National Importance in the Area of Communicable Diseases

3.6.1 ICMR - National Institute of Virology (NIV), Pune

During 2024-25, the ICMR - National Institute of Virology (NIV), Pune remained India's frontline centre for viral disease research, surveillance, and diagnostics. The institute conducted the first national sentinel survey for Mpox, detecting 14 IgG-positive individuals and confirming the first Clade Ib case in a traveller from the UAE. The surveillance network was expanded to 35 VRDLs. Furthermore, two *Nippah* Virus outbreaks were detected in Malappuram, Kerala, in July and September 2024, predominantly presenting as Acute Encephalitis Syndrome (AES), followed by a single spillover case in July 2025. Deployment of mobile BSL-3 for on-site diagnosis drastically reduced the turnaround time to just 4 hours, significantly enhancing early containment efforts and marking a pivotal success story in India's fight against infectious diseases. NIV's rapid diagnostic innovations included RT-LAMP assays for Nipah with 100% sensitivity and specificity and LAMP assay with 100% sensitivity and specificity for Mpox developed at Mumbai Unit, Chandipura IgG ELISA (93.1% sensitivity, 94.5% specificity), and a dual HAV–HEV detection strip, several of which were commercialised. Developed LAMP kit for detection of Diphtheria and found to be 100% Sensitive and 100% Specific during external validation at KGMU-Lucknow in collaboration with NIE, Chennai. Development of poliovirus non-permissive HEK293T cell line using CRISPR Cas9 technology: A step further for polio and non-polio enterovirus surveillance, diagnostics and research as per WHO Global Action Plan III/IV for Polio Containment. Development of genetically tailored organotypic model of human intestine for study of Enteroviruses. First time full genome sequencing of Genotype D and G have been done using Ion-torrent at NIV, Mumbai Unit followed by in-silico antigenic sites determination have been done of these genotypes for VLP based vaccine development. High-titre HEK293T cell line has been developed using CRISPR, genetic engineering and Lenti-viral technology for EV A-71 vaccine development. During the Chandipura encephalitis outbreak in Gujarat, NIV confirmed 23 positive cases and initiated development of an inactivated vaccine and animal models. Between January and March 2025, 230 GBS cases (12 deaths; CFR 5.2%) were reported in southwest Pune, affecting all age groups, with *Campylobacter jejuni* and *Norovirus* identified as major pathogens. Environmental contamination in water and poultry was detected, and prompt interventions including water chlorination and community awareness on hygiene and food safety successfully contained the GBS and related diarrheal outbreaks. The institute advanced genomic research with first-time sequencing of HCV subtype 6xa and EV71 genotypes D and G, informing vaccine design. Under NOHM, it led the VishanuYuddh Abhyas H5N1 mock drill in Rajasthan. NIV strengthened India's VRDL network of 162 labs, trained 165 NVBDCP staff, and conducted biosafety audits for national institutions. Through these integrated efforts, NIV bridged discovery, surveillance, and policy impact, reinforcing India's viral preparedness ecosystem.

Table 3: Major Scientific & Programmatic Achievements of ICMR - NIV, Pune

Research Area/ Domain	Achievements	Significance/Status
Basic Research	Study examining HAV immunity across different regions + socioeconomic statuses	Emphasised importance of considering epidemiological statuses in public health planning
	Established Poliovirus Receptor (CD155) knockout HEK-293T cell line compliant with GAP-IV containment.	Deposited the cell line to ATCC for international patent purpose and commercialisation.
	Participation in WHO study to assess immunity to polioviruses, Measles and Rubella in different risk states of India	Beneficial to the developing further national immunisation strategies.
	Nationwide survey in Pteropus bats	Highlighted potential hotspots
	Study on Immune Response Mechanisms in Long COVID	Patients with long COVID showed reduced anti-SARS-CoV-2 IgG, decreased NK cells, and increased apoptosis with elevated PD-1 compared with recovered individuals.
Emerging Pathogens	First sentinel survey for Mpox virus; detection of 14 IgG-positive individuals (no IgM).	Successful identification and isolation of patients, and robust diagnostic preparedness.
Disease Outbreaks	Chandipura virus outbreak investigation (Gujarat) with 245 cases / 23 positives	Reduced case fatality rates through rapid case identification + vector control recommendations.
	GBS outbreak in Pune (230 cases). 72 positive for Campylobacterjejuni, 40 positive for Norovirus	Informed local risk mitigation strategies.
	Zika Virus outbreak (2411 cases). Next-generation sequencing done to understand lineage of strain	Whole-genome sequencing of positive pools is under review, offering deeper insight into local transmission dynamics.
	Aedes mosquitoes tested using RT-PCR during Chikungunya outbreak (all negative)	Suggests alternate transmission mechanism/low viral prevalence in vectors
	Two NiV outbreaks occurred in Malappuram, Kerala, in July and September 2024, presenting mainly as AES with no evidence of human-to-human transmission.	Limited the spread and strengthened local diagnostic capacity.
	Real time RT-PCR testing for Avian Influenzas outbreak in Kerala	Deployment of field assessment teams ensured coordinated responses
	West Nile fever in Kerala (27 cases)	Supported targeted vector control and public health interventions.
	Fatal CCHF cases in Gujarat (2)	Contact tracing contained outbreak
	KFD outbreaks in Karnataka and Maharashtra identified	Support of public health interventions

Research Area/ Domain	Achievements	Significance/Status
Diagnostics	Population-based survey to understand seroprevalence, risk factors and molecular epidemiology of Hepatitis	HBV surface antigen through ELISA under process
	Development of IgG ELISA for detection of exposure to Chandipura virus	Kit ready for technology transfer (93.1% sensitivity + 94.5% specificity)
	Development of a Rapid LAMP assay for detection of Monkeypox virus	Technology transferred to companies- SmartQr technologies Pvt. Ltd., Pune and Acrannolife Genomics Pvt. Ltd., Chennai
	Development of a colorimetric isothermal (RT-LAMP) assay for rapid detection of Nipah virus	
	Development of CD155/PVR knockout HEK-293T cell line to be used in post-polio eradication era	Safe cultivation of enteric viruses from clinical samples for diagnostics & research without risk of inadvertent poliovirus contamination.
Programmes	VDRL establishment of a network of laboratories for managing epidemics and natural calamities	Advanced diagnostic technologies and outbreak investigations in rural and tribal regions
	Oversight for 162 VRDLs EQAS for 22 Measles–Rubella labs	Enhancement of infectious disease Diagnosis Quality
	Network of 72 PAN-India influenza labs; entomology training for 165 NVBDCP staff; BSL-3/4 biosafety audits of national institutes; and oversight/EQAS for 72 ILI/SARI VRDL labs conducting Influenza, SARS-CoV-2, and RSV testing.	Pan India surveillance for respiratory viruses through the DHR-ICMR-VDRL network
Vaccines	Studies initiated for development of vaccine for Chandipura virus	
	Development of an inactivated whole virion KFD in collaboration with Indian Immunologicals Ltd	Vaccine shows good immunogenicity in preclinical mouse models.
	Development of overexpressed HEK293T cell line	Can be used to study the receptor's role in viral pathogenesis and vaccine production.
One Health Mission	*Vishanu Yuddh Abhyas* Avian Influenza H5N1 simulation in Ajmer, Rajasthan	Evaluated the preparedness of NJORT

3.6.2 ICMR –National Institute of Translational Virology and AIDS Research (NITVAR), Pune

During 2024-25, ICMR – NITVAR, Pune strengthened its role as India's translational virology hub for HIV and emerging viral diseases. The institute achieved NABL ISO 17043:2023 accreditation, initiated the Phase III DengiAll tetravalent vaccine trial, and served as the national apex reference for HIV serology, CD4, and viral-load testing, processing over 16,000 samples and 1900 early infant diagnoses. Its Mizoram self-testing study proved high acceptance and linkage to care, offering evidence for NACP scale-

up. Through regional surveillance across five western states, NITVAR guided HIV/HBV/HCV control policies and maintained inter-laboratory quality for over 300 sites. Over 250 health and lab personnel were trained nationwide, while new Fluorescence-activated Cell Sorting (FACS) and Luminex facilities enhanced immunology research. Collectively, these achievements demonstrate NITVAR's core mission to translate bench-level discoveries into public-health impact.

Table 4: Key Scientific Contributions of ICMR - NITVAR, Pune

Research Area/Domain	Achievements	Significance/Status
Basic Research	Completion and publication of results from the End TB trial evaluating a short-course BDQ-based regimen for MDR-TB.	Release on new WHO TB treatment guidelines
	Evaluation of Early infant Diagnosis of HIV	Highlighted the gaps and challenges for implementation of EID services
	Assessed STI prevalence among high-risk groups, including FSWs, MSM, IDUs, and migrants.	The study identified challenges and opportunities to improve HIV/AIDS interventions.
Vaccine	Initiated Phase III trial of Panacea Biotec's DengiAll Tetravalent Vaccine on 14 Aug 2024 (healthy adult cohort).	Improved Clinical or Public Health Care
	Completed a multicentre, double-blind RCT comparing antibody responses to one dose of Cervavac® vs. one dose of Gardasil® in healthy girls aged 9–14 years (non-inferiority trial).	Enrolled 504 participants across three sites between Nov 2024 and Mar 2025; visit 2 follow-up is complete, with visits 3 and 4 ongoing.
	Completion of a phase III TB vaccine trial	Improvement of knowledge about the two candidate TB vaccine viz VPM 1002 and Immunovac pertaining to safety & efficacy.
Clinical &laboratory support	Providing clinical care to PLHIV; serving as the national apex lab for HIV serology, CD4, and viral load testing, with NABL accreditation under ISO 17043:2023.	Managing ~3,500 PLHIV through a programme-supported ART centre, with 16,000 VL tests, 1,902 EID samples, and 3,742 serum QA samples processed.
Programme Support (NACP V) & Surveillance Work	Provided HIV burden and estimation inputs for Maharashtra, Goa, Gujarat, Dadra & Nagar Haveli, Daman & Diu.	Completed HSS and HRG-IBBS rounds across 35 labs, providing policymakers with clear insights on epidemic trends, magnitude, and priority locations and populations.

Research Area/Domain	Achievements	Significance/Status
Training & Capacity Building	200 technicians trained via NACO Sysmex CD4 GLP refresher courses across 10 cities; biosafety and ethics modules conducted.	>250 personnel trained nationally.
	Training for researchers across the country for use of Mathematical modelling in control of infectious diseases	27 public health professionals have been trained in first cohort. Disbursement Linked Indicators 10 target is to complete training of 100 professionals by 2027
Infrastructure & Labs	Genetic Analyser, Phenotypic Drug-Resistance Lab, Cytek Aurora FACS and Luminex xMAP systems installed (2024).	All commissioned and functional.
	BSL 2/3 facility is being developed through PMABHIM	Civil construction of the building has been completed.
	MRHRU has been established at Buldhana, Maharashtra, to undertake research in rural context	Process of signing MoA with state health services and DHR has been completed

3.6.3 ICMR - National Institute for Research in Bacterial Infections (NIRBI), Kolkata

During 2024–2025, the ICMR-NIRBI reported several significant novel findings in bacterial and viral disease research. A two-year multi-centric cohort study among vaccinated healthcare workers revealed waning humoral immunity but sustained T-cell responses, guiding booster vaccine strategy. Under antibiotic stress, L-form Salmonella typhi was generated, showing unique methylation signatures linked to persistence. The institute sequenced 22 Sapovirus genomes (GI, GII, GIV) and identified Entamoeba moshkovskii as a pathogenic species with >3% prevalence in diarrhoeal cases. AMR studies detected blaNDM-1 and blaNDM-5 co-existence in E. coli ST167/ST101. A human H9N2 avian influenza case was confirmed in West Bengal. NIRBI filed a Salmonella glycoconjugate vaccine patent, discovered host-targeted antivirals (AOAA, GSK:872), validated two-dose vaccine delivery, and tested 78,000 samples for HBV/HCV, linking AES and hepatitis surveillance in eastern India.

Table 5: Key Scientific Contributions of ICMR - NIRBI, Kolkata

Research Area/ Domain	Achievements	Significance/Status
COVID-19 Immunology	Multicentric cohort (2022–25) among vaccinated healthcare workers revealed waning antibody levels but durable T-cell immunity, guiding booster policies.	National evidence on long-term vaccine protection.
Bacterial Pathogenesis	L-form *Salmonella typhi* generated under ampicillin stress; unique methylation patterns identified via Nanopore sequencing.	Showed epigenetic role in antibiotic persistence.

Research Area/ Domain	Achievements	Significance/Status
Viral Genomics	First complete genome sequencing of 22 Sapo virus strains from India (GI, GII, GIV; 7 sub-genotypes).	Established molecular epidemiology baseline for India.
Parasitology	*Entamoeba moshkovskii* identified as a true pathogen (>3% prevalence) among diarrhoeal patients.	Redefined clinical amoebiasis; identified zoonotic potential.
Antimicrobial Resistance (AMR)	Co-existence of blaNDM-1 and blaNDM-5 in E. coli ST167/ST101 detected.	Critical data for India's AMR surveillance.
Influenza Surveillance	Detected human avian influenza A (H9N2) case (West Bengal, 2024).	Second-ever human H9N2 case reported in India.
Therapeutic Research	AOAA (AAT inhibitor) and GSK:872 (RIP3 inhibitor) both suppressed rotavirus replication in vitro and in animal models.	Host-targeted dual antiviral approach.
Implementation Research	Validated booth-based and door-to-door vaccination strategies; generated data on HPV single-dose efficacy, dengue vaccine safety, and JE vaccine interchangeability.	Strengthened India's immunisation delivery models.
Mortality Surveillance	Developed and validated abridged verbal autopsy tool (95% cause ascertainment accuracy).	Improved community-level mortality data systems.
Hepatitis Surveillance	Tested 78,089 DBS samples under NFHS-5; HBV prevalence 1.1%, HCV 1.2%.	Baseline data for HBV/HCV elimination strategy.

3.6.4 ICMR - National Institute of Malaria Research (NIMR), Delhi

In 2024–25, ICMR-NIMR Delhi strengthened India's malaria elimination effort through vaccine innovation, vector control tools, and genetic insights. It demonstrated pre-clinical success of dual-stage recombinant chimeric vaccine candidates for *P. vivax* and P. falciparum and validated the safety of high-dose Primaquine therapy. A landmark Mendelian randomisation study linked ACE/ACE2 genotypes to malaria protection, while meta-analysis of SP resistance mutations identified surveillance hotspots. NIMR introduced a slow-release insecticidal paint with two-year efficacy and reported new mosquito proteins with bony-fish homology, potentially a world first. The institute also conducted cost analyses for molecular diagnostics and supported National Center for Vector Borne Diseases Control (NCVBDC) community surveys on LLIN utilisation. Through targeted research, field validation, and capacity building, NIMR remains central to translating molecular discoveries and entomological science into national malaria elimination policy.

Table 6: Key Scientific Contributions of ICMR - NIMR, Delhi

Research Area/ Domain	Achievements	Significance/Status
Vaccine R&D	Pre-clinical proof-of-concept for multi-stage recombinant chimeric vaccine candidates targeting *P. vivax* and *P. falciparum* (combining pre-erythrocytic and transmission-blocking antigens).	Dual-stage approach advancing toward GMP production and clinical testing for elimination goals.
Population Genetics Study	First global Mendelian randomisation study (linking sickle-cell trait with hypertension risk) showed ACE (DD) and ACE2 (TT) protect from severe malaria; ACE ID/ACE2 CT also protective.	Reveals natural selection and host adaptation in malaria - hypertension interplay.
Therapeutics	High / Double-dose Primaquine validated as safe and efficacious for radical cure.	Supports NCVBDC policy updates on Primaquine dosage.
Vector Control Innovation	Developed slow-release insecticidal paint with ≈ 2-year mosquito control efficacy.	Promising long-acting vector tool for residual transmission settings.
Molecular & Evolutionary Biology	Earlier reported PLTs in *An. culicifacies* via HGT; recently found bony-fish-homologue proteins linked to iron homeostasis (unreported in insects).	Potential world-first insight into mosquito evolution and vector physiology.
Drug Resistance Mapping	Meta-analysis of *P. falciparum* SP-resistance mutations identified Indian hotspots for genetic surveillance.	Guides antimalarial drug-policy revision and targeted monitoring.
Economic Analysis	Comprehensive cost assessment of molecular diagnosis for malaria.	Framework for funders and research planners on diagnostic method adoption.
Community Survey (HHS-1)	Household Survey on LLIN availability and use completed (Mar 2024).	Inputs for LLIN distribution strategy under NVBDC.

3.6.5 ICMR - Vector Control Research Centre (VCRC), Puducherry

During 2024–25, ICMR-VCRC Puducherry strengthened its leadership in vector biology, filariasis diagnostics, and field entomology. The centre validated the QFAT rapid LF test for WHO, demonstrated 95.5% sensitivity and 99.7% specificity, and developed a new ELISA based on anti-Wb-gp15/400 antibodies. Research spanned vector genomics (Aedes aegypti, An. stephensi), climate-malaria linkages, and eco-innovative control tools including novel Ovi traps and larval-preference devices. The ACL-II insectary at Koraput is being established for undertaking advanced experimental malaria vector research. Twenty training programmes (> 350 participants) and five workshops strengthened national capacity in entomology and vector surveillance. VCRC has been constantly supporting NCVBDC through its research and training activities over the years. A recently completed ICMR funded study identified sampling strategies to assess LF transmission in non-surveyed/non-mass drug administration (MDA) districts. VCRC conducted nationwide surveillance of Leishmaniasis in sandfly vector. Wide distribution of Leishmania donovani has been identified in different parts of the country. Through field stations in Kerala, Tamil Nadu, and Odisha, VCRC continued integrated vector management and public-health training, bridging laboratory innovation with community-level vector control. These achievements position VCRC as India's flagship centre for translating vector research into sustainable disease-control practice.

Table 7: Key Scientific Contributions of ICMR - VCRC, Puducherry

Research Area/Domain	Achievements	Significance/Status
Vector Genomics & Evolution	Genome-wide comparison of *A. aegypti* variants and *An.stephensi* (India vs Ethiopia) revealed high genetic divergence.	Guides vector taxonomy and global resistance mapping.
Novel Vector Control Tools	Developed innovative mosquito traps and a two-choice three-chamber device for larval behaviour testing.	Supports eco-friendly vector control designs.
Diagnostics – LF	Evaluated SD Biosensor's QFAT kit for WHO multi-country study – 95.5 % sensitivity, 99.7 % specificity.	QFAT recommended as alternative to FTS in GPELF portfolio and NCVBDC programme.
Surveillance strategies for LF	Four Sampling strategies evaluated to assess LF transmission, recommended Mini-TAS and molecular Xeno monitoring for Non-MDA/ unsurveyed areas. Regular monitoring in areas bordering endemic districts is necessary to prevent resurgence	The findings of the study was showcased in the Newsletter of WHO TDR Global South Asia in the month of September 2025 as new research evidence supporting LF elimination
New LF Diagnostics (Developed in-house)	ELISA formats for anti-Wb-gp15/400 IgG4 antibodies Updated primer set for L3 *W. bancrofti.*	Enhances early detection and programme surveillance capacity.
Vector Ecology & Epidemiology	Assessed climatic influence on malaria (1995–2023) across hyper to low endemic states.	Evidence for climate-sensitive malaria forecast models.
Infrastructure Development	Arthropod Containment Level 2 (ACL-II) Insectary at Koraput Field Station (Ongoing since Jan 2025).	Enables controlled malaria vector infectivity experiments.

3.6.6 ICMR - National JALMA Institute for Leprosy and Other Mycobacterial Diseases (NJIL&OMD), Agra

During 2024–25, ICMR–NJIL&OMD Agra advanced translational research on leprosy, tuberculosis, and mycobacterial diseases. A comparative evaluation of Multiplex, RLEP, and LAMP PCR established non-invasive diagnostic options for paediatric leprosy, while ꞵB glycoprotein and haptoglobin-1 were validated as early leprosy biomarkers. Proteomic analyses of *M.tuberculosis* clinical isolates identified potential new drug targets, and genetic studies revealed TLR and chemokine polymorphisms linked to disease susceptibility. Two patents were filed for innovative anti-TB conjugate drugs. Field services at Ghatampur supported diagnosis and care for 742 TB, 115 leprosy, and 187 filariasis patients, integrating research with community care. A new haematology laboratory strengthened diagnostic capacity. Through a blend of molecular discovery, genetic epidemiology, and patient service delivery, NJIL&OMD continued to be India's nodal centre for leprosy and mycobacterial research.

Table 8: Key Scientific Contributions of ICMR - NJILOMD, Agra

Research Area/Domain	Achievements	Significance/Status
Diagnostics – Leprosy	Comparative evaluation of Multiplex PCR, RLEP PCR, and LAMP PCR on urine, stool, and blood for paediatric leprosy.	Validated rapid non-invasive diagnostic strategies.
Molecular Biomarkers	Identified β2 glycoprotein and haptoglobin-1 as biomarkers for early leprosy detection (Lepr Rev., 2025).	Enables early case diagnosis and improved control strategies.
Mycobacterial Proteomics	Comparative proteomic profiling of *M. tuberculosis* clinical isolates (aminoglycoside-resistant vs. sensitive) to reveal novel drug targets.	Provides molecular targets for anti-TB drug design.
Genetics of Drug Resistance	TLR2 and TLR1 polymorphisms associated with drug-resistant TB in North India; CC-chemokine ligand-2 variants linked to leprosy reactions.	Advances genetic understanding of host-pathogen interaction.
Drug Discovery & Repurposing	ATLS2021 strengthens host sphingolipid pathways to boost macrophage killing, curb both wild-type and MDR TB, and enhance rifampicin sensitivity	Makes it a strong candidate for host-directed TB therapy.
Clinical Research (Field Unit – Ghatampur)	1,858 TB (CBNAAT) and 235 Leprosy (AFB smear) samples processed; patient care for 742 TB, 115 leprosy, 187 filariasis cases.	Strengthened integrated field-based diagnostic services.
Programme Support	Diagnosis, treatment and follow-up of TB and leprosy under NTEP and NLEP	Monitoring of patients and management of complications
	Development and Certification of New TB Culture and Drug Susceptibility (DST) laboratory	Diagnosis

3.6.7. ICMR - Regional Medical Research Centre (RMRCBB), Bhubaneswar

During 2024–25, ICMR - RMRC Bhubaneswar consolidated its role as a national leader in infectious disease research, zoonotic surveillance, and capacity building. The institute's One Health study identified high seroprevalence of Scrub Typhus (82%), Brucellosis (43%), and Leptospirosis (31%) in a peri-urban cohort of Odisha and developed a fever-screening algorithm for field use. RMRC advanced malaria research through the NIH-supported CSCMi-3 project and developed an oral *Lactococcus lactis*-based malaria vaccine candidate. VRDL achieved WHO accreditation for Measles–Rubella testing, expanded genomic sequencing, and led outbreak investigations of diphtheria and avian influenza. Work on colistin resistance diagnostics, filariasis clinical management, and a new DHR-funded BSL-3 facility strengthened public health preparedness. With over 8,000 trainees in its One Health course, ICMR-RMRC Bhubaneswar exemplified translational research linking advanced science with local health impact.

Table 9: Key Scientific Contributions of ICMR - RMRC, Bhubaneswar

Research Area/ Domain	Achievements	Significance/Status
Zoonotic Diseases (One Health)	Found high seroprevalence in a peri-urban Odisha cohort, Scrub Typhus 82%, Brucellosis 43%, Leptospirosis 31%, and developed a community fever-screening algorithm.	Strengthened zoonotic surveillance and early detection.
Malaria Research	NIH-funded CSCMi-3 project on hidden Plasmodium reservoirs; established malaria biomarker discovery pipeline.	Advanced India's malaria elimination science.
Vaccine R&D	CSIR-funded oral malaria vaccine using *Lactococcus lactis* recombinant antigen (PfCSP-Pro6C) showing immunogenic response in mice.	First Indigenous oral candidate for malaria prevention.
Filariasis & AMR	Clinical study on lymphatic filariasis lymphedema (944 screened; 43 completed one-year follow-up). Developed molecular kit for colistin resistance detection.	Evidence for chronic LF management and AMR monitoring.
Viral Surveillance (VRDL)	WHO-accredited Measles–Rubella lab; genomic sequencing of Dengue-1 & -2; metagenomics of AES CSF; outbreak response to diphtheria and avian influenza.	State-wide viral diagnostics and outbreak preparedness.
BSL-3 Laboratory	Construction initiated under DHR funding for high-risk pathogen research (Phase II with CPWD).	Expands national containment and biosafety capacity.

3.6.8 ICMR - Regional Medical Research Centre (RMRC), Dibrugarh

During 2024-25, ICMR - RMRC Dibrugarh played a pivotal role in strengthening virological preparedness and biosafety in India's eastern region. As part of the ICMR–NIV zonal network, the centre-initiated establishment of a state-of-the-art BSL-3/BSL-4 facility under the PM–ABHIM Mission, positioning itself as a nodal hub for outbreak response. The institute conducted multi-disease surveillance including dengue, Japanese encephalitis, and scrub typhus and expanded entomological monitoring across Assam. Through partnerships with ICMR - NIV Pune, DHR, and state agencies, RMRC contributed to national studies on climate–vector dynamics and genomic surveillance. Fifty scientists and health personnel were trained in biosafety and outbreak handling, ensuring regional readiness for high-risk pathogen containment. With its integrated focus on research, infrastructure, and training, RMRC Dibrugarh continues to anchor public health security in Northeast India.

Table 10:Key Scientific Contributions of ICMR – RMRC,Dibrugarh

Research Area/ Domain	Achievements	Significance/Status
Virology Infrastructure	Initiated construction of integrated BSL-3/ BSL-4 facility under PM–ABHIM scheme; designed to support zoonotic and emerging infection surveillance.	First high-containment facility of its kind in the Eastern Zone.
Surveillance & Response	Conducted regional outbreak investigations for dengue, Japanese encephalitis, and scrub typhus in Upper Assam districts.	Strengthened early warning and rapid response mechanisms.
Zoonotic & Vector-Borne Research	Expanded entomological monitoring and pathogen detection in *Culex* and *Aedes* mosquitoes.	Provided regional data for vector ecology and risk prediction.
	Identified an *Aedes nr. albopictus* in India with distinct male genitalia; a new sibling species within the *An. maculatus* group in Meghalaya; and a morphologically An. fluviatilis–like but genetically *An. minimus* species in Tripura.	Expand India's catalogue of medically important mosquitoes, sharpen vector identification, and strengthen surveillance.
Capacity Building	Organised biosafety and biosecurity workshops for 50 personnel from ICMR, ICAR, NCDC, and state labs.	Enhanced readiness for handling high-risk pathogens.
Collaborative Projects	Partnered with ICMR–NIV, Pune in Climate Influence on Mosquito Demographics Study and NGS Hub under PM–ABHIM.	Contributed to national surveillance modelling and genomic capacity expansion.

3.6.9 ICMR - National Institute of Epidemiology (NIE), Chenna

During 2024-25, ICMR - NIE Chennai strengthened its leadership in field epidemiology and data-driven public health research. Through IHCI, over 20 lakh patients were enrolled and 47 percent achieved blood-pressure control, earning both national and international recognition. The institute developed a real-time influenza dashboard, trained 38 district surveillance teams, and implemented One Health zoonotic spillover monitoring across three states. A non-inferiority trial validated single-dose Cervavac® HPV vaccine efficacy, while new digital platforms (AI-VRDLN, API data link with IDSP/ IHIP) enhanced laboratory integration and disease modelling. NIE also embedded a Quality Improvement model for hypertension and diabetes management within primary care systems. With award-winning research outputs and policy influence spanning NCDs, infectious diseases, and One Health surveillance, NIE continues to serve as India's central hub for translational epidemiology and capacity building.

Table 11: Key Scientific Contributions of ICMR-NIE, Chennai

Research Area/ Domain	Achievements	Significance/Status
Animal bites and Rabies death estimates	Led a nationwide survey (2022-23) that estimated 9.1 million animal bites and 5,726 annual human rabies deaths every year in India.	Provides first evidence base for 2030 rabies-elimination roadmap, aligning human-animal surveillance and mass dog-vaccination strategy
One Health Surveillance	Built real-time model for zoonotic spillover detection in slaughterhouses (Punjab, Assam, Telangana).	Strengthened cross-sectoral outbreak preparedness.
Integrated Influenza Surveillance	Developed ILI/SARI dashboard and trained personnel from 38 districts of Tamil Nadu.	Enhanced state-level early warning for respiratory viruses.
TN-KET	In the ongoing differentiated TB care initiative to reduce TB deaths in Tamil Nadu, in 2024, more than two-thirds of the district have documented TB death rate reduction by 20-30%.	Ongoing implementation of triage and prioritisation for severely ill patients in Tamil Nadu, with triage indicators now included in the 2025 national differentiated TB care guidance; TN-KET received special recognition for generating evidence within routine NTEP settings.
TN TB-DM initiative	Updated TB-DM box introduced in Tamil Nadu to not only capture DM status among TB patients but also to document glycaemic status and insulin use. TB-DM module added to TB SeWA to capture in electronically in routine program settings	Monitoring glycaemic status of TB-DM patients during TB treatment and prioritising insulin among those with cFBG>250 mg/dl is part of routine NTEP activity in Tamil Nadu
TB Control (End TB Project)	Demonstrated district-wide Active Case Finding with geo-tagged mapping and TPT completion among contacts.	Provided data to NTEP for targeted TB control.
Cervavac® HPV Trial	Evidence for single-dose efficacy of indigenous HPV vaccine vs. Gardasil®.	Supported national HPV immunisation policy.
Health System Innovation	Developed Quality Improvement (QI) model for primary care hypertension & diabetes management.	Scalable within NP-NCD programme.
Data Innovation	API-based data integration between ICMR and IDSP/IHIP; AI-driven recommender system for VRDLN.	Improved data flow and lab test efficiency nationwide.

3.6.10. National Institute for One Health (NIOH), Nagpur

NIOH Nagpur is in its inception and working towards strengthening India's One Health research, biosafety systems, outbreak preparedness, and multi-sectoral coordination under NOHM. NIOH produced data and technical inputs shaping zoonotic disease control and response strategies. A national survey estimated 9.1 million annual animal bites and 5,726 human rabies deaths, guiding policies on vaccination, post-exposure prophylaxis, and integrated surveillance. The institute co-developed the Integrated Community Engagement Program for One Health (ICEP-OH) guidelines and coordinated the V*ishanu*

Yudh Abhyas national pandemic preparedness drill in Ajmer (August 2024). The exercise, involving over a dozen central and state agencies, tested the readiness of the National Joint Outbreak Response Team (NJORT) for human–animal outbreak containment. Under NOHM, NIOH established a network of 22 BSL-3 laboratories and designed a biosafety and biosecurity assessment framework, validated at JIPMER Puducherry, AIIMS Jodhpur, RMRC Dibrugarh, and AIIMS Bhopal. Two nationwide training sessions for 42 officers enhanced technical capacity in biosafety and outbreak surveillance. The institute also managed ₿3.78 crores in sanctioned project funds (Feb 2025–Jan 2026), ensuring transparent governance aligned with GFR-2017 norms. In outbreak response, NIOH supported Nipah virus management in Kerala, deploying a mobile BSL-3 lab for rapid field testing. While all human samples tested negative, bat surveillance confirmed prior Nipah Virus exposure in Pteropus medius species. NIOH contributed to WHO's Measles Elimination Programme, the *Paramyxovirus* CORC consortium, and integrated laboratory networking efforts. With its new Project Monitoring Unit, oversight of 22 surveillance projects, and a proposed ₿96.09 crore infrastructure expansion including new BSL-3/4 facilities, NIOH Nagpur has emerged as India's central hub for One Health governance, advancing national preparedness for zoonotic and pandemic threats.

Table 12: Key Scientific Contributions of NIOH, Nagpur

Research Area/ Domain	Achievements	Significance/Status
National Surveys	Animal bites and rabies burden	Estimated 9.1 million annual bites and 5,726 human rabies deaths, data informed dog vaccination, PEP access, and surveillance strategies
Guidelines Development	ICEP-OH Framework	Contributed to WHO-supported ICEP-OH guidelines
Outbreak Preparedness	*Vishanu Yudh Abhyas* national mock drill (Ajmer, Aug 2024)	Simulated zoonotic outbreak to assess NJORT and multisectoral response; identified key gaps for improvement
Laboratory Network Strengthening	Establishment of 22 BSL-3 labs under NOHM	Developed biosafety & biosecurity evaluation framework (aligned with IHR, GHSA); validated at JIPMER, AIIMS Jodhpur, RMRC Dibrugarh, and AIIMS Bhopal
	Biosafety training	Two programmes in April 2024; 42 participants trained in biosafety, outbreak surveillance, and GLP with ICMR-NIV Pune support
Financial Management	Fund coordination under NOHM	Managed ₿3.78 crores (Feb 2025–Jan 2026); ensured GFR-2017 compliance, TSA management, and transparent governance
Outbreak Response	NiV outbreak, Kerala (July–Aug 2024)	Mobile BSL-3 lab deployed; 199 human samples tested (all negative); six of 52 Pteropus medius bats positive for anti-NiV IgG indicating past exposure
Collaborations & Networks	National and global coordination	Supported NOHM advisory groups, WHO's Measles Elimination Programme, and Paramyxovirus CORC consortium

Research Area/ Domain	Achievements	Significance/Status
Infrastructure Development	Project Monitoring Unit (PMU)	Oversaw 22 NOHM projects on surveillance at animal–human interfaces (slaughterhouses, wetlands, bird sanctuaries)
	Institute expansion proposal	Prepared ₹96.09 crore SFC proposal for 6-year development including BSL-3/4 labs, World Bank-linked pandemic preparedness integration, and 460+ staff positions
Overall Impact	National One Health Leadership	Strengthened India's preparedness for zoonotic disease outbreaks through integrated surveillance, biosafety governance, and multisectoral coordination

3.6.11 ICMR - Regional Medical Research Centre (RMRC), Gorakhpur

During 2024-2025, ICMR - RMRC Gorakhpur made major advances in diagnostics, vector control, and One Health surveillance. It developed two indigenously designed molecular diagnostic kits, a point-of-care test for chikungunya (Indian patent application 202411042360) and a CRISPR/Cas12a-based assay for detecting all dengue virus serotypes, both validated at TRL-4 and ready for commercialisation. The institute contributed to a nationwide survey on animal bites, estimating an annual incidence of 6.3 per 1,000 persons in Uttar Pradesh and about 5,700 human rabies deaths nationally, reinforcing the need for an integrated One Health approach and intensified rabies control.In vector control, RMRC Gorakhpur's studies in Uttar Pradesh revealed *Anopheles culicifacies* susceptibility to alphacypermethrin and *Phlebotomus argentipes* resistance to DDT but full susceptibility to alphacypermethrin and malathion, findings adopted by NVBDCP for refining elimination strategies for malaria and visceral leishmaniasis. The centre developed multiplex molecular point-of-care tests for scrub typhus and spotted fever detection in acute encephalitis cases and created CRISPR-based rapid diagnostics for dengue and chikungunya, strengthening outbreak readiness in resource-limited settings. Long-term follow-up of paediatric AES survivors identified rehabilitation and social participation needs, informing post-acute care frameworks. Additional research on gestational diabetes biomarkers and hepatitis B vaccine impact among tribal populations expanded its maternal and child health portfolio. Overall, RMRC Gorakhpur's multidisciplinary work combined technological innovation, surveillance data, and vector biology insights to strengthen India's infectious disease preparedness and control programs.

Table 13: Key Scientific Contributions of ICMR - RMRC, Gorakhpur

Research Area/Domain	Achievements	Significance/Status
Diagnostics Innovation	Pan-DENV molecular point-of-care assay	Detects all dengue serotypes in one reaction; combines isothermal RT-RPA amplification (≤20 min at 38–40°C) with CRISPR/Cas12a fluorescence detection; one-tube contamination-free format; validated at TRL-4
	Multiplex molecular tests for scrub typhus & spotted fever rickettsiae	Developed for rapid diagnosis of AES-related febrile illnesses in field conditions
	CRISPR/Cas-based isothermal assays for dengue & chikungunya	Enables rapid, field-level detection during outbreak scenarios
One Health & Zoonoses Surveillance	Nationwide animal-bite survey participation	Multistage cluster survey (60 districts, 15 states; 2022–2023) estimating dog-bite incidence and rabies mortality: 6.3 bites/1,000 persons and ~5,700 annual rabies deaths. Findings support stronger dog vaccination, full PEP coverage, and integrated One Health surveillance.
Vector Control Research	Malaria and VL control studies on *An. culicifacies* (Sonbhadra) and *Ph. argentipes* (Deoria & Kushinagar), with findings integrated into policy.	Implemented IRS (DDT until Dec 2023) and LLINs (alphacypermethrin) and conducted IR assessments: vectors remained susceptible to alphacypermethrin; fully susceptible to alphacypermethrin and malathion but resistant to DDT. Findings were integrated into NVBDCP to refine elimination strategies.
AES & Neurological Research	Disability outcomes among paediatric AES survivors	Findings informed recommendations for post-acute care and rehabilitation programs for children with neurological sequelae

3.6.12 ICMR - National Animal Resource Facility for Biomedical Research (NARFBR), Telangana

During 2024–2025, ICMR – NARFBR Telangana strengthened its role as a national hub for high-quality laboratory animal resources to support biomedical research, particularly in studies involving pathogens with pandemic potential. The facility procured and is maintaining 11 different transgenic animal models to enable evaluation of vaccines, pharmaceuticals, biological products, and other technologies recommended by ICMR. These transgenic models are critical resources for preclinical investigations into emerging and re-emerging infectious diseases. The centre also established lab-grown, specific-pathogen-free (SPF) quality large animal models for testing various medical devices developed under ICMR initiatives. These models provide an essential platform for ensuring the safety and efficacy of devices prior to clinical application. In addition, NARFBR is maintaining transgenic mice for the generation and supply of secondary induced Pluripotent Stem Cells (iPSCs) and their organoids. These resources are made available to other ICMR institutes and facilitate research aimed at developing alternatives to traditional animal models, thereby contributing to the refinement and reduction of animal use in biomedical research.

Table 14: Key Scientific Contributions of ICMR – NARFBR, Telangana

Research Area/ Domain	Achievements	Significance/Status
Transgenic & Animal Models	Maintained 11 transgenic models for testing vaccines, pharmaceuticals, and biologicals.	Enables preclinical validation for pandemic pathogens.
SPF Animal Production	Established lab-grown SPF-quality large-animal models for ICMR medical device testing.	Strengthens national biomedical research self-reliance.
iPSC & Organoid Research	Supplied secondary iPSCs and organoids to ICMR institutes for developing animal model alternatives.	Reduces animal usage; supports translational bioengineering.
Preclinical Evaluation	Conducted biocompatibility trials on IIT Delhi's orthopaedic screws (PLA–Ti6Al4V hybrid) in pig models; demonstrated rapid fracture healing and callus formation.	Validated indigenous implant technology for clinical use.
GLP Training	8 regulatory and GLP workshops held (May–Oct 2024) for 200+ participants; covered IND, device preclinical protocols, QA, and IT security.	Advanced India's regulatory compliance for biomedical testing.

3.6.13 ICMR – National Institute for Research in Tuberculosis (NIRT), Chennai

In 2024-25, ICMR - NIRT Chennai expanded its mandate from clinical research to technological and community innovation in tuberculosis control. It developed and validated rapid diagnostic platforms including a CRISPR-Cas13a assay, dual-target ddPCR, and a tNGS kit for drug resistance mapping. The release of the Indian Mutation Catalogue 2.0 provided a genomic foundation for precision medicine in TB. Artificial intelligence tools for chest X-ray screening and post-TB lung disease monitoring were tested for national scale-up. Modified BPaL trial generated evidence for optimising the Linezolid dose in BPaL regimen for drug resistant TB treatment. A Composite TB Research Facility with BSL-3 and Animal BSL-3 labs was inaugurated by the Hon'ble Prime Minister, strengthening India's preclinical vaccine and drug testing capabilities. Community initiatives like *Nikshay Mithra* enhanced nutrition support for patients, while policy-oriented Health Technology Assessments guided national programmes. Through AI-enabled tools, genomic innovation, and field translation, NIRT continues to anchor India's scientific fight against tuberculosis.

Table 15: Key Scientific Contributions of ICMR-NIRT, Chennai

Research Area/ Domain	Achievements	Significance/Status
Novel Diagnostic Tools	Developed CRISPR-Cas13a TB assay (limit 20 copies/µL, < 3 h turnaround) – internal validation completed.	Rapid, specific molecular TB test for resource-limited settings.
Treatment	Completed modified BPaL trial for drug resistant TB treatment	Structured dose reduction of Linezolid in BPaLregimen is safe and effective.
Molecular Surveillance	Released Indian Mutation Catalogue v2.0 covering 9,000 M. tuberculosis isolates for 15 drugs.	National database for drug-resistance tracking and treatment optimisation.
AI & Digital Tools	Evaluated AI Chest X-ray CAD and cough-based AI tool for post-TB lung disease prediction.	Point-of-care solutions to enhance diagnostic reach under NTEP.
Advanced Diagnostics	Developed dual target ddPCR for cfDNA TB detection and tNGS kit for drug resistance mapping (under validation).	Enables early detection and precision therapy.
Infrastructure Developed	Inaugurated Composite TB Research Facility (Tiruvallur) comprising BSL-3 lab, Animal BSL-3, Biorepository & Data Centre. A BSL-3 facility completed and awaiting external validation.	National hub for preclinical TB vaccine and drug evaluation.
Community Programmes	*Nikshay Mithra*: Nutrition support to 40 TB patients in Tiruvallur (award from District Administration, Sep 2024).	Strengthened TB patient care and community linkages.

3.6.14 ICMR - Rajendra Memorial Research Institute of Medical Sciences (RMRIMS), Patna

During 2024-25, ICMR - RMRIMS Patna consolidated its position as a national leader in translational leishmaniasis research, data-driven innovation, and international collaboration. The institute's hallmark achievement was the development of a short-term combination therapy of Liposomal Amphotericin B and allometric miltefosine dosing for Post–Kala-Azar Dermal Leishmaniasis (PKDL), now recognised in the draft WHO guideline (2025). This marks a critical transition from experimental therapy to global policy relevance. Complementary pharmacokinetic studies demonstrated prolonged skin drug retention, supporting dose optimisation. The institute also advanced drug repurposing research, identifying Luliconazole as an Amphotericin B–sensitising compound against Leishmania donovani, opening pathways for managing drug-resistant strains. Beyond therapeutics, RMRIMS expanded its digital and collaborative research capacity by establishing the first CDISC-compliant Case Report Form (CRF) for VL–HIV trials and creating an Individual Participant-Level Data (IPD) Platform with Oxford University's IDDO, significant steps toward international data harmonisation. As a key site for the Dengue Vaccine Trial (DengiAll) and the developer of machine learning models for disease outcome prediction, the institute demonstrated strong integration of biomedical research with digital analytics. Additionally, the institute's exploration of Ginkgo biloba Carbon Quantum Dots (CQDs) reflects emerging nanoscience potential in antimicrobial applications. Through these achievements, RMRIMS bridged bench science and public health, contributing to India's kala-azar elimination programme and global translational medicine frameworks.

Table 16: Key Scientific Contributions of ICMR - RMRIMS, Patna

Research Area/ Domain	Achievements	Significance/Status
PKDL Therapeutics	Short-term LAmB + miltefosine regimen	Included in WHO Draft Guideline (2025) for VL/PKDL treatment
Pharmacokinetic Research	Confirmed sustained skin drug concentration exceeding EC90 in 87% patients	Validated rationale for optimised dosing
Drug Repurposing	Luliconazole restored Amphotericin B susceptibility in L. donovani	Identified potential adjunct therapy for resistant VL
Data Infrastructure	Individual Participant-Level Data Platform (with Oxford University)	Enabled global collaboration and meta-analysis for VL/PKDL
Clinical Data Standards	Developed first annotated CDISC-compliant CRF for VL–HIV trials	Established international trial data compliance
Vaccine Research	Site for Dengue Vaccine DengiAll Phase III trial	Strengthened India's vaccine research ecosystem
AI Analytics	Machine learning models for disease prediction	Advanced data-driven clinical decision support
Nanotechnology	Ginkgo biloba Carbon Quantum Dots with antimicrobial potential	Introduced eco-friendly nanomaterial innovation
Public Health Capacity	Two Centres of Excellence for VL case management	Enhanced national kala-azar elimination capacity

3.6.15 ICMR - National Institute of Child Health and Development Research (NICHDR), New Delhi

During 2024-25, ICMR – NICHDR New Delhi conducted Covid-19 vaccine studies that produced significant leads related to immunity, and researchers have identified zonulin and endocan as biomarkers that may signal gut-related injury and support long-term COVID serological surveillance. Work on post-COVID MIS-C has also yielded important insights. Research on leishmaniasis has similarly generated noteworthy findings.

3.6.16 ICMR - National Institute for Implementation Research on Non-Communicable Diseases (NIIRNCD), Jodhpur

During the year 2024-25, ICMR-NIIRNCD Jodhpur has advanced research on tuberculosis and other lung diseases, compiling 3,396 annotated adult TB X-rays and 156 annotated paediatric TB X-rays, with analyses showing specificity and sensitivity above 90 per cent. The institute is also conducting dengue surveillance, analysing 1,210 samples, of which 9.9 per cent tested positive for NS1. DENV-2 and DENV-3 are currently the dominant serotypes, and viral isolation along with next-generation sequencing is ongoing.

3.6.17 ICMR – National Institute for Research in Environmental Health (NIREH), Bhopal

During the year 2024-25, ICMR-NIREH Bhopal has conducted research that identified future malaria hotspots in western Mizoram, driven by rising temperatures and increased humidity. Studies on arboviral vectors show that they develop fastest at 32°C, suggesting a higher risk of transmission in the future. A droplet digital PCR assay has been developed

for the detection and quantification of rotavirus and other enteric viruses in wastewater. A portable, low-cost and robust artificial mosquito blood feeder has also been created and named "*Rudhira Ahara Yantra (RAY)*." It can be used effectively in remote locations and in settings with limited resources.

3.6.18 ICMR - National Institute of Cancer Prevention and Research (NICPR), Noida

During the year 2024-25, ICMR-NICPR Noida has advanced its tuberculosis elimination efforts by screening 70,000 people. This work has identified 31 individuals with tuberculosis, and 28 of them are now receiving anti-tubercular treatment. Fifty contacts have begun tuberculosis preventive therapy. In addition, information, education and communication activities have reached 2,000 residents.

3.6.19 ICMR - National Institute of Immunohaematology (NIIH), Mumbai

During 2024-25, ICMR-NIIH Mumbai served as a recognised sentinel site for polio surveillance, specifically for detecting immunodeficiency-associated vaccine-derived poliovirus, as designated by the Government of India and the World Health Organisation. The institute has also made advances in hemoglobinopathy diagnostics, validating point-of-care lateral flow kits for sickle cell disease and adopting dried blood spots for field testing.

3.6.20 ICMR - National Institute for Research in Reproductive and Child Health (NIRRCH), Mumbai

During the year 2024-25, ICMR – NIRRCH Mumbai developed a less virulent strain of Candida albicans SC5314 by knocking out a novel target gene, including the alanine transaminase protein, and has filed a provisional patent (202411050602) in collaboration with ICMR. The institute has also conducted Nipah virus monitoring, with results published in the Journal of Medical Virology. For HIV research, a humanised hu-HSE mouse model was successfully used for the first time to evaluate HIV-1C infection. In addition, a novel intravenous formulation of Besifloxacin was developed and tested in a murine model of *Candida albicans* infection, demonstrating antifungal activity, and a patent application for this formulation has been filed. As part of NACO testing, over 20,000 HIV-1 viral load tests have been completed on the high-throughput COBAS 6800 platform.

3.6.21 ICMR -Regional Medical Research Centre (RMRC), Sri Vijaya Puram

During the year 2024-25, ICMR–RMRC Sri Vijayapuram serves as a WHO Collaborating Centre for the diagnosis, reference, research, and training in leptospirosis, measles, and rubella.

Chapter 4: Non-Communicable Diseases: Addressing the Growing Bruden

Recognising complexity of NCD causes and lifelong impact, ICMR's research in 2024 -25 focused on strengthening national capacity for prevention, early detection, and management of major NCDs, including cardiovascular diseases, cancers, diabetes, chronic respiratory illnesses, neurological disorders, and mental health conditions.

This chapter presents a comprehensive view of ICMR's work on NCDs, from laboratory-based studies to population-level interventions. The chapter captures the translation of research into actionable health policy, providing a roadmap for mitigating the country's NCD crisis.

4.1 Research Priorities

4.1.1. Improved Clinical and Public Health Care

The INDIA-EMS Project focuses on implementation research to develop a high-quality, patient-centric, integrated emergency-care model across five districts. The initiative includes designing operational workflows, integrating the 108-emergency services app, training medical officers, ASHAs, and police personnel, creating information, education and communication material, and implementing the "One Responder One Village" (OROV) programme.

4.1.2. Cardiovascular Diseases

a. **Programme Support – CARE (Heart Failure):** The National Heart Failure Database has been compiled from 43 studies encompassing 75,000 participants. An India-specific quality-of-life questionnaire has been validated. The PACT-HF trial, which combines structured physical activity with behavioural therapy, has been completed. A Heart Failure Biobank has been established with 4,294 participants, creating 13,648 aliquots. Additionally, a prototype lateral-flow NT- proBNP diagnostic device has been developed and is undergoing validation.

b. **Indian Hypertension Control Initiative:** The initiative has expanded to 154 districts, enrolling approximately 5.1 million patients across more than 22,000 facilities, including around 16,000 Health and Wellness Centres. Blood pressure control has been achieved in 47% of registered patients. A private-sector pilot in Ludhiana screened 22,790 industrial workers, identifying 7,452 hypertensives, while a hub-and-spoke model was created for ESI hospitals.

c. **ICMR ST-Elevation Myocardial Infarction Acute Coronary Thrombosis (STEMI-ACT)**: A hub-and-spoke tele-ECG model has been implemented in nine districts, achieving a door-to-ECG time of under ten minutes and a door-to-needle time of 17–21 minutes, with thrombolysis rates ranging from 70–90%. Reteplase has been introduced under the Rajasthan government health scheme.

d. **Heart Failure Registry (Trivandrum HF Cohort):** The registry enrolled 1,205 patients with

a 10-year follow-up retaining 88% of participants. Findings revealed 82.7% mortality, with 95% of deaths due to cardiovascular causes, and only 25% receiving guideline-mediated therapy at discharge, providing critical evidence for policy action to improve heart failure care quality.

e. **Congenital and Rheumatic Heart Disease Initiatives:** Neurodevelopmental outcomes of 1,639 infants post-CHD surgery were tracked, showing over 90% six-month survival and a reduction in motor delay from 25% to 8% by the third follow-up. A randomised RHD trial comparing digoxin with placebo enrolled 1,769 patients. The BESEACH study recruited 1,042 children for paediatric cardiac sepsis profiling.

f. **Genetic Cardiology (Channelopathies):** Cohorts established in North and South India (815 samples) identified multiple novel variants in LQTS, BrS, and CPVT, including 38 pathogenic, 14 likely pathogenic, and 25 variants of uncertain significance.

g. **Stroke Care Pathways (Assam Model):** A mobile stroke unit integrated with the 108-ambulance system reduced door-to-CT times to 8–10 minutes, achieving 100% thrombolysis within the unit and improving functional outcomes (mRS ≤2 in 57.9% of patients compared to 7.1%).

h. **Indian Stroke Clinical Trial Network Phase II:** The network has expanded to 58 centres with three ongoing clinical trials (INTRINSIC, MOBILITY, STENOSIS). The INTRINSIC trial enrolled 2,231 patients, while the MOBILITY app has been developed in 11 languages, and 493 patients were randomised in the STENOSIS trial.

i. **Cardiovascular Disease Risk Assessment and Prevention in Adult Indians:** A ten-year risk assessment among adults aged 40–69 using NNMS data identified key modifiable and metabolic risk factors, providing evidence for targeted prevention and policy planning.

j. **PURI-HF Trial:** The effectiveness of indoor air purifiers on heart failure outcomes was evaluated, including moderation analyses for ambient air pollution and environmental factors.

4.1.3. Diabetes

a. **ICMR Young Diabetes Registry Phase III:** Data from the cohort showed 65.8% Type 1 diabetes, 24.1% Type 2 diabetes, 5% gestational diabetes, and the remainder other types. Complications included retinopathy (34%), neuropathy (28%), and nephropathy (16%). Hypoglycaemia and DKA were the leading causes of hospitalisation.

b. **CARE Young Diabetes:** A structured paediatric-to-adult transition intervention improved adherence and clinical outcomes in Type 1 Diabetes patients. Lifestyle interventions for postpartum women with GDM were shown to improve glycaemic control and weight (CARE-FIG trial).

c. **ICMR-INDiaBetes (INDIAB) Study:** This pan-India study quantified the burden of diabetes, pre-diabetes, and metabolic NCDs, generating state-wise and region-wise prevalence data. Dietary diversity explained differences in diabetes prevalence, and the Indian Diabetes Risk Score (IDRS) was validated for cost-effective screening. National data on obesity, physical activity, kidney function, and gestational diabetes were also established.

4.1.4. Cancer Studies

a. **National Cancer Registry Programme:** For 2024, the first comprehensive national estimates of cancer incidence, mortality, and prevalence have been generated, informing national cancer surveillance, resource allocation, and policy formulation. Subnational burden of cervical cancer was quantified in terms of YLL, YLD, and DALYs. Several states are strengthening cancer control initiatives, with Himachal Pradesh declaring cancer a notifiable disease.

b. **Survival Studies in Cancer:** Five-year survival of 17,331 female breast cancer patients across 11 Indian PBCRs revealed geographic disparities and stage-specific outcomes, highlighting the need for early detection programmes, equitable access, and region-specific interventions.

c. **CARE – Acute Myeloid Leukaemia:** Protocols have been established for characterising leukemic stem cells at the single-cell level and for personalised, protocol-based treatment guided by molecular aberrations and therapy monitoring.

d. **Comparative Analysis of Genetic, Clinical, and Epidemiological Factors in Breast Cancer:** Risk factors such as pesticide exposure, benign breast diseases, family history, age at menopause, and physical activity were highlighted. Frequently mutated genes included TP53, MUC16, SYNE1, OBSCN, CSMD1, DST, and PIK3CA.

e. **Oral Potentially Malignant Lesion Atlas Project:** Point-of-care diagnostics for oral potentially malignant disorders were evaluated, and a multi-dimensional prognostic nomogram combining clinical, imaging, and multi-omics data was developed.

f. **Genomics and Transcriptomic Profiling of Triple Negative Breast Cancer:** Targetable mutations in residual disease were identified, and differential mRNA expression profiles before and after neoadjuvant chemotherapy were characterised.

g. **Epstein-Barr Virus in Aggressive Mature B-Cell Non-Hodgkin Lymphoma:** Standardised detection methods were established, clarifying the genetic basis of its impact on disease biology and survival.

h. **Paired Targeted Genomic Profiling of Triple Negative Breast Cancer:** A curated mutational profile of HBOC patients, along with clinical and outcome data, was shared. Lymphoblastic cell lines were developed for patients with pathogenic mutations, and genetics services were integrated into routine clinical care.

i. **Genomics of Gall Bladder Carcinoma in Indian Patients**: Pathogenic or likely pathogenic variants relevant for treatment were identified. Multicentric studies assessed prevalence and risk factors for incidental and premalignant gall bladder conditions, informing early detection and care strategies.

j. **Women Empowerment – Cancer Awareness Nexus (WE-CAN):** HPV self-sampling and education programmes promoted cervical cancer literacy, reduced stigma, and increased screening uptake.

k. **Screening and Early Diagnosis:** Barriers and facilitators for screening, diagnosis, and treatment initiation for oral, breast, and cervical cancer were assessed under NP-NCD programmes in selected districts.

l. **FloNamiR: Nano-Hybrid Array for Lung Cancer Detection:** A fluorescent polystyrene-based nano-hybrid array was developed to detect lung cancer-associated circulating cell-free microRNAs. The findings were patented.

4.1.5. Climate Change

a. **Climate Change and Health Preparedness:** An India-specific toolkit was developed to assess public sector health facilities' preparedness for climate-related health impacts. Field testing was conducted in three states to document preparedness and optimise the tool.

b. **Climate Change and Ocular Health:** Studies evaluated the impact of UV exposure and environmental factors on ocular diseases, including cataract, dry eye, pterygium, and vernal keratoconjunctivitis, providing evidence for policy interventions and resource allocation to support universal eye health.

4.1.6. Dementia Prevention

A community cohort of 2,325 elderly participants (≥55 years) has been established across four MRHRUs. Multimodal care bundle booklets and videos have been validated, and Phase 2 (CHETNA trial) is testing efficacy.

4.1.7. CARE ALS

Research has demonstrated that the CHIT-1 enzyme in cerebrospinal fluid and serum is a strong early-stage biomarker for ALS, with a 99% positive predictive value. PET-MRI studies and cortical organoid models have been developed to better understand microglial activation and neuro-inflammation mechanisms.

4.1.8. Brain Bank Network India Initiative

Satellite brain banks have been established at AIIMS Bhubaneswar (187 samples) and PGIMER Chandigarh (28 fetal and 30 adult samples), linked to the NIMHANS central repository, which houses over 269 brain samples.

4.1.9. High-Risk Autopsy Suite and National Biorepository

A BSL-3/4 autopsy suite has been established, collecting over 21,000 biospecimens from neurovirology cases, enhancing preparedness for Group 3 - 4 pathogens.

4.1.10. MS and Allied Demyelinating Disorders Registry

A 24-centre network that includes 3,840 patients (MS 51%, NMOSD 16.7%, MOGAD 13.5%). Cohorts have been established for paediatric and pregnant populations, with 4,000 MRI scans collected for AI-based diagnostic tools.

4.1.11. Neurocognitive Testing Protocol Development

A skill-based test battery for low-literacy populations has been developed and validated across NIMHANS, Hyderabad, and Kolkata.

4.1.12. CARE Virtual Autopsy

Virtual autopsy using postmortem CT (PMCT) was compared with traditional autopsy in cases of trauma and morphometric studies. PMCT proved more accurate, and training, SOPs, and dissemination were carried out nationwide, including in the Northeast.

4.1.13. CARE Clinical Pharmacology

A paediatric formulation of 6-Mercaptopurine for acute lymphoblastic leukaemia has been developed, providing flexible dosing, improved compliance, and safety. An oral liquid isotretinoin formulation for paediatric cancer has been completed, and a model for personalised doxorubicin dosing was developed to minimise toxicity in geriatric patients.

Two patents have been generated and two drugs commercialised.

4.1.14. SARS-CoV-2 and NCD Interaction Studies

Comparative studies assessed COVID-19 seroprevalence and clinical outcomes among people with and without diabetes and/or hypertension, highlighting increased metabolic dysregulation, systemic inflammation, and post-recovery symptoms in affected populations.

4.1.15. Sudden Unexplained Death in Young Adults

Prospective studies, including virtual autopsy via CT scans, have been implemented to determine causes of death in individuals aged 18–45 when traditional autopsy is not possible.

4.2 ICMR Institutes: Initiatives of National Importance in the Area of Non-Communicable Diseases

4.2.1 ICMR - National Institute for Research in Environmental Health (NIREH), Bhopal

In FY 2024-25, ICMR - NIREH Bhopal made major strides in environmental and public health research. The institute standardised genomic and metabolomic protocols to study air pollution's impact on ageing and osteoarthritis, establishing an advanced bioanalytical pipeline. Through the WASH Round 6 project, it assessed school-level water quality and menstrual hygiene practices, developing a digital dashboard in partnership with ICMR - NIE Chennai. Cohort studies in Bhopal linked built environment features to childhood respiratory and diarrhoeal illnesses, while waste segregation research identified behavioural barriers to urban sanitation. A breakthrough in viral surveillance was achieved through a droplet digital PCR assay for detecting enteric viruses in wastewater. By integrating field epidemiology, molecular diagnostics, and data visualisation, NIREH strengthened its position as India's leading centre for environmental health research and policy-oriented evidence generation.

Table 17: Key Scientific Contributions of ICMR - NIREH, Bhopal

Research Area/ Domain	Major Achievements / Outputs	Significance/Status
Environmental Health & Ageing Biology	Established protocols for genomic DNA, metagenomic DNA, and metabolomic profiling (amino acids, sphingolipids, fatty acids) to study air pollution–linked osteoarthritis and ageing.	Analytical pipelines standardised for ongoing cohort studies
	Study identifying that expression of microRNA-195-5p is observed in pulmonary epithelial cells exposed to arsenic.	Possibility of developing this microRNA as a predictive biomarker for arsenic exposed individuals
	Study identifying that expression of microRNA-221-3p is observed in pulmonary epithelial cells exposed to manganese.	Possibility of developing this microRNA as a predictive biomarker for manganese exposed individuals
Water, Sanitation & Hygiene (WASH)	Completed WASH Round 6 in 30 schools in Sehore District; tested fluoride, pH, chloride, *E. coli*, alkalinity, TDS, and nitrate; and developed an interactive visualisation dashboard with ICMR–NIE Chennai.	Report submitted to district administration; manuscript on menstrual hygiene under review
Diagnostics	Fluorescent polystyrene-based nanohybrid arrays for acellular circulating miR detection, using oligo-nano polystyrene composites and fLNA.	Generates a measurable signal for early diagnosis and prognosis of critical illnesses such as cancer (International Patent Granted)
Novel Findings	Deep learning enabled nanophotonic assay using poly-L-lysine–tethered carbon quantum dots to assess CVD risk.	The assay detected ccf-NA, ccf-mtDNA, NT-proBNP, and exosomes with high selectivity, sensitivity, and real-time quantification capability
	CVD risk assessment via circulating microbiome sensing using perovskite quantum dots and deep learning–guided bacterial species selection.	CVD risk assessed by sensing the circulating microbiome using perovskite quantum dots and deep-learning–driven bacterial species selection.

4.2.2 ICMR - National Institute of Cancer Prevention and Research (NICPR), Noida

During FY 2024-25, ICMR – NICPR Noida advanced India's cervical cancer prevention and tobacco-control agenda through translational innovation and policy impact. Three indigenous HPV diagnostic technologies and an Indo-US anti-HPV therapeutic trial mark major benchmarks in women's health. NICPR's tobacco research directly prompted DGHS action against tobacco advertising in sports broadcasts, reflecting evidence-to-policy translation. The environmental burden study on tobacco waste (170,330 tonnes annually) influenced national discussions on plastic waste and EPR regulations. Gallbladder cancer genomics and phyto-molecule studies broadened India's oncogenomic and drug discovery landscape. Overall, NICPR exemplified ICMR's bench-to-policy mission through patentable diagnostics, cross-sectoral collaborations, and research with direct societal benefit.

Table 18: Key Scientific Contributions of ICMR - NICPR, Noida

Research Area/ Domain	Major Achievements / Outputs	Significance/Status
Genomics of Cancer	Demonstrated novel mutations and genetic alterations in Indian gallbladder cancer patients (first-time evidence).	Enables population-specific diagnostics, prognosis, and development of targeted therapies.
Host Genetics & Reproductive Infections	Identified higher prevalence of CT, HPV, and *Candida* in symptomatic women; detected TLR SNP distributions; linked SNPs to c-Rel, RelA, NFKB1; elevated TNF-β and IL-6.	Provides insights into genetic susceptibility and immune mechanisms in RTIs; supports precision diagnostics and risk stratification.
AI in Drug Discovery (Cancer)	Machine learning-based application to predict inhibitory potential of phyto-molecules against lung and breast cancer.	Accelerates cancer drug discovery using natural products and AI.
Molecular Therapeutics (Cancer & Antiviral)	*Thuja occidentalis* induced apoptosis in cervical cancer cell lines, inhibited tumorigenicity, minimal toxicity, altered proteome, induced telomere-mediated senescence.	Demonstrates anticancer and antiviral potential with favorable safety profile.
Traditional Medicine-Based Oncology	Developed a resource to identify combinatorial effects of phyto-molecules in anticancer therapy.	Facilitates evidence-based integrative oncology and traditional drug discovery.
Maternal Health & Tobacco Control	Pilot study demonstrated feasibility of integrating tobacco screening and cessation in antenatal clinics.	Scalable model for national public health programs in maternal care.
Digital Health – Tobacco Cessation	Developed mobile and web-based system for tobacco screening, risk assessment, management, and follow-up.	Scalable and integrable into national tobacco control programs; open-access for government use.

4.2.3 ICMR - Regional Medical Research Centre (RMRC), Dibrugarh

In FY 2024 - 25, ICMR - RMRC Dibrugarh advanced its role as a regional hub for infectious and non-communicable disease research. Follow-up has been completed for 74,457 of the 1,06,769 individuals enrolled in the Health and Demographic Surveillance System. The crude birth rate stands at 14.2 per 1,000 population, and the crude death rate is 7.4 per 1,000 population. Hypertension prevalence is 22.4 per cent. A machine-learning model developed for predicting hypertension has been published in the Indian Journal of Medical Research, and the longitudinal dataset is now fully operational, supporting chronic-disease risk modelling. Community-based non-communicable disease interventions include the establishment of a self-help-group-based model for blood pressure monitoring using a mobile decision-support application. The work has demonstrated the feasibility of task-shifting for hypertension control at the primary-care level and is currently being scaled up with the Assam Health Department. A cancer screening implementation project has been initiated to improve early detection of oral, breast, and cervical cancers across Assam, in collaboration with Assam Medical College and Hospital and the State NCD Cell under the National Health Mission.The programme

is also engaged with more than forty partners, including AIIMS Guwahati, IIT Bombay, JNU, NESAC, Tripura NHM, the German Epidemics Preparedness initiative (SEEG), and Harvard University. These collaborations support ongoing studies on malaria genomics, non-communicable disease risk, and One Health.

Table 19: Key Scientific Contributions of ICMR - RMRC, Dibrugarh)

Research Area/ Domain	Major Achievements / Outputs	Significance/Status
Health & Demographic Surveillance (HDSS)	Completed follow-up for 74,457 of 1,06,769 individuals; CBR 14.2 and CDR 7.4 per 1,000; hypertension prevalence 22.4%; and an ML-based hypertension prediction model published in IJMR.	Longitudinal dataset operational; outputs guiding chronic-disease risk modelling
Community-based NCD Interventions	Established an SHG-based BP monitoring model using a mobile decision-support app, demonstrating the feasibility of task-shifting for hypertension control at the primary-care level.	Under scale-up with Assam Health Dept
Cancer Screening Implementation Research	Initiated implementation project for screening and early diagnosis of oral, breast, and cervical cancers across Assam.	Collaboration with AMCH & State NCD Cell under NHM Assam
Collaborations	Engaged with >40 partners including AIIMS Guwahati, IIT Bombay, JNU, NESAC, Tripura NHM, German Epidemics Preparedness (SEEG), and Harvard University (USA).	Ongoing joint studies on malaria genomics, NCD risk, and One Health

4.2.4 ICMR - National Institute of Immunohematology (NIIH), Mumbai

In FY 2024-25, ICMR - NIIH achieved major translational breakthroughs in diagnostics, genomics, and clinical haematology. The institute identified 62 novel mutations linked to haematological and immunological disorders, expanding India's rare-disease mutation database. Two indigenous diagnostic innovations, a G6PD point-of-care test and a multiplex PCR assay for blood group antigens were licensed to Mylab Discovery Pvt. Ltd., marking successful academia-industry translation. The Rare Donor Registry and mapping of human neutrophil antigens provided critical infrastructure for national transfusion safety. Clinically, the low-dose Emicizumab therapy study for haemophilia demonstrated comparable efficacy to standard treatment, leading to national adoption and a DHR-supported trial for global policy impact. Through advanced genomics and AI-driven analytics, NIIH strengthened its leadership in precision haematology, immunology, and rare-disease diagnostics.

Table 20: Key Scientific Contributions of ICMR - NIIH, Mumbai

Research Area/ Domain	Major Achievements / Outputs	Significance/Status
Genetic Discoveries	Identified 62 novel mutations: Bone marrow failure (13), RBC channelopathies (2), Methemoglobinemia (1), Haemophilia A (26), Haemophilia B (5), Von Willebrand disease (1), Inborn Errors of Immunity (15).	Expanding India's mutation database for rare blood and immune disorders
Diagnostics & Health Technologies	Flow cytometry–based technique developed	Anti-neutrophil antibody detection.
Rare Donor & Disease Registries	Rare Donor registry created with >6000 donors across India	Valuable resource for chronically transfused and rare phenotype patients S
Clinical & Translational Research	A retrospective study showed that low-dose Emicizumab delivers markedly superior outcomes to low-dose FVIII prophylaxis, matching standard-dose effectiveness with zero bleeds and full target-joint resolution.	Nationwide clinical uptake and prompting a DHR-funded randomised trial now underway.
Computational Biology & AI	Developed machine learning model for predicting disease severity in Common Variable Immunodeficiency (CVID) using transcriptomic profiling.	Model validated and published as preprint (Oct 2024)
Programme Support	Selected by CDSCO as national validation centre for Sickle Cell Disease diagnostic kits in collaboration with CRMCH, Chandrapur.	Validation completed; approved for field implementation

4.2.5 ICMR - National Institute of Occupational Health (NIOH), Ahmedabad

In FY 2024 -25, ICMR - NIOH advanced India's occupational and environmental health agenda through impactful translational research. Its studies on silica exposure and tuberculosis directly informed national policy, leading to the inclusion of Silica exposure as a key variable in the Nikshay TB surveillance system. A landmark Lancet feature highlighted NIOH's work on silicotuberculosis. The institute quantified India's climate-linked cardiovascular disease burden, projecting a significant rise by 2030, thereby strengthening climate-health evidence. NIOH provided diagnostic and rehabilitation services to hundreds of workers with silicosis and musculoskeletal disorders and delivered national capacity-building programs for over a thousand participants. NIOH successfully hosted Indo-US conference on climate change impacts of occupational and environmental health with key deliberations focused on health impacts of climate change, risk assessment, adaptation frameworks, and policy innovations to strengthen health system resilience. A major outcome of the conference was the collective emphasis on developing early warning systems, enhancing health system preparedness for emerging climate-sensitive diseases, and advancing community- and policy-level mitigation strategies. With 51 peer-reviewed publications, licensed tools, and policy translations, NIOH reaffirmed its role as India's apex institute for occupational health research and evidence-based worker protection.

Table 21: Key Scientific Contributions of ICMR–NIOH, Ahmedabad

Research Area/Domain	Major Achievements / Outputs	Significance/Status
Occupational Lung Disease & Programme Support	Based on NIOH research, Silica exposure was added as a variable under key population/risk factors on the *Nikshay* portal for TB surveillance.	Policy integration into NTEP; nationwide adoption
Silicotuberculosis & Policy Translation	The Lancet featured NIOH's research on silicosis and silicotuberculosis (March 2025).	Recognition of NIOH's work as global reference on occupational lung disease
Tuberculosis & Silica Exposure	Study on Latent TB infection among silica-exposed workers proposed inclusion of systematic testing and TB preventive treatment (TPT) in NTEP guidelines.	Policy recommendation under review; publication in Scientific Reports (2024)
Climate Change & Cardiovascular Health	Multistate analysis estimated ₹ ß3–75 billion annual CVD burden (2021) from temperature–humidity stress, projected to rise to ß2–108 billion by 2030.	Quantitative evidence for India's climate-health policy framework
Clinical & Diagnostic Services	Performed 308 PFTs for silicosis patients; provided community rehabilitation for 97 patients; and delivered physiotherapy to 110 healthcare workers with musculoskeletal disorders.	Enhanced occupational health service delivery
Training & Capacity Building	12 training/workshop programs held; >1,100 participants, including researchers, doctors, and industrial workers.	Continuous workforce upskilling in occupational safety
Low-cost intervention for musculoskeletal disorders: clinical trial	12-week intervention among intensive healthcare worker resulted in 0.51 kg (95% CI: 0.20–0.82; p=0.002) gain in fat free mass, reduction in frequency and intensity of pain and improved strength.	The workplace intervention programs are shared among intensive healthcare workers for prevention and treatment of musculoskeletal disorders.
Occupational safety and health for informal workers including artisans	Demonstrated ergonomic, pulmonary dysfunction, musculoskeletal and heat related stress among the artisans, informal workers employed in industries such as ceramic processing, construction, farming, recyclers	Shared workplace safety policies and SOPs with key divisionsincluding the Office of the Development Commissioner (Handicrafts) and the Ministry of Textiles & engaged multiple stakeholders & NGOs to strengthen occupational safety & health for women in the informal sector.
Health risk assessment of community residents, adjacent to industrial corridors	Demonstrated potential NCD's due to rapid industrialisation	Presented recommendations such as periodic screening and environmental monitoring to state pollution control board.

4.2.6 ICMR - National Institute for Implementation Research on Non-Communicable Diseases (NIIRCD), Jodhpur

In FY 2024-25, ICMR - NIIRNCD Jodhpur demonstrated strong leadership in implementation research addressing India's growing NCD burden. Its mixed-method community study identified key behavioural and environmental risk factors driving chronic diseases in rural Rajasthan, providing actionable insights for NP-NCD and Ayushman Bharat programmes. The institute advanced digital health integration through the DIGI-CARE initiative with IIT Jodhpur, leveraging mHealth tools for hypertension and diabetes management. PRABHA, a new intervention for high-risk pregnancies, was developed to improve maternal care outcomes. Parallelly, field implementation under the National Sickle Cell Elimination Mission began in tribal areas. Air-quality mapping in Jodhpur contributed valuable environmental health evidence. With 37 publications and major training initiatives, NIIRNCD continues to bridge the gap between research and public health delivery, ensuring that evidence translates into scalable action.

Table 22: Key Scientific Contributions of ICMR - NIIRNCD, Jodhpur

Research Area/ Domain	Major Achievements / Outputs	Significance/Status
Non-Communicable Diseases (NCDs)	Community-based mixed-methods study on screening and management of hypertension, diabetes, COPD, CKD, cancer, and mental disorders in rural Rajasthan showed high smoking rates, obesity, and low physical activity, with PHQ-2 ≥ 3 strongly associated with higher NCD risk	Data informing NP-NCD and *Ayushman Bharat* health promotion modules
Maternal & Reproductive Health	IR on high-risk pregnancy identification in rural Rajasthan revealed low awareness, poor infrastructure, and weak referral pathways, leading to development of the *PRABHA* intervention to strengthen ANC and postnatal care.	Adopted for piloting under NHM Rajasthan
Digital Health & mHealth	SMS- and app-based diabetes intervention improved HbA1c, BP, BMI, and lifestyle adherence; DIGI-CARE launched with IIT Jodhpur to integrate digital tools for diabetes and hypertension management in public health systems.	Demonstrated scalable mHealth and AI-based NCD management model
Genetic Diseases (Sickle Cell Anaemia)	Implementation research initiated under National SCA Elimination Mission in Sirohi district; piloted tools and baseline surveys in tribal locks.	Supports National Mission rollout; inter-ICMR collaboration with NIIH & NIRTH
Air Pollution & Urban Health	Under JUMP project with IIT Jodhpur, indoor-outdoor air quality mapping showed spatial variations in particulate pollution across city zones.	Provided micro-level exposure data for urban health risk modelling
Capacity Building	Conducted 2 major workshops, including statistics simplified for 419 researchers and a mental health training module for 25 frontline workers.	Strengthened implementation research skills nationally

4.2.7 ICMR – National Institute of Traditional Medicine (NITM), Belagav

In FY 2024-25, ICMR - NITM Belagavi strengthened the scientific foundation of traditional and integrative medicine by initiating various clinical trials for leads developed from the institute as well as interventions provided by Ayush. A randomised controlled trial combining Drakshavaleha with oral iron supplements is being conducted among reproductive age women with iron deficiency anaemia. ICMR - NITM completed AYUSH–GMH trial, in collaboration with CCRAS, New Delhi for managing non-alcoholic fatty liver disease using integrative approaches. Formulations developed from traditional leads by NITM for osteoarthritis and diabetic foot ulcer have been undertaken for multicentric randomised controlled clinical trials. An Ayush formulation as add-on for sustained weight loss is also being evaluated under multicentric double-blind, randomised controlled clinical trial. These initiatives position NITM as a leader in integrative medicine and in regional public health research bridging traditional knowledge with modern science.

Table 23: Key Scientific Contributions of NITM, Belagavi

Research Area/ Domain	Major Achievements / Outputs	Significance/Status
Clinical & Integrative Medicine	Conducting RCTs on Integrative Therapy *Drakshavaleha* + IFA for iron-deficiency anaemia. Plumbago zeylanica gel for osteoarthritis *Mammeasuriga* ointment for diabetic foot ulcer Triphala for sustained weight loss	Collaboration with KAHER's BMK Ayurveda *Mahavidyalaya,* ICMR-NITM clinical trial network
Non-Communicable Diseases (NCDs)	Completed AYUSH–GMH trial on NAFLD & data analysis in progress	Protocol published in Journal of Research in Ayurvedic Sciences (2025)
Collaborations	CCRAS, KAHER Belagavi, PM-ABHIM Network Sites, ICMR-NITM clinical trial network.	Ongoing national coordination and multi-institute research linkages

4.2.8 ICMR - National Centre for Disease Informatics and Research (NCDIR), Bengaluru

ICMR - NCDIR Bengaluru strengthened India's national evidence ecosystem for non-communicable diseases through enhanced surveillance, digital innovation, and direct policy impact. Cancer and stroke registries expanded their coverage and data quality, with over 37 population-based cancer registries and 83 hospital-based stroke units contributing intelligence for planning and resource allocation. Findings continue to highlight late-stage cancer detection, reinforcing the need for early diagnosis initiatives. The Institute advanced national mortality data quality by improving Medical Certification of Cause of Death (MCCD) in multiple states, implementing an e-audit platform to reduce reporting errors and accelerate completeness. NCDIR's projects were featured in the MoSPI National Compendium of Registries and informed multiple high-level reports by WHO, World Economic Forum, World Bank, and the United Nations. NCRP and stroke registry outputs continue to support Global Burden of Disease estimations. Digital public health technologies including e-cancer and e-stroke notification software are now in active use. The institute delivered 37 trainings benefiting over 1,380 public health professionals nationwide, strengthening frontline capacity for surveillance, cancer care, and NCD control.

Table 24: Key Scientific Contributions of ICMR - NCDIR

Research Area/ Domain	Major Achievements / Outputs	Significance/Status
Cancer Surveillance	37 PBCRs + long-term survival studies	Directly informs cancer screening & treatment guidelines
	Advanced understanding of late-stage detection (>70% breast cancer locally advanced)	Enables resource allocation at state/ subnational level
	Multiple high-impact publications	
Stroke Surveillance	PBSR in 5 geographic regions	Nationally trusted stroke incidence dataset
	HBCR-type stroke reporting in 83 hospitals	Strong foundation for stroke care systems + LMIC leadership
	Standardised digital reporting	
Mortality Data Quality (MCCD)	e-Audit tool to improve cause-of-death data	Elevates CRS data integrity
	Training & quality assurance in multiple states	Improves policy accuracy for health spending & disease priorities
Digital Public Health Technology	e-Cancer notification system deployed	Scalable digital backbone for future-ready disease registries
	e-Stroke notification deployedICD-10 β ICD-11 conversion prototype	Real-time public health intelligence

4.2.9 ICMR - National Institute of Epidemiology (NIE), Chennai

In 2024-25, ICMR - NIE Chennai implemented a quality improvement model for NP-NCD service delivery in primary care, and developed training modules for medical officers, nurses and community health officers. The institute is evaluating a low-carbohydrate DASH-based diet for improving glycaemic control in patients with type 2 diabetes as part of the Low Carb Diet trial. It has assessed the rehabilitation of homeless people with mental illness through Emergency Care and Recovery Centres, and the findings have informed policy decisions in Tamil Nadu.

The state trauma registry under the Tamil Nadu Accident and Emergency Care Initiative (TAEI) programme has been evaluated through a mixed-methods assessment of its portal. A tool has been developed to assess health-system preparedness under the National Action Plan on Climate Change and Human Health. The institute has also built and deployed a machine-learning web tool that predicts mortality and surgical needs in coronary stent infections, supporting personalised risk assessment and strengthening clinical decision-making.

Reports have been generated on the cost-effectiveness of infertility diagnosis and treatment, the use of Vedolizumab for managing inflammatory bowel disease, and the initiation of sodium-glucose cotransporter inhibitors in patients with heart failure.

4.2.10 ICMR - National Institute of Research in Tribal Health (NIRTH) Jabalpur

In 2024-25, ICMR - NIRTH Jabalpur conducted implementation research to strengthen and optimise comprehensive sickle cell anaemia care services under the national Sickle Cell Anaemia Mission 2047. The institute also developed a machine-learning decision-support system designed to enable early prediction of complications in sickle cell disease.

4.2.11 ICMR - National Animal Resource Facility for Biomedical Research (NARFBR), Hyderabad

In 2024-25 ICMR - NARFBR Hyderabad initiated in-vitro gene editing of a candidate gene to develop a Parkinson's disease mouse model for neurodegenerative research. A porcine model study examining the effects of nicotine and stress on the development of atherosclerosis is currently under way as part of its cardiovascular research portfolio. For bone-health research, a goat model is being established to support studies on human osteoporosis. In the area of autoimmune disease, the institute is developing a haematopoietic stem-cell gene-editing model for Sjögren's syndrome.

4.2.12 ICMR - National Institute for Research in Digital Health and Data Science (NIRDHDS), New Delhi

In 2024-25 ICMR - NIRDHDS New Delhi managed the national hospital-based registry for venous thromboembolism (iRegVed), which has enrolled 2,052 patients and uses a real-time web portal for data capture. The institute has examined how the prevalence of overweight and obesity among women and men has shifted between 2005-06 and 2019-21, with the analysis stratified by wealth and educational status.

Its work on socioeconomic equity has explored healthcare utilisation patterns across economic quintiles and diverse geographic contexts, offering a detailed picture of disparities in access and resource distribution. The MycoNet invasive fungal infection registry is operational across eight AMDRCs and has recorded 1,667 ICU cases, with mortality analysis showing rates above 50 per cent.

Moving forward, emphasis will remain on scaling proven models (e.g., hypertension control, MSU stroke care), expanding genomic and biomarker research, and leveraging AI-driven tools for precision public health. These efforts are pivotal for achieving SDG 3.4 targets and ensuring India's readiness to manage the dual challenge of preventing NCD onset and optimising long-term management for affected populations.

Chapter : 5 Reproduction, Maternal, Child Health and Nutrition: Building Healthy Generations

The Reproductive, Child Health and Nutrition (RCN) Division at ICMR Headquarters functions as a bridge between scientific research and national health programmes, focusing on policy translation and high-level programme support. In FY 2024–25, it contributed to key health missions targeting maternal anaemia, reducing perinatal/neonatal mortality, promoting menstrual hygiene safety, and improving child nutrition. By synthesising evidence from ICMR institutes, multicentric studies, and collaborations, the Division developed guidelines and protocols that were integrated into flagship initiatives like NHM and Anaemia Mukt Bharat, ensuring ICMR research directly informed public health policy and programmes.

During FY 2024-25, the ICMR's RCN Division played a pivotal role in translating research into national policy and programme frameworks. It provided direct technical support to the Anaemia Mukt Bharat Programme through evidence reviews and expert committee consultations that refined anaemia treatment protocols for pregnant women. The division's multicentric projects under the National Health Research Priority framework further anchored policy innovations. These included the development of Bereavement Care Guidelines, a first-of-its-kind national standard for integrating bereavement support into maternal and perinatal healthcare, and an optimised delivery model for stillbirth reduction, aligning with national reproductive and maternal health priorities. Additionally, the NECCTAR trial advanced evidence for improving nutritional outcomes among children through enhanced take-home ration models, informing the Ministry of Women and Child Development's policy ecosystem. Collectively, these efforts positioned the RCN Division as a key bridge between biomedical research and policy translation, directly influencing maternal, child, and nutritional health strategies across India.

5.1. Initiatives of National Importance

5.1.1. *Anaemia Mukt Bharat*

The RCN Division, with its expertise in reproductive and nutritional health, was mandated to provide high-level scientific inputs for strengthening programme implementation. In FY 2024-25, the Division undertook a comprehensive evidence review on interventions and treatment algorithms for pregnant women with anaemia. This included:

- Review of national and international literature on oral iron, intravenous iron formulations, folic acid supplementation, dietary interventions, and food-based strategies.
- Critical appraisal of clinical guidelines from WHO, NICE, and other evidence bodies, aligning them with Indian epidemiological and programmatic contexts.
- Assessment of implementation gaps in existing AMB strategies, particularly in antenatal care pathways and community-level delivery.

5.1.2. Guideline Development: Intravenous Ferric Carboxymaltose (IC FCM)

The management of moderate-to-severe iron deficiency anaemia in pregnancy requires rapid haemoglobin correction. Traditional oral iron supplementation is limited by poor adherence and gastrointestinal side effects, while iron sucrose requires multiple infusions. Ferric carboxymaltose (FCM) offers advantages of higher single-dose administration, rapid correction, and improved compliance.In 2024–25, the RCN Division convened an Expert Committee comprising haematologists, obstetricians, pharmacologists, programme managers, and ICMR scientists to evaluate the role of FCM in pregnancy and the postpartum period.

5.1.3. Stillbirth Reduction

Stillbirth reduction has emerged as a priority within India's maternal and perinatal health agenda. Despite progress in reducing neonatal mortality, stillbirth rates remain unacceptably high. The RCN Division contributed to a multicentric implementation research project aimed at developing optimised delivery models for evidence-based interventions to reduce stillbirths. It is aimed at developing a scalable and sustainable model of delivery strategies, identification of timing and risk factors for stillbirths, and evaluation of impact at study sites.

5.1.4. Menstrual Hygiene Management

The Division supported national programmes by initiating a study on chemicals in sanitary pads, focusing on phthalates, volatile organic compounds (VOCs), and environmental hazards associated with incineration. This is the first national-level scientific assessment of chemical exposure risks from menstrual hygiene products in India.

5.1.5. Child Nutrition Interventions

The Division contributed to the NECCTAR trial, a multicentric cluster-randomised controlled trial evaluating improved take-home rations (THR) in combination with behaviour change interventions. Objective is to develop evidence-supported, cost-optimised THR recipes to improve child nutrition in six Indian states. The trial provides a data-driven foundation for reforming THR under Integrated Child Development Services (ICDS) and Poshan Abhiyaan, ensuring nutritional adequacy and acceptability.

In FY 2024–25, the RCN Division demonstrated exemplary performance in programme support and policy contributions. Its work in anaemia control, ferric carboxymaltose guideline development, stillbirth reduction, menstrual hygiene management, and child nutrition interventions highlights the Division's strategic role in advancing the objectives of the National Health Mission.

5.2. Significant Contribution by Institutes in the Reproductive, Child Health and Nutrition Research

5.2..1. ICMR - National Institute for Research in Reproductive & Child Health (NIRRCH), Mumbai

During FY 2024-25, ICMR - NIRRCH consolidated its leadership in reproductive and child health research through breakthroughs linking bench science to policy translation. The Institute pioneered frontline immune profiling during the Nipah virus outbreak and identified key mitochondrial variants driving PCOS pathophysiology. Multiple indigenous technologies, HPV screening kits, Haemophilia POC tests, and Gazelle devices, were validated and adopted under national programmes such as the NHM

and Sickle Cell Elimination Mission. With over 75 publications in high-impact journals, two patents filed, and multi-institutional collaborations spanning AIIMS, IIT Bombay, and international universities, the Institute advanced precision diagnostics and clinical translation. NIRRCH further strengthened community engagement through MRHRUs in Maharashtra, serving thousands of beneficiaries via screening, counselling, and disease management. Its evidence-based contributions on IV Ferric Carboxymaltose and Yoga for PCOS directly influenced national guidelines, reinforcing ICMR-NIRRCH as India's flagship centre for women and child health innovation.

Table 25: Key Scientific Contributions of NIRRCH, Mumbai

Research Area/Domain	Major Achievements / Outputs	Significance/Status
Child Health	This study identified a high-accuracy kisspeptin-LH ratio as a promising biomarker for diagnosing ICPP	The index has a specificity of 86.9% and sensitivity of 72.73% towards ICPP
	Placement of Gazelle Hb Variant test device in the community and examination of children by haemato-oncologists.	Protocol development and screening of Sickle-cell disease and Thalassemia in children for early interventions.
	Creation and maintenance of biorepository of childhood tuberculosis	Data collection for decision making
	Initiating community awareness activities in special schools	Providing support to community
Reproductive	Found for the first time that the mtDNA copy number is significantly reduced in women with PCOS	Indicates severe mitochondrial dysfunction in classical PCOS phenotype.
	Identification and validation of microfluidic based device using chemoattractant molecule.	This molecule has a potent ability to attract capacitating sperm.
	Validation of indigenous HPV test	Detection of 7 most common oncogenic strains to detect high cervical intraepithelial neoplasia.
	Creation and maintenance of biorepository of endometriosis and PCOS	Data collection for decision making
	Standardised cost-effective protocol for detection of endocrine disrupters in the serum of Indian women.	Diagnosis of endocrine disrupters
Maternal	Identification of novel gene variant in the foetus.	Improved genetic diagnosis in foetal malformation
	Use of Multiplex PCR in the diagnosis of BV infection in pregnant women.	Improvement of antenatal screening in clinical setting.
	Project on maternal and perinatal death surveillance and response	Strengthening the maternal and perinatal death surveillance and response at district level
Nutritional	Traditional diet approach for calcium and iron intake in lactating women	Feasible option among low-income women

5.2.2 ICMR - National Institute of Nutrition (NIN), Hyderabad

During FY 2024-25, ICMR - NIN continued to lead as India's top nutrition science institute in FY 2024-25, driving progress through high-impact research, policy translation, and technological innovation. The Institute's signal contribution, the latest Dietary Guidelines for Indians play a pivotal role in guiding individuals toward selecting appropriate foods in adequate quantities across a range of food groups, thereby facilitating optimal nutrition throughout the lifetime. The 17 dietary guidelines place firm emphasis on health promotion and disease prevention across all age groups. The guidelines contain in them scientific evidence-based information that would facilitate the attainment of the goals stated in the National Nutrition Policy. The Institute advanced digital nutrition ecosystems through Nutrition Atlas 2.0, NutriAIDE, and NIN 2.0 App, integrating AI-based dietary tracking, environmental sustainability, and open-data visualisation. The Poshan Nirnayak, an ML-driven tool predicting stunting risk based on UKRI-supported Action Against Stunting Hub (AASH) study is under development. Clinical and community studies demonstrated the efficacy of millet-based diets, assessed nutrition status of severely undernourished children in the immediate one year following discharge from Nutritional Rehabilitation Centres, and adherence of the elderly to the dietary recommendations, while evaluations of PM-POSHAN and Take-Home-Ration programmes shaped Ministry of Women and Child Development's sugar-reduction directives. Beyond laboratory science, NIN led nationwide Poshan Maah and breastfeeding campaigns, engaged tribal communities, and enabled a new dialysis unit under its CKD research translation. Through 75 projects, 600 trainees, and multisectoral partnerships, ICMR - NIN delivered evidence, innovation, and impact in India's nutrition and health landscape.

Table 26: Significant Findings of ICMR-NIN, Hyderabad

Research Area/ Domain	Major Achievements / Outputs	Significance/Status
Guidelines	Release of dietary guidelines for Indian population.	The guidelines facilitate the attainment of the goals stated in the National Nutrition Policy.
New health technologies-Digital platform for dietary assessment and nutrition tools	Launching applications and tools like Nutrition Atlas 2.0, Nutrify India Now 2.0 App, NutriAIDE, *Poshan Nirnayak*	Tools for dietary assessment, nutrition tracking, and data visualisation.
Nutritional Survey	SAMPADA SURVEY	Generating one of India's Largest, high-quality datasets on nutrition, biomarkers, physical activity for targeted interventions.
Nutritional Status, Cognition, And Wellbeing in Healthy Aging	Provided framework for developing "My Plate" And guidelines for Well-Being for Geriatric Population	The study highlights a high burden of metabolic, cognitive, and micronutrient deficiencies among older adults.
Maternal Health	First study on prevalence and factors associated with thiamine deficiency among pregnant and lactating mothers in India.	The ETKAC method was standardised for assessing thiamine in blood and breast milk.

Research Area/ Domain	Major Achievements / Outputs	Significance/Status
Dietary Supplement	Millet Diet RCT improved Hb and micronutrient levels in anaemic women CKD-tribalstudy, led to new dialysis unit in ITDA-Utnoor, Telangana	Evidence-based nutrition solutions for anaemia reduction and improves CKD care in marginalised tribal populations
Programme Support	Provides scientific support on Food Labelling as well as Nutrition & Food Fortification of Food Safety and Standards Authority of India.	These panels set and review regulatory standards in India.

5.2.3 ICMR – National Institute for Child Health and Development Research (NICHDR) (Formerly known as ICMR - NIP), New Delhi

In FY 2024 - 25, ICMR - NICHDR New Delhi advanced precision child health through translational and diagnostic innovations. The institute filed two patents, one for a Dried Blood Spot (DBS)-based RNA extraction process and another for a cost-effective cfDNA isolation method, paving the way for affordable leukaemia diagnostics and liquid biopsy applications. A multicentric validation study of the DBS kit was launched under the ICMR - NHRP program. The newly strengthened FISH facility expanded diagnostic coverage for paediatric tumours, while AI-driven models for breast and oral cancer detection were piloted. Notably, NICHDR identified Zonulin and Endocan as biomarkers for MIS-C, offering new tools for post-COVID paediatric care. Through its research, diagnostics, and innovation ecosystem, NICHDR solidified its role as India's leading centre for translational child health research and technology-enabled paediatric diagnostics.

Table 27: Key Scientific Contributions of ICMR - NICHDR, New Delhi

Research Area/ Domain	Major Achievements / Outputs	Significance/Status
Advanced Molecular Diagnostics	Established a FISH facility under the Advanced Molecular Diagnostic & Research Laboratory, providing diagnostics for paediatric solid tumours including gliomas and abdominal tumours.	Facility functional; serving >3,000 patients annually
Biomedical Research	Completed study on PI3K/Akt/ mTOR inhibitors for T-cell acute lymphoblastic leukaemia (T-ALL), proving synergistic inhibition superior to isolated inhibitors.	2 publications; translational leads for drug repurposing
Child Health & Infectious Diseases	Identified Zonulin and Endocan as biomarkers for chronic COVID-associated gut injury and MIS-C in children.	Report published; clinical validation planned with VMMC–Safdarjung
Artificial Intelligence & Digital Health	Developed AI-based tools for early detection of breast and oral cancer using medical imaging.	Algorithms under pilot evaluation

5.2.4. ICMR– Regional Medical Research Centre(RMRC), Sri Vijaya Puram

In 2024-25, ICMR - RMRCSVP Sri Vijaya Puram conducted a community programme focused on personal and menstrual hygiene, along with awareness of common cancers, reaching a group of 30 participants.

5.2.5. ICMR – National Institute of Virology (NIV), Pune

In 2024-25, ICMR - NIV Pune identified five CD8β T-cell epitopes for HPV-16 and HPV-18 that show strong potential as targets for therapeutic vaccine development in oncology.

5.2.6. ICMR – National Institute of Research in Bacterial Infections (NIRBI), Kolkata

In 2024-25, ICMR - NIRBI Kolkata generated evidence supporting the efficacy of a single-dose HPV vaccine for cancer prevention in India.

5.2.7. ICMR – Regional Medical Research Centre (RMRC), Gorakhpur

In 2024-25, ICMR - RMRC Gorakhpur conducted a biomarker performance comparison study on gestational diabetes mellitus. Of the planned 353 samples, 250 have been collected so far.

5.2.8. ICMR – National Institute of Research in Environmental Health (NIREH), Bhopal

In 2024-25, ICMR - NIREH Bhopal completed cohort studies assessing acute respiratory infections, diarrhoea and developmental status among children under five years of age. The institute also investigated heavy metal exposure and its associated health risks in young Indian children through the analysis of primary teeth. In addition, a comparative study of processed and unprocessed foods has been carried out to understand dietary sources of toxic metal exposure among infants.

5.2.9. ICMR – National Institute of Research in Digital Health and Data Science (NIRDHDS), New Delhi

In 2024-25, ICMR - NIRDHDS in New Delhi conducted a study on child vulnerability using a life-course approach, analysing forty indicators across the three major domains of vulnerability, with all findings disaggregated by sex.

5.2.10. ICMR –National Institute for Implementation Research on Non-Communicable Diseases (NIIRNCD), Jodhpur

In 2024-25, ICMR - NIIRNCD Jodhpur carried out implementation research on the identification of high-risk pregnancies in rural Rajasthan, that revealed low levels of awareness, inadequate infrastructure and weak referral systems. The institute developed the PRABHA intervention to strengthen the continuum of antenatal and postnatal care.

5.2.11. ICMR – National Institute of Immunohaematology (NIIH), Mumbai

In 2024-25, ICMR - NIIH Mumbai conducted a multicentre screening study involving 63,536 newborns. The work identified 547 babies with sickle cell disease, ensured their clinical follow-up and care, and highlighted major barriers that continue to limit effective newborn screening implementation in India.

5.2.12. ICMR – National Institute of Cancer Prevention and Research (NICPR), Noida

In 2024-25, ICMR - NICPR Noida advanced the development of an anti-HPV therapeutic (SHetA2) for cervical intraepithelial neoplasia under the Indo-US clinical trial (NCT04928508). The therapy has an FDA-authorised IND, and Phase I dosing has progressed to the third dose level. The institute also completed validation of indigenously developed platforms and kits for cervical cancer screening and diagnostics.

Chapter 6 : ICMR - Bhopal Memorial Hospital and Research Centre: Translating Research into Care

The ICMR - Bhopal Memorial Hospital and Research Centre (BMHRC), located on Raisen Bypass Road, Karond, Bhopal (Madhya Pradesh), continued to serve as one of India's leading super-speciality hospitals under the Indian Council of Medical Research during the reporting period April 2024 - March 2025. Established to provide free health care to the victims of the Bhopal Gas Tragedy and their dependents, the Institute has evolved into a major tertiary-care and research hub delivering high-quality, affordable healthcare to the wider population of Central India.

The Institute houses 17 super-speciality departments and operates eight mega outreach health centres, ensuring accessibility of advanced healthcare at the doorstep of beneficiaries. BMHRC's service mandate covers clinical care, diagnostics, education, and health research aligned with several national health programmes including the National Tuberculosis Elimination Programme (NTEP), National Vector Borne Disease Control Programme (NVBDCP), NACP, National Viral Hepatitis Control Programme (NVHCP), National Mental Health Programme (NMHP), District Mental Health Programme (DMHP), National Programme for Control of Blindness (NPCB), and the National Sickle Cell Anaemia Elimination Mission (NSCEM).

6.1 Most Significant Contributions in FY 2024-25

6.1.1 Tuberculosis Control and Research

The Department of Microbiology at BMHRC remained a key node under the NTEP (2015–2025). The National Reference Laboratory (NRL) at BMHRC performed advanced molecular diagnostics using CBNAAT/TruNAT, Line Probe Assay (LPA), Liquid Culture, and Drug Susceptibility Testing (DST) for early identification of MDR-TB. A major implementation study titled Accelerating Efforts to END TB in India screened 101,366 individuals across two Tuberculosis Units (TUs) in Bhopal. 2.89 % (2,932) suspects were identified; 4.67 % were diagnosed with TB, and 34.31 % of them initiated anti-TB treatment. Notably, hand-held X-ray machines were deployed for the first time in this region, improving case detection.

BMHRC participated in several multicentric validation studies led by ICMR - NIRT, Chennai, and other ICMR institutes:

i. Phage lysin vs Mycobacteria Growth Indicator Tube (MGIT) PANTA for rapid MTB detection – performance found equivalent, offering a potential alternative decontamination method.

ii. Evaluation of multiple commercial diagnostic kits (Genes 2 Me, 3B BlackBio, GlowTBPCR, TrueAmp MDR-TB PLUS, GeneNAT) for adult pulmonary TB and drug-resistant TB diagnosis.

iii. Additionally, the Saharia Tribe Implementation Research Project continued to demonstrate community-based TB reduction strategies in collaboration with ICMR-HQ, GMC Bhopal, NIMS New Delhi, and NAARI Pune.

6.1.2 National AMR Surveillance Programme (2024–25)

BMHRC contributed significant data to India's National Antimicrobial Resistance Surveillance Network (NARS-Net) under ICMR and NCDC. Antimicrobial susceptibility testing (AST) data from BMHRC labs helped track resistant strains such as MRSA, ESBL, and CRE. This information feeds national databases (NARS-Net, ICMR-AMRAN, WHONET) to guide evidence-based Standard Treatment Guidelines (STGs) and rational antibiotic use.

6.1.3 Maternal Mental Health and Community Training

In partnership with NHM (Madhya Pradesh), BMHRC developed a Maternal Mental Health Module (2023–24) to address perinatal mental health. This module is now utilised to train district-level health providers for integration of mental health into Reproductive and Child Health services.

6.1.4 National Viral Hepatitis Control Programme (NVHCP)

The Department of Transfusion Medicine established a Treatment Centre and Molecular Diagnostic Laboratory for Viral Hepatitis under NHM. More than 52,000 blood donors were screened for HBV and HCV to assess infection burden in asymptomatic populations. The unit conducts qualitative and quantitative testing for Hepatitis B and C, supports treatment and vaccination drives, and facilitates policy-level data generation for Madhya Pradesh.

6.1.5 National Sickle Cell Anaemia Elimination Mission (2023–24 – 2025)

BMHRC established the first Centre of Competency (CoC) for Sickle Cell Anaemia in Madhya Pradesh under the Ministry of Tribal Affairs. The Centre created SOPs, protocols, and logbooks for screening and diagnosis and organised community camps for tribal students. Out of 878 individuals screened, 8 cases of SCD and 112 carriers were identified. The CoC also established a Molecular and Genetic Laboratory for prenatal diagnosis and counselling. (Grant value: ₿.92 crore).

6.1.6 Mental Health Training under National Mental Health Programme and District Mental Health Programme

BMHRC strengthened state-level mental health capacity by training medical officers (7 batches) and nursing officers (40 batches) under NHM (M.P.), ensuring early identification and referral of mental health conditions in community settings.

6.1.7 National Programme for Control of Blindness (NPCB)

The Department of Ophthalmology performed 1,900–2,000 surgeries per year and continued to function as a regional centre for corneal blindness prevention and cataract surgery.

6.1.8 Academic and Capacity Building Milestones

BMHRC conducted extensive training programmes:

i. 41 training batches (2020–2025) under transfusion medicine benefited 1,070 health professionals (226 medical officers, 505 lab technicians, 240 nurses, 122 counsellors, 23 drug inspectors).

ii. Postgraduate courses: MD (anaesthesia, psychiatry, microbiology), MS (ophthalmology), DM (cardiology), M.Ch (neurosurgery).

iii. Ph.D. programmes in research and transfusion medicine; collaboration with AcSIR-FMR.

iv. Paramedical Institute offered eight diploma programmes (anaesthesia tech, blood transfusion tech, dialysis, cath lab, lab tech, optometry, perfusion technology, radiography).

6.1.9 Diagnostic Testing and Patient Care

Table 28: Summary of diagnostic activities and patient care delivery across specialties

Category	Details	Highlights / Outcome
Diagnostics Performed	39,504 microbiology samples	Molecular testing for TB, HIV, Hepatitis, Dengue, CKD, and others
Patient Services	54,174 OPD & 2,587 IPD in Cardiology; 12743 OPD in Pulmonary; 35,053 OPD in Ophthalmology etc.	Consistent delivery of multi-specialty care and super-speciality surgeries

6.1.10 Technologies Developed / Validated

Table 29: Technologies Developed / Validated, FY 2024–25

S.No.	Technology / Kit Evaluated	Area	Outcome / Remarks	Collaborating Institute / Company
1	Genes 2 Me kit	Tuberculosis diagnosis	Validation of adult pulmonary TB kit completed	Genes 2 Me Pvt Ltd., India
2	3B BlackBio Biotech kit	Tuberculosis diagnosis	Validation completed	3B BlackBio Biotech India Pvt Ltd.
3	GlowTBPCR kit	Tuberculosis diagnosis	Pre-validation performed at RMRC Dibrugarh	RMRC Dibrugarh
4	TrueAmp MDR-TB PLUS	Drug-resistant TB diagnosis	Ongoing clinical performance evaluation	Molbio Diagnostics Pvt Ltd.
5	GeneNAT kit	Pulmonary TB / Drug Resistance	Ongoing evaluation in multi-centre trial	Genetix Biotech Pvt Ltd.
6	Phage lysin alternative to MGIT PANTA	TB decontamination	Demonstrated equivalent efficacy to standard MGIT method	ICMR-NIRT Chennai & BMHRC
7	Dx InstaLyte Modular Electrolyte Analyser	Health Technology Assessment	Validation study initiated for accuracy assessment	DHR-HTA cell & BMHRC
8	MyLamp (Mylab Discovery Solutions)	TB Diagnosis & Resistance	Kit evaluation in progress with ICMR network labs	Mylab Discovery Solutions

6.1.11 Training and Workshops

BMHRC conducted numerous training initiatives targeting health professionals, technicians, and students across departments. Major programmes included:

i. Microbiology: Virtual CBNAAT EQA training for 243 state TB laboratory staff; onsite culture and DST training at AIIMS Bhopal; comprehensive exposure for NIRTH Jabalpur staff at NRL BMHRC.

ii. Transfusion Medicine: ECHO-India infection-control training for 185 nurses (May 2024–Mar 2025); World Sickle Cell Day and World Blood Donor Day observances (each 150 participants); component separation training for technicians and medical officers.

iii. Cardiology: Certificate and workshop programmes for DM residents.

iv. Rajbhasha Cell: Four workshops on official language implementation with 179 participants.

v. Nursing Services: CPR workshops in schools

Section III
Extramural Research Highlights: The 4Ds Continuum

EXTRAMURAL RESEARCH HIGHLIGHTS

Table 30: Research Highlights

Metric	Value
Publications	1632 peer-reviewed articles
Technologies Developed/Validated	67
Patents Filed	20
Patents Granted	2
Workshops & Training	64 national and international events
Start-ups Supported	>270
Digital / Platform Innovations	5 (NRROID, COVID-19 Registry, FoodNet, INTENT, AaMm)

Table 31: Consolidated Quantitative Report of the Contributions by the Extramural Research Wing

Category	Completed	Ongoing	New
Small Grants (SG)	2	617	450
Intermediate Grants (IG)	0	127	125
Centre For Advanced Research (CAR)	10	31	49
National Task Force	42	43	2
AD HOC	108	580	0
Total	162	1398	626

INITIATIVES OF NATIONAL IMPORTANCE

Descriptive Research

1. **Space Psychology Compendium:** Covers human space missions (1961-2025), astronaut selection, training and technologies; digital database being developed for research access.
2. **Astronaut Personality Criteria:** New set of critical and desirable traits for long-duration missions validated through expert ratings and weighted kappa analysis; test battery in development.
3. ***Antarisksh Manas Mitra* (AaMm) AI Tool:** Artificial-intelligence system simulating mission scenarios to detect behavioural and personality markers; includes NSFW filtering module.

4. **One-Health Study on Zoonotic TB and Others:** Haryana study among 155 livestock handlers showed low awareness of bovine TB and identified risk behaviours, informing zoonosis control policy.

5. **Avian Influenza End-to-End Diagnostics (J&K):** Developed complete pipeline for AIV detection (RNA isolation to RT-qPCR) for migratory bird routes in Jammu & Kashmir.

Discovery Research

1. **Broad-specificity Salmonella Conjugate Vaccine:** A single glycoconjugate protecting against typhoidal and non-typhoidal *Salmonella* induces humoral, cell-mediated, and mucosal IgA responses for durable immunity in children, expected to reduce carrier state.

2. **G6PD Diagnostic Kit (Tech Transfer):** Indigenous diagnostic for G6PD deficiency developed under CPD, transferred for commercialisation; ICMR-NIIH Mumbai as lead institute.

3. **Multiplex RT-PCR for Enteric Viruses:** Real-time multiplex RT-PCR method for rapid enteric virus detection developed and licensed to Molbio Diagnostics for national rollout.

4. **Phytopharmaceutical PDP-117 (Pre-diabetes)**: *Trigonella foenum-graecum*-based tablet received CDSCO IND approval and completed Phase I trial for preventing Type 2 diabetes in pre-diabetic subjects.

5. **AYUSH-ICMR Advanced Centres for Integrative Medicine:** Joint AYUSH–ICMR initiative to develop evidence-based protocols linking traditional and modern medicine through priority research and cross-referral guidelines.

6. **ICMR - Research Infrastructure Sharing Ecosystem (I-RISE) policy and portal**: ICMR through its institutes, has established a robust network of biomedical research laboratories nationwide

Development Research

1. **National Phase-I Clinical Trial Site Network:** Phase-I sites at SRM MCH&RC, SETH GS & KEM, ACTREC and PGIMER operational, building India's early-phase trial capacity.

2. **Pipeline of Phase-I Trials:** Key examples include AUR107, NexCAR19, Mynflu 001 that showcases active indigenous vaccine and therapeutic development.

3. **Evaluation of Indigenous Diagnostics & Devices:** Clinical tests of CanAssist/CanScan, SindiColpo, AI PAP smear reader, DBS TB drug-level assay, AiSteth GTX tele-stethoscope.

4. **North East (NE) India Bacteriology Lab Network:** Labs established across six NE states with equipment for isolation, molecular ID and AST.

5. **Foodborne Surveillance & Digital Outbreak Response:** NE FoodNet digital platform and outbreak investigations with training and data linkages to state authorities, strengthening national food safety.

Delivery Research

1. **NHRP *Sankalp* for Single-Digit NMR:** Ten-district initiative with Chief Secretaries to co-design evidence-based interventions toward single-digit neonatal mortality by 2027.

2. **Madhya Pradesh *Sanjeevan* Mission:** State MCH strategy formulated with ICMR inputs was launched by Chief Minister on 7 Apr 2025.

3. **TB Patient Score Card (TB-PSC):** Validated community-feedback tool to monitor TB services and these monthly interface meetings improved patient satisfaction and facility performance.
4. ***Nehru Yuva Kendra Sangathan* Youth Model for TB Awareness & Active Case Finding:** Youth club members conducted village-level TB screening and referrals across six sites that made for feasible and cost-effective for active case finding.
5. **National Registry for Rare and Inherited Disorders:** Hospital-based prospective registry (23 institutes) to pool data for policy and research on rare/genetic diseases

Table 32: Extramural Divisions Collaborations, Programmes & Policy Support

Division / Document	Collaborations	Programmes / Networks / Centres	Policy / National-Level Support Outcomes
Discovery Division	Ministry of AYUSH – MoU for establishing AYUSH-ICMR Advanced Centres for Integrative Medicine. Molbio Diagnostics Pvt. Ltd. – Technology transfer of multiplex RT-PCR for enteric viruses. Industry partners: Phytopharmaceutical product development under CDSCO guidance. Rare Diseases- Evidence generation Department of Pharmaceuticals (DoP) Rare Disease Cell, MoHFW CDSCO	Phytopharmaceutical Programme (PDP-117–119) for drug discovery. Centre for Product Development (CPD) – Diagnostics & therapeutics innovation. AYUSH–ICMR Centres – Evidence-based integration of AYUSH & biomedicine. Conducting multiple systematic reviews commissioned by Central Technical Committee on Rare diseases (CTCRD) to inform inclusion/exclusion of disorders in National Policy for Rare Diseases (NPRD), 2021. Coordinated the listing and prioritisation of Active Pharmaceutical Ingredients (APIs)/Intermediates/Key Starting Material (KSM) required for critical healthcare needs. Drafted entry/exit criteria for treatment of 15 inherited rare disorders. Providing Technical review of clinical trial and market authorisation dossiers in Cell and Gene Therapy (CGT) Division in CDSCO	Inputs for national integrative medicine policy formulation. Development of clinical evidence for CDSCO regulatory approvals (phytopharmaceutical category). Technology transfer mechanisms aligned with Make in India biopharma agenda. Evidence generation for treatment of 5 inherited rare disorders. Identified critical API/ KSM Entry/exit criteria for treatment of 15 inherited rare disorders Input on clinical trials and dossiers and marketing authorisation.
Delivery Division	Government of Madhya Pradesh – Technical partner for *Sanjeevan* Mission. Nehru Yuva Kendra Sangathan (NYKS) – TB awareness and screening. Bill & Melinda Gates Foundation (BMGF) – External support for SANKALP project.	NRROID – National Registry for Rare & Other Inherited Disorders.	TB feedback mechanisms into NTEP programme planning.

Division / Document	Collaborations	Programmes / Networks / Centres	Policy / National-Level Support Outcomes
Descriptive Research Division	Indian Space Research Organisation (ISRO) – Collaborative framework for astronaut psychology & human factors research. AIIMS Bibinagar – Training collaborations (536 healthcare professionals). National One Health Platform – Multi-institutional zoonosis surveillance. International Society for Space Psychology & Behavioural Health – Academic collaboration.	*Antarisksh Manas Mitra* (AaMm) – AI-based behavioural assessment tool. One-Health Research Programme - Zoonotic TB, Melioidosis, Glanders. Space Psychology Compendium & Personality Framework - National reference project.	Findings inform One Health Mission India. Inputs to national space health protocols for human missions. Cognitive ageing toolkit proposed for National Programme for Health Care of Elderly (NPHCE) integration.
Development Division	MoHFW (DHR-ICMR Headquarters) – Coordination with inter-ministerial and national programmes. ICMR Institutes (PGIMER, AIIMS, NIRT, NIRRCH, NIMR) – Institutional networks under INTENT and FoodNet. DST, DBT, CSIR, CDAC – Mentioned partners for translational and digital projects. Industry collaborators – CIBioD device partners.	ICMR-INTENT 4 Phase-I sites (SRM, KEM, ACTREC, PGIMER). ICMR FoodNet – 11 labs for outbreak surveillance (15 outbreaks in FY). CIBioD (PGIMER) – Centre for Innovation & Bio-Design; 9 patents filed, 2 granted. Northeast Bacteriology Network – 6 labs operational.	FoodNet & outbreak data feed into Integrated Disease Surveillance Programme (IDSP). Phase-I trial network supports National Clinical Trial Capacity Development Strategy. CIBioD output integrated into *Atmanirbhar Bharat* MedTech Mission. Policy briefs to MoHFW and Cabinet Secretariat on health innovations.

Table 33: ICMR – Extramural Division Technology Development, Validation & Commercialisation

Division / Document	Technology Developed / Area	Type of Innovation / Validation	Status (Filed / Granted / Transferred / Validated)
Discovery Division	Multiplex RT-PCR for Enteric Viruses	Multiplex real-time PCR detection of enteric viral pathogens	Transferred to Molbio Diagnostics Pvt. Ltd.
	Phytopharmaceutical PDP-117	*Trigonella foenum-graecum*–based formulation for pre-diabetes	CDSCO IND approved; Phase-I completed
	Phytopharmaceutical PDP-118 / 119	Polyherbal formulations for metabolic and inflammatory disorders	Under Phase-I regulatory evaluation
Delivery Division	TB Patient Score Card (TB-PSC)	Digital & field-validated feedback tool for TB service monitoring	Validated & recommended for NTEP implementation
	NRROID Digital Portal	Rare-disease patient data management platform	Technology platform developed & validated; under use across 12 CoEs
	COVID-19 Pregnancy Registry IT Platform	Data capture & analytics system across 20 institutes	Operational & validated; used for national policy reporting
	TB Vaccine Phase III Trial (Platform Infrastructure)	Large-scale vaccine evaluation system across 18 sites	Operational validation completed; >1000 staff trained
Descriptive Research Division	*Antarisksh Manas Mitra* (AaMm) AI Tool	AI-based behavioural simulation for astronaut psychology	Under development & functional validation ongoing
	Space Psychology Compendium Database	Digital compendium of human missions (1961–2025)	Digitisation & data-validation in progress
	Cognitive Health Assessment Toolkit (CHE)	Standardised geriatric cognitive screening tool	Pilot validation completed; recommended for further trials
	One-Health Zoonotic Surveillance System	Field diagnostic and bio sample analysis pipeline	Field-validated in Haryana (n=155)

Division / Document	Technology Developed / Area	Type of Innovation / Validation	Status (Filed / Granted / Transferred / Validated)
Development Research	CanAssist / CanScan Diagnostic Kits	Cancer risk stratification tools	Clinical validation completed
	SindiColpo	Low-cost digital colposcope	Validated for cervical screening
	AI-Assisted PAP Smear Analyser	Artificial intelligence–based cytology image interpretation tool	Validated in hospital settings
	DBS-Based TB Drug-Level Test	Dried blood spot–based TB drug monitoring assay	Validated for clinical use
	AiSteth GTX Tele-Stethoscope	Smart auscultation and remote diagnostic device	Validated for multi-site use
	NE Bacteriology Laboratory Network	Infrastructure & molecular identification systems	Commissioned & validation completed (6 labs)
	ICMR FoodNet Digital Platform	Outbreak surveillance and lab-data integration software	Operationalised; validated through 15 outbreak investigations
	CIBioD (PGIMER)	Medical devices & assistive technologies	9 patents filed; 2 patents granted; technologies under scale-up
	ICMR-INTENT Clinical Trial Network	National Phase-I trial network infrastructure	Validated through multicentric Phase-I/III trials
	Phase-III Trial (AIIMS Jodhpur)	Clinical trial enrolment system	Validated; 2,888 participants enrolled

Chapter 7 : Descriptive Research Understanding Health Landscapes

This chapter highlights the breadth and depth of research, innovation, and dissemination activities undertaken during the year in the descriptive research. A total of over 300 projects across multiple domains were supported, reflecting India's commitment to addressing pressing health priorities through science and technology.

In FY 2024–25, the Division of Descriptive Research demonstrated strategic leadership in integrating research, surveillance, technology validation, and capacity building. Its efforts have not only advanced scientific understanding of antimicrobial resistance and infection dynamics but also created a robust foundation for evidence-informed policy and translational impact. The establishment of repositories, implementation of stewardship programs, and initiation of multi-institutional NHRPs collectively mark a decisive move toward sustainable public health innovation in India

7.1. Initiatives of National Importance

i. **Emerging Initiative:** Gut Microbiome Research: To advance microbiome science in India, the division initiated a national consultation on gut microbiome research. The brainstorming meeting brought together domain experts to identify research gaps, assess global advancements, and design an Indian roadmap integrating metagenomics, next-generation sequencing, and AI-driven data analytics. This initiative laid the foundation for establishing a National Microbiome Research Strategy to support cohort-based studies and personalised health interventions. It represents the first coordinated national effort to align microbiome research with clinical and public health goals.

ii. **Antimicrobial Stewardship (AMS) Implementation:** ICMR continued implementation of its AMS network across 20 tertiary care hospitals. To date, data from over 135,000 patients have been collected through the ICMR Data Management System. The repository includes demographic characteristics, diagnosis, antibiotic use, culture and susceptibility results, and cost analytics, thereby enabling comprehensive evaluation of antibiotic utilisation patterns. This large dataset supports real-time monitoring of implementation of stewardship interventions and provides the burden of treating drug resistant infections in Indian hospitals.

iii. **National Repository of Antimicrobial Resistant Bacteria (NRAMRB):** The division established the NRAMRB under the AMR Hub as a national facility for preserving representative bacterial isolates. By March 2025, 1,275 well-characterised strains received from nodal centres of the AMR surveillance network were cryopreserved and catalogued in the public web portal www.nramrb.org.in. This repository can support the scientists and innovators working towards development new drugs and diagnostics in India and globally.

iv. **ICMR – Global Antibiotic Research and Development Partnership (GARDP) collaboration:**Under the ICMR - GARDP MoU on promotion of research in AMR, for an observational study successful recruitment of patients with CRE/CRPA in India and the high quality of the collected data demonstrated the feasibility of these hospitals to act as clinical sites for future studies with new antimicrobials in India.

v. **ICMR-National Disease Modelling Centre (NDMC-IIT-B) MoU on AMR:** The large data sets viable with ICMR through the AMR surveillance and stewardship initiatives have been shared with NDMC, IIT-B sets to develop national level disease burden estimates for AMR.

vi. **National Essential Diagnostics List:** The first NEDL was released in 2019 by ICMR, making India among the first countries to adopt a national essential diagnostics list. In 2025, ICMR published the second edition (2nd edition) of the NEDL (July 2025) after consultation and drafting processes. The updated NEDL was developed in collaboration with the National Health Systems Resource Centre (NHSRC). The list serves as a roadmap for infrastructure planning, workforce allocation, and investment in diagnostics across states.

vii. **Understanding Availability of Essential Diagnostics in Health Care Systems:** A study was undertaken to assess the availability of essential diagnostics as per NEDL 2019, in *Ayushman Arogya Mandir* Sub-Centre (AAM-SC), Primary Health Centres (PHC), Community Health Centres (CHCs) and District Hospitals (DHs) in 5 states namely Tamil Nadu, Odisha, Uttar Pradesh, Madhya Pradesh and Maharashtra.

viii. **Space Psychology for Selection and Training of Astronaut Designates and Astronauts:** Compendium of Space Psychology compiled since the first Human Space program (1961) till the recent NASA Space X Crew 9 mission (2025), encompassing anecdotes and comprehensive details regarding selection and training.

- **Compendium of Space Psychology:** It encompasses anecdotes and comprehensive details regarding selection, training of the astronauts in space missions by space agencies in the world. Newer technologies being employed by various space agencies incorporated.
- Personality Criterion for Selection of Astronauts: A personality criterion for selection of astronauts for long duration space mission identified by extensive review of literature and inputs from Subject Matter Experts; grouped as critical and desirable requirements.
- **Development of Suitable Test Battery for Astronaut Selection:** Identification, adaptation and development of suitable test battery to assess the criteria is under progress. Inter-rater agreement (kappa) computed to confirm the criteria and assigned weightages for each criterion.
- **Identification of Mental Health Red Flags During Missions** Identification of potential red flags in mental health during training and orbital phases necessary for implementing early interventions to ensure mission safety through comprehensive behavioural health monitoring.
- ***Manovigyan* Unit for Reinforcing Astronaut Health (MAyURAH)** An interdisciplinary Behavioural Health Program called as *Manovigyan* Unit

for reinforcing Astronaut Health (MAyURAH) is under progress, providing comprehensive behavioural health and performance monitoring throughout all the phases of missions.

- **Behavioural Health and Performance Monitoring Unit**
  This unit provides comprehensive behavioural health and performance monitoring throughout all the phases of missions. The identification of roles and objectives of the unit are under progress.

- **AI-Based Tool Antarisksh Manas Mitra (AaMm)**
  A quick and a handy tool in form of an AI Based tool called Antarisksh Manas Mitra (AaMm) in design stages to provide real time emotional support and adaptive strategies.

ix. **Air Pollution Impact on Pregnancy and Early Childhood Development in India (APiPED Cohort):** Successful implementation of portable air pollution monitoring devices to measure rural and urban exposure in the intermediate grant project titled 'Air Pollution impact on Pregnancy and Early childhood Development in India - (APiPED Cohort).

x. **One-Health Approaches to Zoonotic Tuberculosis, Melioidosis and Glanders:** Profiling of socio-demographic and associated risk factors in acquiring zTB in animals and humans under One Health Approaches conducted with 155 livestock handlers from different districts of Haryana.

xi. **Successfully designed Loop-mediated isothermal amplification (LAMP) primers for Neisseria gonorrhoeae and Trichomonas vaginalis.**

xii. **Transportation of human corneas by drones followed by transplantation to patients.**

xiii. **One novel cost effective, sensitive, portable diagnostic device has been developed for the detection of Neisseria gonorrhoeae.**

xiv. **Six bioactive compounds (C1–C6) were identified from Phyllanthus emblica, showing significant in vitro activity against Plasmodium falciparum (3D7) strain, with low cytotoxicity to human cells.**

xv. **Identified a patient with visceral Leishmaniasis (VL) having an underlying genetic defect in IL12R1 gene:** There are only 5 cases of leishmania with underlying inborn errors of immunity reported worldwide. This case is first to be reported from India and carries significant clinical implications in terms of need to screen resistant/recurrent cases of VL for genetic defects and may also warrant consideration or integration into National Kala Azar Elimination Program.

7.2. Small Grants: Ongoing Research Studies in FY 2024-25

A total of 121 projects were supported, spanning across India's major health priorities.

i. **Cancer and Precision Medicine (18 projects):** The largest cluster focused on tumour biology, diagnostics, and targeted therapies, including studies on triple-negative breast cancer, oral squamous cell carcinoma, cervical cancer, nasopharyngeal carcinoma, acute lymphoblastic leukaemia, and paediatric solid tumours. Projects emphasized genomic profiling, single-cell and spatial analyses, epigenetics, nanocarriers, drug repurposing, and biobanking for precision medicine.

ii. **Infectious Diseases and Antimicrobial Resistance (45 projects):** A substantial portfolio addressed tuberculosis, leprosy, malaria, visceral leishmaniasis, dengue, HIV, hepatitis B and C, avian influenza, SARS-CoV-2, and fungal pathogens such as *Candida auris.* Several projects developed novel diagnostics (LAMP assays, aptamers, biosensors, multiplex platforms), therapeutic approaches (nanomedicine, proteasome inhibitors, phage libraries), and implementation research on post-TB care, vaccine impact, and One Health AMR surveillance across humans, animals, and the environment

iii. **Neurology and Mental Health (20 projects):** Studies investigated traumatic brain injury, stroke, Alzheimer's disease, Parkinson's disease, Moyamoya disease, autism spectrum disorder, depression, and substance use. Research included biomarker discovery, imaging correlates, neuromodulation trials, cognitive–behavioural interventions, and the role of environmental toxins such as Bisphenol-A.

iv. **Liver, Gut, Kidney, and Metabolic Disorders (30 projects):** This theme covered chronic liver disease, diabetes, gestational diabetes, metabolic dysfunction, kidney stone disease, fatty kidney, inflammatory bowel disease, alcoholic hepatitis, venous thrombosis, endometriosis, and pre-eclampsia. Projects applied multi-omics, organoid models, probiotic and microbiome modulation, predictive biomarkers, and machine learning approaches for diagnosis and risk stratification.

v. **Maternal, Neonatal, and Child Health (8 projects):** Research included antenatal biomarkers (progesterone, mitochondrial DNA), haemoglobinopathies in tribal populations, milk oligosaccharides, colostrum-based supplements, early-life nutrition, intrauterine growth restriction, and paediatric shock monitoring, with a focus on early detection and improved outcomes.

vi. **Diagnostics, Devices, and Technology Platforms (crosscutting):** Several projects developed innovative technologies such as drone-enabled transport for corneas and sputum, point-of-care immunoassays, biosensors, nanostructure coatings, CRISPR-based strategies, and AI/machine learning predictive tools.

Overall, the project portfolio demonstrates a balanced investment across cancer, infectious diseases, non-communicable diseases, maternal–child health, and technology-driven health innovation, with cancer and infectious disease research forming the two largest domains.

7.3. Intermediate Grants: Ongoing Research Studies in FY 2024-25

A total of 13 projects were supported across interconnected health domains. Vaccines and infectious diseases included studies on the impact of childhood pneumococcal and Hib vaccination on pathogen epidemiology, and evaluation of cefiderocol against antimicrobial resistance in ESKAPE pathogens. Rare and genetic disorders were addressed through metabolomic profiling in lysosomal storage disorders, analysis of genetic and environmental risk interactions in diabetes, and immune system characterization in X-linked agammaglobulinemia. The largest cluster focused on cancer and precision medicine, with projects on oral cancer genomics, acute lymphoblastic leukaemia, postpartum breast cancer, immunotherapy response, paediatric tumour biobanking, and colorectal cancer screening. Maternal and child health was represented through investigations on the effects of iron supplementation during pregnancy on gestational diabetes risk, and a cohort study assessing the impact of air pollution on pregnancy and early childhood outcomes.

7.4 Newly Funded Small Grant Programme

During the reporting period, 108 research projects were supported across a broad spectrum of health priorities. A major share of the portfolio addressed cancer research (14 projects), including studies on drug resistance, immunotherapy, tumour signalling pathways, and patient-centric issues such as treatment-related toxicities. Infectious diseases (12 projects) formed another significant cluster, covering malaria, tuberculosis, dengue, leptospirosis, scrub typhus, zoonotic viruses, and tribal health. Neurological and neurodegenerative disorders (10 projects) focused on Alzheimer's disease, dementia, ataxia, circadian disruption, and paediatric neuromuscular conditions.

Emerging research areas included the human microbiome and host interactions (5 projects), with emphasis on gut, urinary, and infant faecal microbiomes. Antimicrobial resistance and novel therapeutics (7 projects) advanced indigenous strategies such as phage therapy, antimicrobial peptides, and biosensor development. Autoimmune, metabolic, and endocrine disorders (11 projects) covered diabetes, PCOS, ovarian ageing, and rare endocrine syndromes. Cardiovascular and haematological disorders (6 projects) addressed cardiomyopathy, sickle cell disease, nephrotic syndrome, haemophilia, osteoporosis, and haemolytic anaemia.

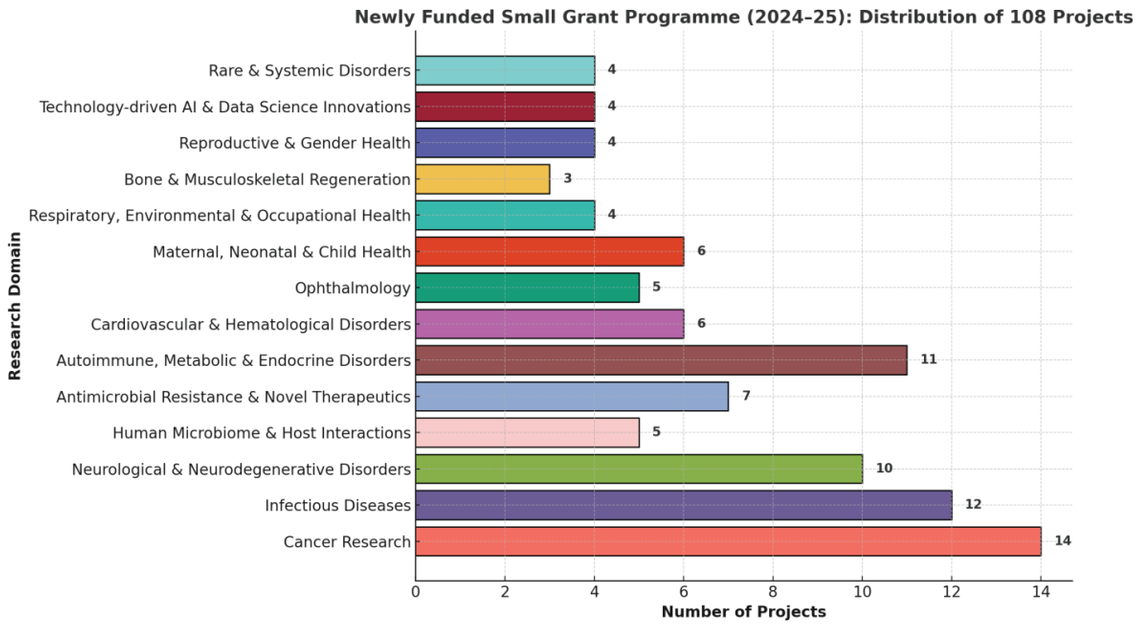


Figure 2: Distribution of Newly Funded Small Grant Programme (2024-25)

Specialised research was supported in ophthalmology (5 projects), maternal, neonatal, and child health (6 projects), and respiratory, environmental, and occupational health (4 projects). Targeted grants also covered bone and musculoskeletal regeneration (3 projects), reproductive and gender health (4 projects), and technology-driven innovations using AI and data science (4 projects). Rare and systemic disorders, including laminopathies and inborn errors of immunity, accounted for 4 projects.

This diversified portfolio highlights a balanced investment in priority diseases, emerging health threats, technology-enabled solutions, and vulnerable population health, reflecting both national needs and global research frontiers.

7.5. Newly Funded Intermediate Grant Programmes

A total of 18 projects were supported, reflecting a wide spectrum of national health priorities. Environmental and kidney health was addressed through research on microplastics and nano plastics in chronic kidney disease of unknown aetiology. Infectious diseases were represented by studies on malaria pathogenesis, leprosy drug resistance through whole genome sequencing, and a one-health bacteriophage approach to combat antimicrobial resistance. A major cluster focused on cancer and precision medicine, with projects on drug sensitivity and genomic profiling, postpartum breast cancer, oral cancer, acute lymphoblastic leukaemia, immune checkpoint blockade, and a paediatric solid tumour bio-banking network. Liver and metabolic disorders were studied through mechanisms of fibrosis and non-alcoholic steatohepatitis. Ophthalmology research targeted glaucoma-related trabecular meshwork damage using omics approaches. In maternal and adolescent health,projects addressed iron-folic acid non-response, metabolic syndrome in adolescents, and thiamine deficiency across regions. Finally, reproductive health research advanced biomarkers for sperm fertilising competence in assisted reproductive technology.

7.6. Ongoing Ad hoc Projects

A total of 34 projects were supported under this set, with a strong emphasis on maternal, reproductive, and community health.

i. **Pregnancy complications and maternal health (18 projects):** These addressed spontaneous abortion, foetal malformations, caesarean scar assessment, pre-eclampsia, hypertension, gestational diabetes, anaemia, thyroid function, folate deficiency, epigenetic influences, and long-term cardiovascular risk. Novel approaches included AI-assisted ultrasound imaging, iPSC-derived neural tube organoids, and new diagnostic devices.

ii. **Maternal-child interventions and community health (7 projects):** These evaluated behaviour change communication, yoga and stress management, postnatal support interventions, ASHA-led programs, dietary impacts, contraceptive mobile applications, and post-partum IUD continuation.

iii. **Reproductive health and gynaecological disorders (8 projects):** Focused on endometriosis, bacterial vaginosis, ovarian steroidogenesis, reproductive tract biomarkers, and contraceptive innovations including natural polymer-based condom lubricants.

iv. **Violence and medico-legal studies (1 project):** A randomised trial evaluated training of medical and nursing officers in Karnataka on forensic identification and evidence collection in sexual assault and domestic violence cases.

7.7. Highlights of the Division

A major share of the portfolio focused on cancer and precision medicine, with projects on triple-negative breast cancer, oral and cervical cancers, acute lymphoblastic leukaemia, and paediatric solid tumours. Research emphasised genomic profiling, intratumoral heterogeneity, single-cell and spatial analyses, biobanking, targeted nanomedicine, and immunotherapy response.

Infectious diseases and antimicrobial resistance constituted the largest cluster, covering tuberculosis, leprosy, malaria, HIV, hepatitis, dengue, avian influenza, COVID-19, and fungal pathogens like Candida auris. Studies advanced novel diagnostics (biosensors,

aptamer assays, LAMP platforms, multiplex systems), new therapeutic strategies (nanomedicine, proteasome inhibitors, phage therapy, AMR surveillance), and One Health–based approaches linking humans, animals, and the environment.

Substantial investments were made in neurology and mental health, focusing on traumatic brain injury, stroke, Alzheimer's disease, Parkinson's disease, Moyamoya disease, Autism spectrum disorder, depression, and substance use. Projects integrated biomarker discovery, neuroimaging, systems biology, non-invasive neuromodulation, and psychosocial interventions.

Work on liver, gut, kidney, and metabolic disorders addressed fatty liver disease, chronic kidney disease, gestational diabetes, metabolic dysfunction, pre-eclampsia, sickle cell disease, thalassemia, endometriosis, and venous thrombosis. Innovative tools included organoid models, omics-based profiling, predictive biomarkers, and machine learning for disease risk assessment.

A strong portfolio targeted maternal, neonatal, and child health, including antenatal and postnatal tracking, nutrition, anaemia, contraception, folate metabolism, placental biology, reproductive tract infections, and community-led interventions. Programmes piloted digital health solutions such as mobile applications, self-sampling devices, and drone-assisted transport for diagnostics and transplant material.

The research output was actively disseminated through 15 national and international events, including conferences, seminars, exhibitions, and brainstorming meetings. These platforms, covering areas from big data analytics, ethnopharmacology, tuberculosis innovation, and reproductive health to LGBTQI+ health, has engaged thousands of participants and enabled policy dialogues, capacity building, and translation of evidence into practice.

Table 34: Highlights of the Division

Category	Highlights
Technologies / Diagnostics Developed	Novel cost-effective, sensitive, portable diagnostic device for *Neisseria gonorrhoeae.*
	Loop-mediated isothermal amplification (LAMP) primers for *Neisseria gonorrhoeae* and *Trichomonas vaginalis*.
	Real-time PCR–based HIV-1 diagnostic assay for paediatric cohort.
	Swallowing and Eating Related Fatigue Scale (SERF-K) validated in Kannada.
	Monoclonal antibody–based immunochromatographic test for rapid detection of enteric viruses (Noro and Hepatitis A).
	Metabolite-based point-of-care test for bacterial vaginosis.
Medical Device	Portable point-of-care biosensors for preeclampsia diagnosis (patented biomarkers and optical/exosomal approaches).
	Mobile-enabled occupational therapy programs and early interventions for infants.
	Drone-based transportation of human corneas and sputum samples for diagnostic and transplant use.
Patents	Patented biomarkers and portable point-of-care biosensors for preeclampsia diagnosis

Category	Highlights
Policy / Programme Supports	Dissemination and brainstorming meetings on ICMR Registry of Levo-Ormeloxifene (Cent chroman) and PPIUCD contraceptive users. Dissemination and brainstorming meetings on findings from the ICMR-funded Centre for Advanced Research on Pre-eclampsia. One Health–based surveillance on zoonotic tuberculosis, melioidosis, and glanders in Uttar Pradesh, Karnataka, and Haryana.
First Reports of Vectors / Pathogens	First Indian case of visceral leishmaniasis with IL12Rβgene defect identified.
Diagnostic Tools Validated	Swallowing and Eating Related Fatigue Scale (SERF-K). Real-time PCR assay for HIV-1 detection validated in paediatric cohort. RDT kit for anaemia screening validated against gold standard in Karnataka.
National Multicentric Studies	Multicentric study on thiamine deficiency disorders. Multicentric paediatric solid tumour gene panel study. Multicentric study on diabetic population in South India Multi-institute One Health study on zoonotic tuberculosis, melioidosis, and glanders.
Clinical Cases Supported	1 patient with visceral leishmaniasis with IL12Rβgenetic defect (first from India). 30 HIV-exposed children evaluated using optimised real-time PCR assay.
Digital Tools Operationalised	Drone-based transport for cornea and sputum samples. Self-collected specimen transportation tube (SPECTRA-Tube). Mobile contraceptive methods (mCoM) App. AI-based ultrasound placental image analysis for pre-eclampsia prediction. AI-based behavioural health tool *Antarisksh Manas Mitra* (AaMm) under development.

Chapter 8 : Discovery Research: Advancing Scientific Frontiers

This chapter presents the consolidated analysis of projects funded and supported by the Discovery Division during 2024–25. The portfolio demonstrates a dual orientation: addressing immediate national health priorities such as cancer, tuberculosis, antimicrobial resistance, diabetes, and neurological disorders, while simultaneously seeding next-generation platforms in nanotechnology, AI-driven discovery, gene and cell therapies, regenerative medicine, and precision diagnostics.

By combining disease-focused interventions with enabling technologies, the Division is advancing India's long-term biomedical innovation capacity while directly contributing to improved healthcare outcomes. This integrated approach ensures both relevance to current health challenges and preparedness for future scientific and public health demands.

8.1 Initiatives of National Importance

The Discovery Research initiatives of national importance includes collaborative initiatives between Indian government agencies, research institutions, and industry partners to strengthen healthcare innovation and policy. The initiatives such as integrative medicine centres, tech transfer of diagnostics, phytopharmaceutical drug pipelines, rare disease evidence frameworks, API prioritisation lists, and regulatory reviews for advanced therapies. Each outcome contributes to national priorities, ranging from mainstreaming AYUSH, boosting indigenous diagnostics, and advancing herbal drugs, to improving rare disease policy, enhancing pharmaceutical self-reliance, and ensuring ethical governance of cell and gene therapies, reflecting a cohesive effort toward evidence-based policy, innovation-driven healthcare, and public health security.

Table 35: Key initiatives of National Importance

Domain	Agencies / Partners	Output	Significance
Integrative Medicine	Ministry of AYUSH, ICMR, AIIMS Network	Establishment of 5 AYUSH–ICMR Advanced Centres for Integrative Health Research	Evidence for National Integrative Medicine Policy; integration of AYUSH into mainstream care.
Diagnostics Commercialisation	Molbio Diagnostics Pvt. Ltd., ICMR-NIRBI	Tech transfer of multiplex RT-PCR for enteric viruses	Indigenous commercial deployment of rapid diagnostics.
Phyto pharma Innovation	Emami Ltd., BITS Pilani, CDSCO	PDP-117 and SDA-217 drugs for diabetes and insomnia	First CDSCO-approved clinical pipeline for phytopharmaceutical products.

Domain	Agencies / Partners	Output	Significance
Rare Disease Policy Support	MoHFW (Rare Disease Cell), CTCRD, ICMR	Systematic reviews and criteria for 15 inherited rare disorders	Strengthens implementation of NPRD 2021 through evidence and clinical criteria.
API Self-Reliance	Department of Pharmaceuticals (DoP)	Prioritisation of critical APIs/KSMs	Supports *Atmanirbhar Bharat* in pharma and public health security.
Advanced Therapies Regulation	CDSCO (CGT Division), ICMR	Technical review of cell and gene therapy dossiers	Ensures scientific and ethical oversight for emerging biotherapeutics.

8.2 Completed Research Projects

During 2024–25, five CAR projects delivered significant outputs with direct policy and health system relevance. Clinical guidance and algorithms were developed for the multidisciplinary management of PCOS within the Indian healthcare system. A novel dibenzimidazole radioprotector (DMA) completed safety studies and is ready for Phase-1 human trials in cancer radiotherapy. A diagnostic kit for G6PD deficiency entered technology transfer, while a multiplex real-time RT-PCR for enteric virus detection was successfully transferred to industry (Molbio) for commercialisation. In addition, comprehensive meta-analyses on drug safety and treatment outcomes have strengthened evidence-based practice across infectious and non-communicable diseases.

The completed NTF projects delivered impactful outcomes across rare diseases, genetic disorders, and herbal therapeutics. Key advances include the first Indian genetic cohort studies on Alport Syndrome and Primordial Dwarfism, enabling prenatal diagnosis and genetic counselling. Gene panels for cortical malformations and new insights in keratoconus therapy strengthen diagnostic capacity. Translational progress was achieved with PDP-117 tablets for type-2 diabetes prevention, which secured regulatory approval and Phase I trial completion, and SDA-217 capsules for chronic insomnia, which showed strong efficacy in patients resistant to standard treatment. These projects demonstrate the discovery research in rare disease research, indigenous drug development, and clinical translation.

8.3 Ongoing Small Grant Projects

The Discovery Division is currently supporting 179 Small Grant projects, representing a broad and dynamic research portfolio with strong translational potential. Cancer research leads with 33 projects, advancing diagnostics, therapies, and nanotechnology-based solutions. Cross-cutting and mechanistic research (31 projects) explores molecular pathways, immunology, and enabling technologies, strengthening the foundation for multiple disease areas. Infectious disease and antimicrobial resistance (25 projects) remain a key priority, with efforts on tuberculosis, leishmaniasis, viral pathogens, and innovative antimicrobial strategies.

The portfolio also includes Neurology and Brain sciences (20 projects), addressing Alzheimer's, epilepsy, stroke, Parkinson's, and neurodevelopmental disorders. Therapeutics and delivery systems (17 projects), including vaccines, gene therapies, and drug delivery innovations, highlight India's growing translational capacity. Significant

investments are seen in cardio-metabolic and rare/genetic disorders (13 each), along with targeted work in haematology (10), biomarkers/omics (6), liver and GI diseases (4), women's/perinatal health (4), ophthalmology (2), and digital systems research (1).

This distribution reflects a balanced research agenda: addressing national health priorities (cancer, infections, diabetes), investing in rare disease and genetic research, and building future-ready technologies such as nanomedicine, omics-based diagnostics, and regenerative medicine. The portfolio ensures that India's health research system is positioned to deliver both near-term solutions and long-term innovation capacity.

8.4 Newly Funded Small Grant Projects

The Discovery Division portfolio of 142 newly funded projects demonstrates a strategically balanced research agenda addressing India's major disease burdens while advancing cutting-edge modalities. Cancer (47 projects) leads the pipeline, spanning breast, oral, cervical, pancreatic, and haematological malignancies. This strong oncology emphasis reflects the urgent national need for improved diagnostics, immunotherapies, and targeted delivery systems. Infectious diseases and AMR (38 projects) remain a critical focus, with projects tackling tuberculosis, malaria, dengue, chikungunya, fungal infections, and resistant bacterial pathogens, underscoring preparedness for persistent and emerging threats.

Beyond these, neurology and brain disorders (21 projects) invest in Alzheimer's, Parkinson's, epilepsy, SMA, ALS, and psychiatric conditions, aligning with the growing non-communicable disease burden. Cardio-metabolic research (13 projects) advances diabetes, obesity, cardiovascular, and PCOS therapies. Liver/GI diseases (7 projects) and haematology (6 projects), including anaemia, sickle cell disease, and leukaemia, strengthen underrepresented but high-impact areas. Rare genetic disorders (5 projects), ophthalmology (2 projects), and women's/perinatal health (2 projects) add to a diversified portfolio.

From a modality perspective, the pipeline is therapy and innovation-heavy: 128 nanotechnology (66 projects). Translational readiness is evident through preclinical (55) and in vitro (49) studies, while omics/biomarkers (34) and diagnostic devices (32) enhance precision capabilities. The adoption of AI/computational methods (16) and gene/cell therapy (15) signals readiness for next-generation healthcare. Clinical trials remain fewer (8), reflecting early-stage discovery focus but offering a foundation for future translation.

Overall, this portfolio reflects a dual policy orientation: strengthening India's position in oncology and infectious disease control, while seeding innovation in neurology, rare diseases, and advanced therapeutic platforms. It balances immediate health priorities with long-term leadership in biomedical innovation.

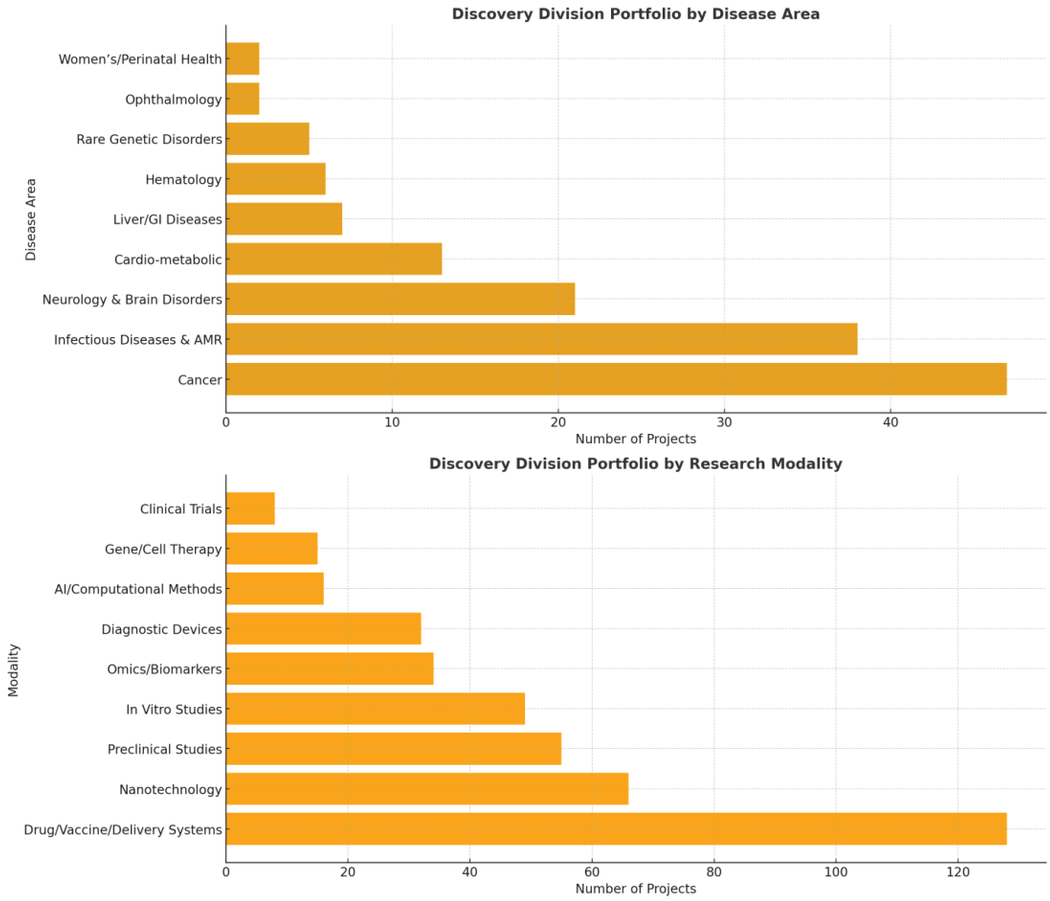


Figure 3: Number of projects by disease area and research modality

8.5 Newly Funded Intermediate Grant Projects

In 2024–25, 30 advanced projects are shaping the Discovery Division's translational pipeline across cancer, infectious diseases, neurology, and rare disorders. Cancer research (9 projects) is pursuing next-generation immunotherapies, such as CAR-T cells, NK cell modulation, and recombinant antibodies, while also advancing biomarker discovery, AI-guided diagnostics, and low-cost detection tools for colorectal, lung, and oral cancers.

Infectious diseases and AMR (9 projects) remain a central pillar, with efforts on mRNA and live-attenuated vaccines (Hepatitis C, Chikungunya), novel therapeutics for tuberculosis and malaria, and biomarker-driven approaches for dengue prediction. Preclinical anti-virulence and AMR strategies strengthen India's preparedness for resistant pathogens.

Neurological disorders (5 projects) are targeted through cutting-edge molecular and genetic interventions for ALS, Alzheimer's, stroke, and Friedreich's Ataxia, combining antisense therapy, peptide drugs, and regenerative strategies.

Additionally, 7 projects address metabolic, musculoskeletal, ocular, and rare genetic conditions, including osteoporosis, keratoconus, osteoarthritis, fibrosis, inborn errors of metabolism, and Gaucher's disease, using integrative metabolomics, RNA therapeutics, and innovative dietary solutions.

Collectively, this portfolio demonstrates a balanced focus: precision oncology, vaccine innovation, AMR combat, and advanced neurology and rare disease interventions. It underscores India's leadership in marrying biomarker-driven science, next-gen immunotherapy, and indigenous therapeutic discovery to address both national and global health priorities.

8.6 Newly Funded Centres of Advanced Research Projects

In 2024–25, the Discovery Division advanced 16 Centres for Advanced Research (CAR) projects, strategically balancing evidence-based ayurveda, infectious disease preparedness, and advanced therapies.

A major thrust (10 projects) lies in integrative medicine, with seven randomised controlled trials on osteoarthritis, sarcopenia, postmenopausal bone health, mild cognitive impairment, PCOS, and head & neck cancer. Additional pilots in oral cancer and COPD rehabilitation, alongside Centres of Excellence in women's health and metabolic liver diseases, are creating an evidence base for integrating Ayurveda and yoga into mainstream clinical practice.

Infectious disease and resistance research (3 projects) target urgent public health threats: novel inhibitors against malaria parasites, discovery of therapeutics for multi-drug-resistant bacteria, and a consortium for arbovirus vaccines.

In haematology and oncology (2 projects), the Division is strengthening advanced care by establishing a Hematopoietic Cell Transplantation Centre at PGIMER and advancing STORM-L research on leukaemia resistance, bridging laboratory insights to clinical strategies.

Together, these CAR projects demonstrate a dual commitment, advancing rigorous clinical validation of ayurveda for chronic and age-related conditions, while investing in cutting-edge translational science for infections, cancer, and rare disorders. This integrated approach ensures national relevance, global competitiveness, and future-ready healthcare innovation capacity.

In summary, 2024–25, the Discovery Division advanced 188 new health research projects through dedicated support to Centres for Advanced Research (16), Intermediate (30), and Small Grants (142). Together, these represent India's commitment to addressing pressing health burdens while investing in frontier science.

Cancer research emerged as the largest focus (47 projects), with efforts spanning early detection, immunotherapies, precision medicine, and drug delivery systems. Infectious diseases and antimicrobial resistance (38 projects) formed the second major cluster, targeting tuberculosis, malaria, dengue, chikungunya, fungal infections, and resistant bacterial pathogens. Alongside these, the Division has invested in neurological disorders (21 projects) such as Alzheimer's, Parkinson's disease, ALS, epilepsy, and mental health, and in cardio-metabolic diseases (13 projects) including diabetes, cardiovascular disorders, obesity, and PCOS. Additional, investments address rare genetic disorders, blood diseases, liver and gastrointestinal conditions, ophthalmology, and women's and perinatal health.

Most projects emphasise drug, vaccine, and therapy development (128 projects), with strong use of nanotechnology (66 projects) to enhance diagnostics and delivery. Preclinical (55 projects) and in vitro studies (49 projects) form the backbone of discovery, while omics and biomarkers (34 projects) and innovative diagnostic devices (32 projects) strengthen precision approaches. Importantly, AI-driven research (16 projects), gene and cell therapies (15 projects),

and regenerative platforms are emerging as next-generation strengths, while select clinical studies (8 projects) ensure pathways to translation.

8.7 Innovations / Patents

Table 36: Technologies and Products developed by the division

S. No	Name of Technology/Product	Area	Patent (filed)	Patent (Granted)
1	Repurposing FDA-Approved drug cefotetan, as a novel anticancer avenue through inhibition of βhCG and its mechanism for the process of inhibition thereof	Cancer	Submitted Preliminary Invention Disclosure Form (PIDF) for provisional International patent application (Form No. 012/ PIDF/OTV/2024)	
2	Acrylamide compounds for the treatment of cancer	Cancer	Yes	202411050724 A provisional patent has been granted, and PIs are now in the process of filing for a complete patent
3	A nano formulation for inhibition of mycobacterial SOS response and a process of preparation thereof	Tuberculosis		Patent Number: 557921
4	Multifunctional hybrid nanozymes for MRSA-infected diabetic wound healing	Diabetic wound	Patent Filed Number: 202411075838	
5	Process for synthesis of SNP loaded PDA coated ceria zinc nanoflowers.	Nano-delivery system	Patent Filed Number: 202411090580	
6	A nanomaterial based antimicrobial composition and a method of preparation thereof	Nano-antimicrobial therapy		India Patent No. 546016 (2024-08-25)
7	A mesoporous anti-microbial nanocomposite and a method of preparation thereof	Nano-antimicrobial technology		India Patent No. 548670 (2024-08-27)
8	Mesoporous nano-inorganic antibiotic compositions and method of preparation thereof	Nano-antimicrobial delivery system		India Patent No. 552525 (2024-12-10)
9	Biocompatible nano-triblock-co-polymers and a process for their preparation	Nano-bio delivery system		India Patent No. 553317 2024-02-01)]

S. No	Name of Technology/Product	Area	Patent (filed)	Patent (Granted)
10	Kinetically enhanced engineered FnCas9 and its uses thereof	CRISPR Cas/Genetic Engineering		International US Patent US11970699B2 (30.04.2024)
11	Portable Breast Cancer Detection Device	Cancer		Patent/Design no. 404431-001 (22.03.2024)
12	Portable Cancer Diagnostic Device	Cancer		Patent/Design no. 03252-001 (27.02.2024)

Chapter 9: Development Research: From Bench to Prototype

The Development Research division for Extramural Grants focuses on advancing research to create innovative interventions for screening, diagnosis, prevention, and treatment of various diseases and conditions. This research aims to enhance the efficacy, safety, affordability, and accessibility of existing and new healthcare solutions. Core areas of this division include developing point-of-care diagnostic tests, molecular diagnostics, disease-specific animal models, optimised dosages and formulations, artificial intelligence, machine learning tools for predictive modelling, and conducting advanced clinical trials for vaccines and therapeutics. Through these initiatives, the division seeks to bridge gaps in medical technology, improve public health outcomes, and make impactful contributions to the healthcare sector.

9.1 Initiatives of National Importance

i. ICMR FoodNet, identified, eleven clinically significant enteric pathogens, from environment, food, human, animal, and outbreak samples. Most of the pathogens were resistant (70–100%) to commonly used antimicrobials use for the treatment of diarrheal infection, and some pathogens such as Diarrhoeagenic *E. coli,* (DEC)*Salmonella enterica, Staphylococcus aureus, Shigella spp.* and *Yersinia enterocolitica* were multidrug resistance (MDR) which signifies the need for swift preventive intervention. FoodNet data revealed a high MDR/XDR DEC burden across humans 75%, food 73.4%, animals 88.2% with emerging carbapenem resistance. AMR profiles were strongly correlated between humans and food (r = 0.95), indicating shared reservoirs and transmission. These findings emphasised the urgent need for stringent antimicrobial stewardship, a systematic surveillance system and improved hygiene practices to mitigate the spread of MDR-DEC. Northeast ethnic food surveillance data revealed 6.8% enteric pathogen positivity along with identification of mycotoxin-producing fungal pathogens (*Aspergillus niger, Aspergillus flavus* and *Rhizopus microsporus*) in different ethnic and fermented food items, which have the potential to cause foodborne outbreaks and impacts on public health.

- Fifteen acute diarrheal disease outbreaks were investigated, 7 of which have been identified source and pathogens (causing outbreak) which helped to curb these outbreaks quickly.
- Animal husbandry surveillance in Northeast India showed high incidence of enteric pathogens(13.2%) among the food animals, indicating transmission of enteric pathogens from sub clinically infected food animal to human.
- 3rd edition of Standard Operating procedure (SOP)of Foodborne pathogens released, which included comprehensive PCR-based detection methods for foodborne pathogens, detection of zoonotic pathogens, viral pathogens, fungal pathogens and procedures for the transportation of samples for B. cereus and S. aureus toxin detection.

- ICMR MycoNet identified 2130 (1.2% positivity) fatal cases of Invasive Fungal Infections (IFIs) in ICUs with fatality rate of 55.6%, which provides strong evidence of spread and deadly nature of fungal infections in vulnerable ICU patients.
- Myconet also identified 97cases of eumycetoma and chromoblastomycosis (subcutaneous rare fungal infections), which are classified as Neglected Tropical Diseases (NTDs) by the World Health Organisation (WHO). The data suggests high hidden burden emphasising the urgent need for early diagnosis to prevent treatment failure, amputation and disease spread.
- Active monitoring of antifungal drug resistance in critical fungal pathogens like *Candida, Cryptococcus, Pneumocystis* and *Aspergillus*, suggested that fungal resistance to commonly used antifungal drugs remains low in most cases. However, Candida auris emerges as resistant fungal pathogen and showed moderate resistance to amphotericin-B (41.3%) and fluconazole (68.3%)
- Developed fungal strain repositories at each ICMR AMDRC centre and preserved 5577 fully characterised clinically significant fungal strains for future research.
- Significant number of hidden case of Invasive Fungal Infections (IFIs) (n=2130) and 97 rare fungal disease (RFD) identified and treated through ICMR MycoNet indicates a large public health benefit.

ii. MedTech Mitra: A joint initiative by NITI Aayog, ICMR, and CDSCO, the Medtech Mitra initiative provides regulatory, clinical, and market access support to Medtech innovators. Key activities included conducting 20 Technology Advisory Committee meetings and the processing of 200+ applications. More than 270 start-ups have been supported through this initiative. Three workshops have been conducted to create awareness on different aspects of Medical Device Rules, 2017.

iii. ICMR-DHR-CoEs at 7 IITs: Thirty-two (32) technologies, aligned with National Health Priorities, have been supported.

iv. ICMR-DHR-mPRAGATI under PM-ABHIM: A national facility was established at IIT Delhi for the design, fabrication, pilot batch manufacturing, and testing of medical devices and diagnostics. ICMR-DHR-mPRAGATI has been assessed and accredited by NABL in accordance with the standard ISO/IEC 17025:2017 for General Requirements for the Competence of Testing & Calibration Laboratories. Three technical workshops on PCB fabrication, additive manufacturing and evaluation and PCB fabrication and assembly and one six-month certificate course has been conducted during the last fiscal year.

v. ICMR-MDMS CliMB Programme: This collaborative initiative between medical and engineering institutes trains multidisciplinary teams to develop medical devices and diagnostics. Achievements include the development of 13 technologies, the training of 25 fellows, the organisation of 22 workshops, filing of 3 intellectual property rights, and the formation of 7 start-ups.

vi. Product Ignition and Development Enabler (mPRiDE): The mPRiDE initiative accelerates medical device development and commercialisation by providing funding up to Rs. 1.5 crores for 18 months per project. Six projects are currently being supported under this programme.

vii. ICMR – Centre for Innovation and Bio-Design (CIBioD) at PGIMER, Chandigarh supported by ICMR under MDMS was established as a design innovation centre for devising indigenous technologies to foster robust, sustainable and affordable healthcare solutions by creating a conducive ecosystem. Under the project, 7 technologies have been recommended by ICMR for development & validation, 2 granted Industrial Design registrations and 9 patents have been filed and 2 patents granted.

viii. ICMR-INTENT was initiated to aims to establish a robust ecosystem for clinical trials by integrating institutions, investigators, and resources across India to conduct high-quality, multicentric, regulatory-compliant trials with 45 sites and later expanded to 75 institutions, including public and private medical colleges, hospitals, research institutes, and ICMR institutions. A total of 11 clinical trials (5 Phase I, 5 Phase III and 2 Phase Iia) on therapeutics, vaccines, cell and gene therapy and 7 clinical investigations/evaluation on the medical have been initiated. To enhance researcher capacity, INTENT has conducted 15 webinars on key aspects of clinical trials (with monthly sessions ongoing) and 6 workshops and training programmes to build expertise in clinical trial methodologies.

9.2 Clinical trials (Phase I-III)

Table 37: Overview of Clinical Trials

Clinical Trial	Partner & names of participating sites	Phase	Date of initiation, participants enrolled	Expected date of completion
Efficacy and safety of *Punarnavadi Mandura* alone and in combination with *Drakshavaleha* compared to iron folic acid in the treatment of moderate iron deficiency anaemia among non-pregnant women of reproductive age group: a community-based three arm multi-centre randomised controlled trial	Partner: CCRAS 1. MGIMS Wardha 2. AIIMS Bibinagar 3. AIIMS New Delhi 4. KEMHRC Pune 5. RIMS Ranchi 6. AIIMS Bhopal 7. ICMR NITM Belagavi 8. AIIMS Jodhpur	Phase-III	Ongoing, 2888 participants enrolled	May 2026

Clinical Trial	Partner & names of participating sites	Phase	Date of initiation, participants enrolled	Expected date of completion
A Phase IIa, proof-of-concept, placebo controlled, randomised trial to investigate the efficacy and safety of oxfendazole as a macrofilaricidal drug in adults harbouring lymphatic filarial worms	Partner: Drugs for Neglected Tropical Diseases Initiative, Study sites: 1. RIMS Ranchi 2. IMS and SUM Hospital, Bhubaneshwar 3. ICMR- NIOH- Data Management 4. ACTREC Mumbai- Pharmacokinetic evaluation	Phase IIa	June-July 2025	June-July 2027
A multicentre, open-label, single-arm, two-cohort, clinical study to evaluate the efficacy, safety and pharmacokinetics of eliglustat sublingual film in patients with Gaucher Disease Type 1	Partner: Kashiv Biosciences Study sites: 1. Health1, Ahmedabad 2. MAH, Jaipur 3. Jaslok, Mumbai 4. Horizon, Kolkata 5. AIIMS, Nagpur 6. ICH, Kolkata 7. SGPGI, Lucknow	Phase III	Participant enrolment completed. Follow up ongoing	March 2026
A phase IIa double blind, randomised, placebo controlled, parallel, multicentre, proof-of-concept study to evaluate the efficacy and safety of desidustat oral tablet for treatment of sickle cell disease.	Partner: Zydus Sites: 1. Sai Krupa Research Centre 2. Silver Touch Hospital 3. Sri Aurobindo Institute & Medical Sciences 4. Sir Sayajirao General Hospital 5. Zydus Medical College and Hospital	Phase IIa	Participant enrolment completed. Follow up ongoing	October 2025
Safety and efficacy of probiotic interventions in reducing mortality and severe infection in preterm and SGA infants.	Gates Foundation, Sites yet to be decided	Phase II/III	March 2026	March 2030

Clinical Trial	Partner & names of participating sites	Phase	Date of initiation, participants enrolled	Expected date of completion
Efficacy and safety of ayurvedic package of interventions vs. conventional package of interventions in treatment of early knee osteoarthritis, a phase III randomised controlled trial	Partner: CCRAS Study Sites: 1. Institute of Medical Sciences, Banaras Hindu University, Varanasi 2. SRM Medical College, Chennai 3. MGIMS, Wardha 4. AIIMS Bhubaneswar 5. AIIMS Jodhpur	Phase III	August-September 2025	August- September 2027
Efficacy and safety of Bedaquiline in combination with MDT for the treatment of multibacillary leprosy	No partner, Sites yet to be decided	Phase II/III	July 2025	July 2029
Phase I trial for new chemical entity for Cancer (AUR107)	Partner: Aurigene Study sites: 1. PGI Chandigarh 2. ACTREC, Mumbai 3. 26 other sites (not from phase 1 network)	Phase I	March 2025 45 participants enrolled	December 2026
Phase I trial for Stem cell therapy for CLL (NexCAR19)	Partner: ImmunoAct Study Site: ACTREC Mumbai	Phase I	November 2025	November 2028
Phase I trial for Influenza vaccine (Mynflu 001)	Partner: Mynvax Study Site: SRM Chennai	Phase I	September 2025	Sep 2028
Phase I trial for Zika virus vaccine	Partner: Indian Immunologicals Ltd. Study sites not decided	Phase I	September 2025	Sep 2028
Phase I trial for KFD Vaccine	Partner: Human Biologicals Ltd Study sites not decided	Phase I	September 2025	Sep 2028

9.3 Clinical investigation/evaluation of Medical Devices/ Diagnostics

Table 38: Overview of Clinical investigation/evaluation of Medical Devices/Diagnostics

Name of Device	Description, Intended Use, Field Level	Study sites	Expected dates of start and end
CanScan	Portable, rapid breath analyser test for in-vitro detection of Volatile Organic Compounds (VOCs) associated with Breast Cancer; can be used at primary and secondary healthcare levels	1. AIIMS, Rishikesh 2. Kasturba Medical College, Manipal	November-December 2025
Can Assist	Immunohistochemistry-based in vitro diagnostic test intended as prognostic tool for patients with Stage I & II hormone receptor-positive (ER/PR+) and HER2-negative invasive Breast cancer. AI algorithm-based predictor of cancer recurrence-free survival at five years	1. Mahatma Gandhi Medical College & Research Institute, Puducherry 2. Dayanand Medical College and Hospital, Ludhiana	November-December 2025
AI based cervical cancer screening (SindiColpo)	Low-cost, AI-powered cervical cancer screening device, integrates clinical data, image processing, and explainable AI via conversational agents; can be used at primary and secondary healthcare levels	Study sites 1. Dr. Moopen's Medical College, Wayanad, Kerala 2. Amrita Institute of Medical Sciences	June-July 2025
AI based PAP smear	AI-enabled digital pathology system serves as a decision support tool in cervical cancer screening	Study Sites: 1. AIIMS, Jodhpur 2. SCB Medical College & Hospital, Cuttack	June-July 2025
Dried blood spot samples for serum concentrations of first line anti-tuberculosis drug levels	Can be used for the purpose of therapeutic drug monitoring; no specialised training required; can be collected and transported by health workers at room temperatures	1. AIIMS, Delhi 2. Jawaharlal Institute of Post-graduate Medical Education and Research (JIPMER), Puducherry	June-July 2025
AiSteth®GTX	AiSteth®GTX is an Ai-enabled smart stethoscope that helps to 'see' heart sounds on a smartphone and detect anomalies with the help of Artificial Intelligence (AI) and Machine Learning (ML) integration. It is intended to identify specific heart sounds and presence and/or absence of a heart murmur; can be used as a screening tool by primary-care physicians.	1. Dr. Moopen's Medical College, Wayanad, Kerala 2. SRM Medical College Hospital & Research	July 2025

Name of Device	Description, Intended Use, Field Level	Study sites	Expected dates of start and end
Non-invasive digital BP measuring device using Korotkoff sounds and oscillatory waveform	Current electronic BP instruments utilise only Oscillo metric technique. The said device under investigation uses a novel method which uniquely integrates Korotkoff sounds and Oscillo metric waveforms to enhance the accuracy of blood pressure measurement.	1. Chettinad Hospital and Research Institute, Tamil Nadu 2. Rajendra Institute of Medical Sciences, Ranchi 3. All India Institute of Medical Sciences, Nagpur	July 2025

9.4 Ongoing Small Grants

ICMR supported 224 ongoing Small Grants in FY 2024–25, spanning AI-driven diagnostics, nanotechnology, maternal-child health, cancer, and infectious diseases. Projects demonstrate convergence of digital health, biotechnology, and clinical applications,V with contributions from premier institutes like AIIMS, IISc, IITs, and universities across India. This wide portfolio reflects a strategic shift toward technology-enabled, translational solutions addressing both non-communicable and communicable diseases, strengthening India's innovation pipeline in biomedical research.

The 224 ongoing Small Grants span India's top institutions, with AIIMS and IITs as major hubs in AI, cancer, and nanotechnology. IISc, PGIMER, NIMHANS, and KGMU lead niche areas like neurology, oncology, and oral health. Jamia Hamdard, Jamia Millia Islamia, and VIT contribute expertise in drug delivery and biomaterials. Regional medical colleges broaden the ecosystem, ensuring representation from across India's research landscape, strengthening translational biomedical innovation.

9.5 Ongoing Intermediate Grants

In FY 2024–25, 52 Intermediate Grant (IG) projects continued to advance India's translational research agenda, occupying the crucial middle ground between exploratory Small Grants and institutional Centres of Excellence. The portfolio displays a strategic emphasis on cancer diagnostics and therapy, AI-driven medical devices, and infectious disease monitoring.

Ongoing projects include the development of portable VOC-based breath analysers for breast cancer detection, AI-assisted PAP smear and cervical screening systems, and digital pathology tools that combine imaging, deep learning, and cloud integration. Several initiatives are refining non-invasive cardiovascular and blood pressure devices, AI-enabled stethoscopes, and machine-learning systems for glaucoma and retinal analysis. Infectious disease-focused IGs, such as dried blood spot testing for TB drug levels, strengthen the country's diagnostic infrastructure.

Interdisciplinary teams from AIIMS branches, IITs, JIPMER, PGIMER, SRM, Chettinad, and Amrita Institute are driving these innovations through partnerships that merge

clinical insight with engineering expertise. Thematically, oncology remains dominant, but the growing presence of AI, IoT, and biomaterials research signals ICMR's shift toward affordable, technology-integrated health solutions with direct patient applicability and commercialisation potential, reinforcing the translation of Indian biomedical science into scalable healthcare innovation.

i. AIIMS branches (Delhi, Jodhpur, Nagpur, Rishikesh, Bhubaneswar) are central hubs, linked with cancer research, AI-enabled devices, infectious diseases, and neurology.

ii. IITs (Kharagpur, Hyderabad) and IIITDM Kancheepuram anchor the technology side, collaborating on AI/ML medical devices and cancer imaging tools.

iii. Regional medical colleges (Dayanand, MGMCRI, SRM, Chettinad, RIMS) ensure diverse geographical coverage.

iv. Specialised institutes (NIMHANS, ICMR-CAMH) drive neurology and mental health innovation.

9.6 Newly Funded Small Grant Projects

In FY 2024–25, 138 new small grant (SG) projects were sanctioned, reflecting ICMR's continued commitment to fostering early-stage, investigator-led innovation across India's biomedical ecosystem. The new portfolio demonstrates strong momentum in AI-enabled diagnostics, cancer research, digital therapeutics, and infectious disease management, aligning with national health priorities and global scientific trends.

Several projects target oncology, including the development of AI-based cervical and breast cancer screening devices, prognostic tools (CanAssist), and organoid-based cancer models. In infectious diseases, newly funded studies address tuberculosis drug monitoring using dried blood spot testing, pathogen detection platforms, and novel antimicrobial approaches. A significant number of grants explore AI and digital health, such as the creation of mental health and chronic pain management apps (GenAIMI) and other data-driven decision-support tools for clinical care.

Institutes leading these initiatives include AIIMS branches, JIPMER, CNCI Kolkata, ILBS, SGPGI, NIMHANS, IITs, and private medical colleges, representing a distributed and collaborative network. Collectively, these 138 new SGs mark a decisive shift toward scalable, affordable, and digitally enabled biomedical innovation, strengthening India's research-to-application continuum and nurturing the next generation of translational scientists.

9.7 Newly Funded Intermediate Grant Projects

In FY 2024–25, ICMR approved 49 new Intermediate Grants, with the largest share devoted to cancer diagnostics and therapy (22 projects) and AI/ML-enabled medical devices (12 projects). Additional focus areas included infectious diseases and TB (7), cardiovascular and metabolic health (5), and other translational innovations (3). These projects bring together AIIMS branches, IITs, JIPMER, Amrita, Kasturba, Dayanand, and private medical colleges, reflecting a collaborative, pan-India approach to translational health research that emphasises affordable, scalable, and technology-driven healthcare solutions.

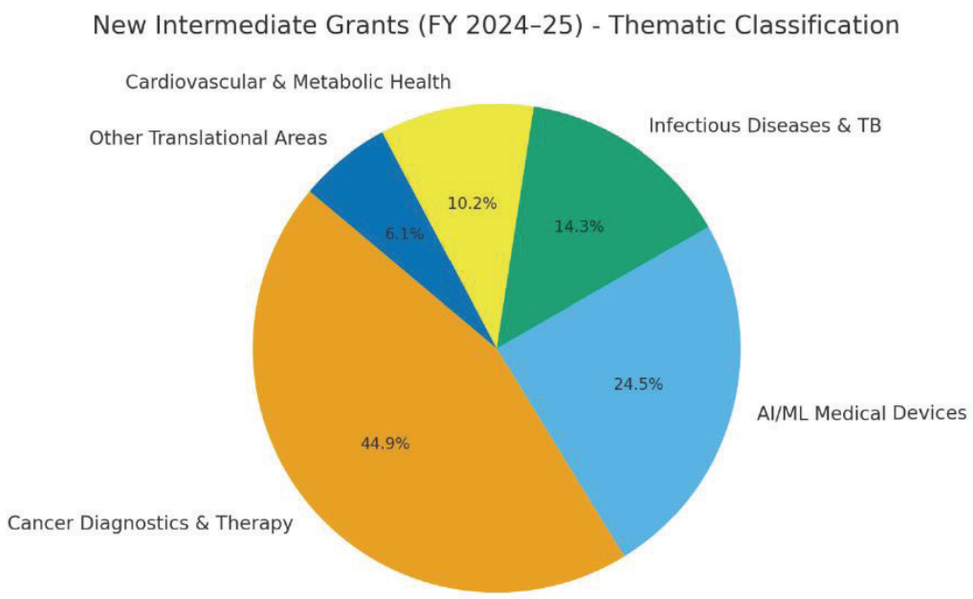


Figure 4: Thematic Classification of New Intermediate Grants (FY 2024-25)

9.8 Newly Funded Centres of Advanced Research

In FY 2024-25, ICMR initiated 14 new CARs, spanning oncology, metabolic disorders, infectious disease diagnostics, advanced gene and cell therapies, neurodegenerative diseases, and regenerative medicine. These include oral insulin microdevices, rabies IgY antibodies, CAR-T/NK therapy platforms, bio printed corneal implants, and novel epilepsy drugs. The projects bring together IITs, IISc, AIIMS, Aurigene Oncology, TMC-ACTREC, LV Prasad Eye Institute, and startups like Inte-E-Labs, reflecting a public–private translational ecosystem. These CARs strengthen India's frontier capabilities in cell therapy, nanomedicine, and bioengineering with long-term global relevance.

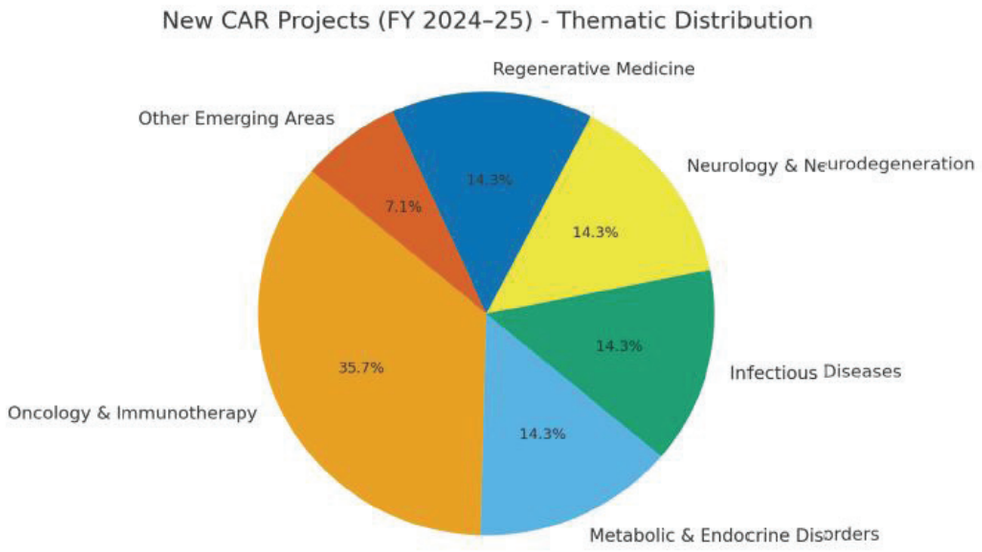


Figure 5: Thematic classification of new CAR Projects (FY 2024-25)

Chapter : 10 Delivery and Implementation Research: Scaling Science for Impact

The Delivery Research Division of the ICMR serves as a pivotal link between scientific discovery and real-world health impact. It anchors the Council's extramural implementation research portfolio, translating innovations from laboratories, clinics, and communities into scalable models for public health delivery. During FY 2024–25, the Division continued to advance ICMR's mission of ensuring that high-quality evidence informs national health programmes, while strengthening India's capacity for outcome-driven, technology-enabled, and community-responsive health research.

Delivery Research catalysed several milestone achievements: deployment of AI-enabled screening tools for tuberculosis under the National TB Elimination Programme; advancement of indigenous diagnostics, therapeutics, and vaccine trials; establishment of NRROID aligned with the National Policy for Rare Diseases (2021); and initiation of multi-state implementation research initiatives such as *Sankalp, UNNATI, LaQshyaNHRP,* and ICMR-MINDS. These programmes have strengthened the bridge between research and policy by generating actionable data, fostering cross-sectoral collaboration, and building implementation capacity at national and sub-national levels.

Through ongoing projects, programme supports of national importance, and over sixty capacity-building workshops across the country, the Division has reinforced its leadership in implementation and translational science. The 2024–25 cycle reflects ICMR's growing emphasis on using data, technology, and participatory models to make healthcare delivery more responsive, evidence-based, and sustainable

10.1 Initiative of National Importance

Table 39: Key initiatives of National Importance by the Division

Domain	Achievements
Diagnostics – Phage Lysin Technique	Improved TB detection by BACTEC MGIT 960 using Phage Lysin technique. New Phage lysine developed and validated for improving liquid culture *Mycobacterium tuberculosis* detection. Normal flora growth inhibited by phage, improving the *Mycobacterium tuberculosis* detection.
Diagnostics – Circular RNA (cRNA) Biomarker	cRNA as diagnostic biomarker. cRNA isolated from serum and plasma, library created, bioinformatics programme (molecular docking) done. cRNA isolation method validated. cRNA identified as as promising biomarker for PTB.
Vaccine – Phase III TB Trial (VPM1002 & MIP/Immuvac)	Phase III TB Vaccine trial using 2 vaccines rBCG (VPM1002) &Immuvac: POD trial using two vaccine candidates VPM1002 and MIP recently completed and report submitted to CDSCO. The vaccines were found to be safe. VPM1002 demonstrated 50% efficacy against microbiologically confirmed EPTB but no efficacy against microbiologically confirmed PTB.

Domain	Achievements
Therapeutics – Clofazimine Regimen and Sertraline Adjunct	For DS-TB: A 4-month clofazimine containing regime (clofazimine in place of ethambutol in DS-TB) was evaluated for DS-TB and the results showed that the shorter 4-month Clofazimine containing regimen is safe. The regimen also led to early culture conversion and can be used for treatment of DS-TB patients under NTEP. The ICMR expert committee recommended that the regimen can be used under NTEP in operational research mode. The study showed that Sertraline (SRT) as an adjunct to ATT improved the bioavailability, PK and PD of the anti-TB drugs and has the potential for improving treatment of the DSTB.
National Registry for Rare and Other Inherited Disorders (NRROID)	India's first prospective nationally represented, multi-center hospital-based observational study. Currently, 16,161 rare disease patients have been enrolled in the registry with a confirmed diagnosis falling under the 6 broad groups of rare disorders namely, Storage Disorders, Inborn Errors of Metabolism, Skeletal Dysplasia, Neuromuscular Disorders, Primary Immunodeficiency, and Haematological Disorders. Steps are being taken to successfully align the registry as per National Policy for Rare Diseases (NPRD, 2021). Updated data from the registry regarding various Rare Disorders is regularly provided to the Ministry for policy support.
COVID-19 Registry for Pregnant Women	The COVID-19 Registry collected data from 20 institutes across the country. The registry includes data from 18,360 pregnant women, comprising 7,902 COVID-19-positive cases and 10,458 COVID-19-negative women. The study was geographically representative. The study found high maternal mortality among COVID-19 positive women with deaths recorded in 2.47% women. The COVID-19 positive women had higher odds of complications like pregnancy induced hypertension, gestational diabetes, need for ventilation. These women also had higher odds of adverse pregnancy outcomes like still birth, neonatal death, very/ extremely low birth weight babies.
TB Patient Score Card (TB-PSC)	TB Patient Score Card - TB-PSC is an innovative tool for community participation in getting feedback regarding TB health services. It is developed and validated and found to be feasible to implement at public health facilities with monthly interface meetings. TB-PSC showed improvement in patient satisfaction for health services.
NYKS – Youth Engagement Model for TB	NYKS – NYKS (*Nehru Yuva Kendra Sangathan*) could be used to create TB awareness programme and active case finding at village level by involving youth club. Youth club members of NYKS have conducted various TB awareness programmes and surveyed the TB case. New TB cases were reported and made sure to be treated. Active screening was done in villages of 6 sites vis., Jaipur, Pune, Patna, Lucknow, Bhopal, and Ratlam, in India. Involvement of NYKS has been found to be feasible and cost-effective model in active case finding for TB at village level.
Policy Contribution – Madhya Pradesh MCH Mission	Contributed to the policy document of the state of Madhya Pradesh upon invitation by the Mission Director, NHM- Maternal and Child *Sanjeevan* Mission Strategy Document was launched by the Chief Minister of Madhya Pradesh on 7th April 2025.
100-Day TB Campaign Support	The ICMR provided support to NTEP in 100-day campaign of active case finding for TB cases. A total of 17 Hand-held X-rays were provided along with the X-ray technician for doing X-ray in the community at 17 districts in Madhya Pradesh. Of these 17 districts, team of medical officers, health assistant, laboratory and X-ray technicians supported the campaign in two districts completely and a total of about 58000 x-rays were done in these two districts wherein about more than 5 lac population was screened.

10.2 Completed Centres for Advanced Research

In FY 2024–25, three Centres for Advanced Research (CAR) projects successfully concluded, each contributing significantly to clinical and public health knowledge.

The first, hosted at AIIMS New Delhi, focused on neuromodulation in mental health. Using high-frequency repetitive transcranial magnetic stimulation (rTMS), the project demonstrated both safety and therapeutic potential in patients with somatic symptom disorder. This represents a novel application of neurostimulation in psychiatry, with implications for scalable non-pharmacological interventions.

The second project established a National Registry on COVID-19 infection in pregnant women and neonates, compiling data from over 18,000 participants across 20 institutes nationwide. The findings were critical, highlighting elevated maternal mortality (2.47%) and increased risks of obstetric complications, adverse neonatal outcomes, and stillbirth among COVID-19 positive women. The dataset has been integrated with broader studies such as PRAYAS, ensuring that insights inform maternal health policy and preparedness for future pandemics.

The third project, the ICMR CAR in Childhood Respiratory Diseases, produced an impressive body of work with ten high-quality publications. It advanced diagnostic algorithms, explored genetic underpinnings of rare conditions like primary ciliary dyskinesia, and pioneered innovative care models such as video-based physiotherapy for cystic fibrosis. Collectively, these CAR completions reinforce ICMR's translational research agenda, linking advanced science with urgent health needs.

10.3 Ongoing Small Grant Projects

The ongoing portfolio of 35 Small Grant projects in FY 2024–25 reflects a strong emphasis on India's major health priorities, with non-communicable diseases (NCDs) dominating at 31% of studies. These projects address stroke care, diabetes, respiratory disorders, and innovative approaches such as AI-enabled diagnostics, underscoring a translational push in chronic disease management.

Maternal and child health (23%) forms the second-largest share, tackling preeclampsia, reproductive health, pre-conception care, epilepsy in pregnancy, and cardio-obstetric risks. Cancer research (14%) highlights screening, survivorship, and community-based prevention, while nutrition (11%) projects target anaemia, fortified foods, and diet-related interventions for children and high-risk groups. Mental health (11%) studies focus on adolescent suicide prevention, transgender wellbeing, substance use, and digital mental health innovations. Emerging areas include geriatrics (6%) and community health for vulnerable populations (3%). Together, this diverse portfolio reflects a balanced strategy: addressing India's pressing NCD burden while simultaneously advancing maternal, child, nutritional, and mental health agendas.

10.4 Ongoing Intermediate Grant Projects

The 13 ongoing Intermediate Grant projects for FY 2024–25 highlight a balanced focus across India's health priorities, with a strong emphasis on NCDs (4 projects) and Maternal/Child Health (3 projects). NCD-related projects address oral health access, surgical solutions for temporomandibular joint ankylosis, stroke prevention through telemedicine, and early detection of neuropathy in diabetes and leprosy, reflecting both clinical innovation and public health scaling. Maternal and child health studies explore

high-impact interventions such as intact cord resuscitation for neonates, cardio-obstetric care for pregnant women with heart disease, and peer-led management for gestational diabetes, underscoring translational research in maternal safety.

The portfolio also supports geriatric health (2 projects), testing psychosocial interventions to improve quality of life for elderly populations, and communicable diseases (2 projects), with a focus on antimicrobial stewardship and lymphatic filariasis rehabilitation. Cancer research and mental health each account for one project, targeting community cancer triaging and epilepsy care in schools. Collectively, these grants showcase applied, patient-centred solutions aligned with national health system priorities.

10.5 Ongoing Centres for Advanced Research

During FY 2024–25, six Centres for Advanced Research (CAR) projects were operational. The Smart Village initiative was launched to address inequities in rural healthcare by integrating digital health solutions. The Time is Life project worked on improving perinatal outcomes through changes in birth practices, referral systems, and family responsiveness. At NIMHANS Bengaluru, a Centre for Advanced Research in Digital Interventions for Mental Health Care was established. A multicentric programme at St. John's Medical College Hospital was initiated to evaluate the impact, cost-effectiveness, and sustainability of a low-cost intervention package for reducing cardiovascular disease burden. NRROID continued to expand, enrolling 16,161 patients across multiple Centres of Excellence, and aligned itself with the National Policy for Rare Diseases (2021) to provide regular data inputs for policymaking. The First 1000-Days of Life project in Karnataka completed its first 10 months of implementation.

10.6 Newly Funded Small Grant Projects

The 28 new Small Grant projects initiated in FY 2024–25 reflect a broad spectrum of India's health research priorities, with the strongest concentration in maternal/child health (6 projects) and communicable diseases (6 projects). Maternal and child health studies range from midwife-led intrapartum care and neonatal Kangaroo Mother Care integration to early child development and paediatric empyema management, showcasing efforts to improve survival and long-term wellbeing. Communicable disease projects address tuberculosis, antimicrobial resistance, perioperative infections, HIV diagnostics, and hospital-acquired infections, highlighting India's commitment to containment and quality of care.

NCD research (5 projects) targets multimorbidity, stroke rehabilitation, renal health, and digital diabetes interventions, reflecting the rising chronic disease burden. Cancer (3 projects) focus on survivorship, financial navigation, and patient-centred care models, while mental health (3 projects) emphasise adolescent resilience and school-based interventions. Nutrition and geriatrics feature in smaller but significant studies. Climate-linked health preparedness also emerges. Together, these projects underline ICMR's strategy of combining immediate public health needs with future-oriented innovation.

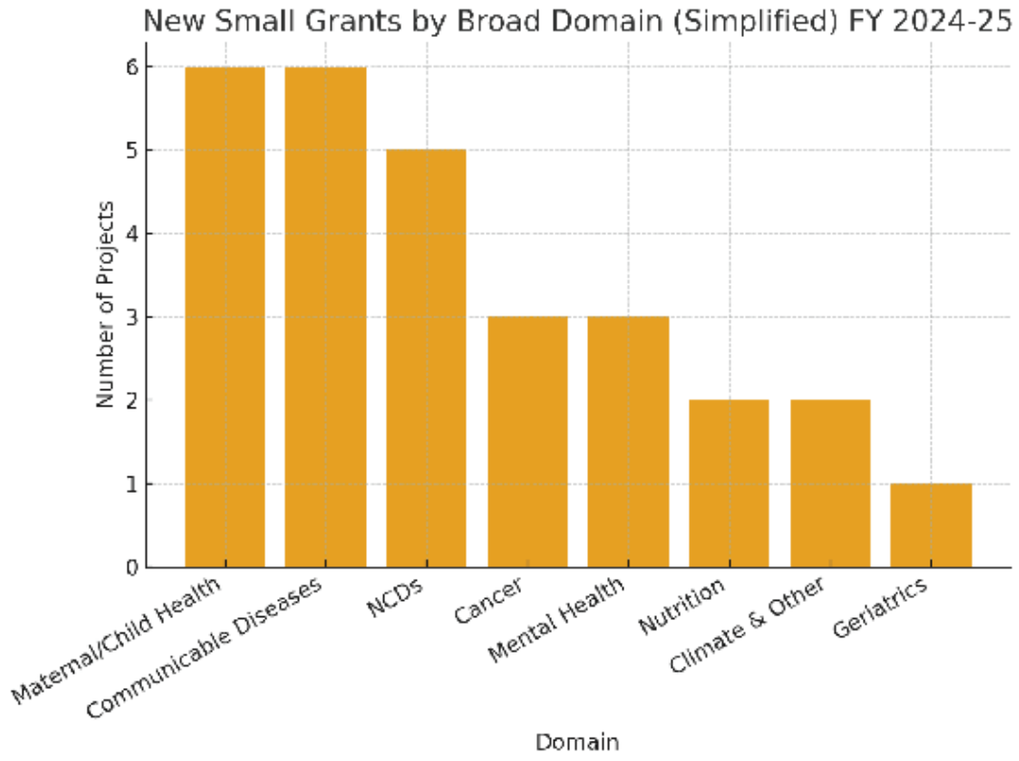


Figure 6: New Small Grant Projects (FY 2024-25) by domain

10.7 Newly Funded Intermediate Grants

The 16 new Intermediate Grants in FY 2024–25 reflect a diversified but strategically focused portfolio. Maternal and child health dominates (7 projects), with studies addressing neonatal care through Kangaroo Mother Care, early childhood development, management of childhood cancers such as retinoblastoma, interventions for disadvantaged populations, and reproductive health challenges like endometriosis. This demonstrates a strong commitment to maternal and child survival, growth, and wellbeing.

NCDs (5 projects) form the next largest group, piloting innovative prevention and management strategies, including digital tools for tobacco cessation, comparative models for NCD prevention, community health promotion for youth, and integrated hypertension control in tribal areas.

Communicable diseases (2 projects) remain critical, with trials on TB diagnostic systems and leprosy vaccination. A health systems initiative (1 project) seeks to expand physician-certified mortality data, while a mental health project (1 project) develops a community-led model for addressing substance abuse among transgender populations. Collectively, these projects bridge prevention, innovation, and inclusivity.

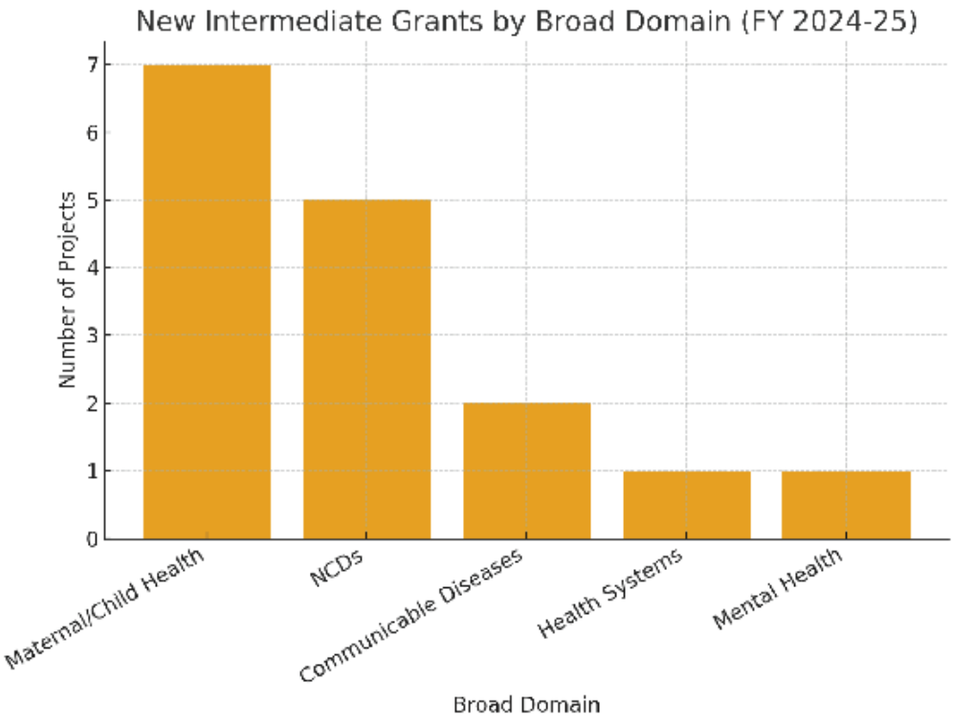


Figure 7: New Intermediate Grants by Broad Domain (FY 2024-25)

In FY 2024–25, the category of other extramural and multicentric programmes (NTF) showcased both completed and ongoing work of national importance. Three projects were successfully completed: the Sertraline adjunct therapy (SINERG) trial which improved anti-TB drug bioavailability, the youth-led TB screening model with NYKS which proved feasible and cost-effective at the village level, and the Phase III TB vaccine trial (VPM1002 and MIP) that demonstrated safety and 50% efficacy against extrapulmonary TB while also building trial capacity across 18 Indian sites.

Ongoing programmes are wide-ranging and align with priority health domains:

i. Mental health and NCDs through ICMR-MINDS, suicide prevention in schools, resilience (PARAM), and yoga-based cardiac rehab.

ii. Communicable diseases through large TB diagnostic and treatment studies, drug resistance surveillance, and tribal-focused interventions.

iii. Maternal, newborn and child health (NTF studies) through *Sankalp* (neonatal mortality), UNNATI (child growth standards), and LaQshya (quality intrapartum care).

No new multicentric/NTF programmes were initiated in this reporting year.

10.8 Ongoing Extramural Research Projects received from national/international agencies (FY 2024–25)

In FY 2024–25, ICMR's training portfolio placed strong emphasis on structured programmes to strengthen India's health research ecosystem. The flagship initiative was the Grantathon India: Young Investigator Training Workshop (YITW), conducted in collaboration with the Fogarty International Centre, NIH. This programme is designed to mentor early-career scientists, focusing on grant writing, study design, and long-term peer networking, thereby building a pipeline of capable health researchers. Complementing this, a series of Research Methodology Training Workshops were organised at different centres, equipping medical faculty, doctoral scholars, and postgraduates with essential skills in biostatistics, research ethics, and protocol development.

ICMR also advanced its agenda on implementation research (IR) through specialised capacity-building workshops supported by WHO-TDR, which introduced participants to tools for bridging research and health systems practice. Together, these programmes not only trained researchers in technical skills but also embedded a culture of evidence-to-policy translation, ensuring wider system impact beyond academic outputs.

Table 40: Delivery Research Contributions to National Health Policies (FY 2024–25)

Policy Area	Evidence / Contribution	Source of Evidence	Policy Linkage
Maternal & Child Health	Data on maternal and neonatal outcomes during COVID-19	National COVID-19 Pregnancy & Neonates Registry	Informed maternal and perinatal management guidelines during the pandemic
Rare Diseases	Prevalence and diagnostic data for 16,161 patients	NRROID, 12 Centres of Excellence	Supported National Policy for Rare Diseases (2021); regular updates shared with MoHFW
Non- Communicable Diseases (NCDs)	Implementation research findings on hypertension, diabetes, and mental health interventions	Ongoing extramural projects (NCD portfolio)	Aligned with NPCDCS (National Programme for Prevention & Control of Cancer, Diabetes, Cardiovascular Diseases & Stroke)

In FY 2024–25, ICMR's extramural research portfolio contributed directly to policy formulation and programme strengthening across critical health domains. The National COVID-19 Registry on pregnant women and neonates provided real-time evidence on maternal mortality, obstetric complications, and neonatal outcomes during the pandemic. These insights were shared with policymakers and translated into improved clinical and public health guidelines for maternal and perinatal care in emergency settings.

ICMR National Registry for Rare and other Inherited disorders (NRROID) has become a cornerstone for policy development in rare diseases. By enrolling over 16,000 patients across 12 Centres of Excellence, it generated prevalence and diagnostic data that informed and supported the National Policy for Rare Diseases (2021), with regular updates shared with the Ministry of Health & Family Welfare.

In the field of non-communicable diseases, findings from hypertension, diabetes, and mental health projects were aligned with NPCDCS, ensuring that research outputs directly strengthened national NCD control strategies.

In FY 2024–25, ICMR's delivery research programmes advanced several notable innovations and patents that bridge clinical research with applied health solutions.

At AIIMS New Delhi, the Centre for Advanced Research in Neuromodulation filed patent applications for protocols and devices employing high frequency rTMS, aimed at improving treatment options for psychiatric conditions such as somatic symptom disorder.

In the domain of paediatric health, the ICMR-CAR in Childhood Respiratory Diseases developed diagnostic algorithms for cystic fibrosis and interstitial lung disease, along with video-based physiotherapy modules to support cystic fibrosis patients, particularly in home-care settings.

Meanwhile, NRROID demonstrated systemic innovation by establishing advanced registry designs, standardised data-sharing frameworks, and genetic diagnostic pathways across 12 Centres of Excellence. These outputs represent a strategic shift from research-only outcomes to tangible technologies, diagnostics, and data infrastructures that are directly applicable to patient care and health system strengthening in India.

Section IV
Transformative Research Initiatives

Chapter 11 : National Health Research Priorities: Investing in India's Next Generation Health Missions

In addition to Extramural and Intra-ural projects, a separate programme has been established to fund projects addressing National Health Research Priorities, which will be monitored directly by the Director General (DG) of ICMR. These priorities are identified by the Scientific Advisory Board (SAB) and approved by the Governing Council (GC), with relevant research questions determined based on feedback from multiple stakeholders. Expressions of Interest (EoI) are invited based on priority research questions in each area and projects are co-developed through collaboration between the applicants and ICMR, with a focus on multi-centric approaches guided by commonly agreed protocols. Multiple projects can be funded for each priority area, with an emphasis on achieving significant and impactful improvements in addressing priority health challenges.

NHRP is India's principal framework for implementing coordinated and mission-oriented research across critical areas of public health. The current portfolio, based on verified data from the compiled NHRP project list, records thirty ongoing projects, of which twenty-nine include detailed progress updates. Together, they reflect a structured and evolving research ecosystem under ICMR, covering national missions, clinical trials, diagnostics, implementation studies, and capacity-building activities. The total financial commitment for these projects stands at approximately ₹551.77 crore, encompassing initiatives of varying scales, from national platforms valued at nearly ₹250 crore each to smaller studies under ₹10 crore. Instead of grouping projects only by administrative divisions, this chapter organises them by strategic function, revealing the purpose and contribution of each category to India's health priorities. This functional approach makes it easier for parliamentarians and senior decision-makers to assess how NHRP investments strengthen India's research infrastructure, disease-preparedness mechanisms, and service delivery systems.

11.1 Overview of the Functional Classification

Table 41: Overview of Functional Classification of projects under the NHRP

Strategic Function (Axis A)	No. of Projects	Approx. Budget Range (₹crore)	Core Focus
National Missions & Research Platforms	5	240–250	Elimination, surveillance, modelling, biomedical standards
Clinical & Interventional Trials	2	8–240	Vaccine & anaemia trials

Strategic Function (Axis A)	No. of Projects	Approx. Budget Range (₹crore)	Core Focus
Implementation & Service Delivery Research	10	15–25	Programme strengthening, convergence, facility models
Diagnostics & Technology Development	1	~4	Indigenous Diagnostic Kits
Capacity & Network Building	3	5–15	Training, evaluation, human resource development
Chronic Disease Research	2	10–20	NCD facility & community models
System Evaluation & Descriptive Studies	2	4–10	Health system assessment
Innovation & Formative Pilots	4	<10	Experimental or pilot initiatives

The programme's portfolio can be viewed across eight major functional categories. These include national missions and research platforms, clinical and interventional trials, implementation and service-delivery research, diagnostics and technology development, capacity and network building, chronic and non-communicable disease research, system evaluation and descriptive studies, and smaller innovation or pilot initiatives. Each category addresses a distinct area of the health research continuum, ranging from foundational national preparedness to localised innovation, and together they illustrate how research outcomes are linked to policy action.

The first and most resource-intensive category is the group of national missions and research platforms, which contains five projects with individual budgets between ₹240 crore and ₹250 crore. These represent roughly half of the entire programme's financial allocation and are central to India's long-term health security. The Mega Tuberculosis Elimination Project (₹249 crore) focuses on achieving the country's End TB goal by using research-led implementation models that integrate surveillance, diagnostics, and community engagement. This project illustrates how evidence from field research is being used to accelerate national disease-control targets. The Pan-India Surveillance for Respiratory Viruses through the Viral Research and Diagnostic Laboratory (VRDL) Network, builds an extensive surveillance platform that monitors respiratory pathogens nationwide. Its formative and evaluation stages are active, and the network serves as a foundation for continuous pandemic preparedness by linking research laboratories with public-health reporting systems. Another major undertaking is the Phase III Multicentre Vaccine Trial (₹240 crore), which is currently enrolling participants and undergoing evaluation. This study tests vaccine efficacy, safety, and immunogenicity under Indian conditions, ensuring that national immunisation decisions rest on domestic evidence. Equally foundational is the Task Force on Establishment of Reference Intervals in the Indian Population (₹249.9 crore), which seeks to generate India-specific biomedical reference standards for clinical diagnosis. By establishing normal ranges for laboratory values based on Indian population data, it corrects a long-standing dependency on international reference systems. The fifth platform, the National Disease Modelling Consortium (₹245.9 crore), builds a computational infrastructure for predictive modelling and outbreak forecasting. This project will allow policymakers to use real-time data and simulations for proactive decision-making on disease control and resource allocation. Together, these five initiatives provide the scientific and analytical foundations of national health security, demonstrating how evidence generation and surveillance are now embedded within India's policy architecture.

The second functional category includes clinical and interventional trials, where research directly evaluates therapeutic or preventive interventions. The dataset identifies two active projects. The first is the ICMR–CCRAS Clinical Trial on Nutritional Anaemia (₹8.29 crore), a multi-centre randomised study currently in the enrolment phase. It tests nutritional strategies aimed at reducing anaemia prevalence, a persistent public-health challenge affecting women and children. Findings from this trial will contribute to refining large-scale programmes such as *Anaemia Mukt Bharat* and *POSHAN Abhiyaan.* The second project, the Phase III Vaccine Trial, though also classified under national missions, functionally represents an interventional clinical study at the national level. It validates India's capacity to conduct globally compliant vaccine trials and supports the regulatory ecosystem for future immunisation initiatives. Clinical research within the NHRP portfolio ensures that interventions introduced in national health programmes are grounded in scientifically verified outcomes relevant to the Indian population.

The largest cluster in terms of project count is implementation and service-delivery research, consisting of ten active initiatives. These projects, typically in the ₹15–25 crore range, focus on improving the efficiency, integration, and quality of service delivery across districts and facilities. The *Sankalp* project (approximately ₹24 crore) covers ten districts and has completed protocol development along with the establishment of an electronic data-capture system. It exemplifies how digital tools can support real-time monitoring and strengthen programme implementation at the district level. The Multistate Operational Models of Service Delivery (₹17.09 crore) is examining how services are organised across diverse administrative contexts to identify scalable practices. The Structural Convergence and Integrated Programmes Project (₹1.45 crore), operating in Uttarakhand and Kerala, has finished its formative phase and focuses on aligning multiple health schemes to reduce overlap and improve resource use. A related project, Strengthening Ambulatory Care for Non-Communicable Diseases, explores how primary and secondary facilities can adapt to the growing burden of chronic disease through improved outpatient management. The Adaptive Facility-Based Intervention Model works on redesigning facility workflows to enhance clinical outcomes and resource efficiency, while the Improving Survival in Childhood Acute Lymphoblastic Leukaemia project develops coordinated systems for early diagnosis and timely treatment in paediatric oncology units. Additional entries in this category include a Hybrid Delivery/Development Operational Research Project, which integrates service-delivery improvements with developmental evaluation, and smaller facility-strengthening studies addressing non-communicable conditions. One project has completed its formative phase and entered closure, marking progress through defined implementation cycles. Collectively, this group demonstrates how implementation research connects policy design with ground-level delivery, producing evidence that can be directly adopted by state governments and health missions.

A single but important project represents the diagnostics and technology-development function: the Development of In Vitro Diagnostic (IVD) Kits (₹3.31 crore). Conducted across four major institutions, including AIIMS Delhi and CMC Vellore, this project focuses on producing indigenous diagnostic tools. The first-year evaluation has been completed, and recommendations for refinement have been issued. The project is significant because it enhances national self-reliance in medical diagnostics, reduces dependence on imported kits, and accelerates access to affordable testing technologies within public-health programmes. In practical terms, it links directly to the government's goal of building domestic biomedical manufacturing capacity.

The capacity and research-network-building component includes three projects grouped under the Research Capacity Network (RCN). These initiatives operate in formative and evaluation phases and are designed to strengthen institutional and human-resource capability in health research. One project focuses on structured training and workshops to enhance research methodology skills among early-career investigators. Another project is

building collaboration frameworks between institutions to facilitate coordinated, multi-site research. A third focuses on establishing monitoring and evaluation systems for assessing research performance. Together, these efforts ensure that the country's research infrastructure grows sustainably and that the outcomes of large national projects are supported by skilled personnel and responsive institutions. By focusing on capacity rather than outputs alone, these projects embed sustainability within India's health-research architecture.

Two projects fall under chronic and non-communicable disease (NCD) research. These are in early formative and evaluation stages, consistent with the longer timelines required for chronic-disease interventions. The first is a facility-based study aimed at improving integrated management of NCDs within the public-health system. It analyses how existing infrastructure can support long-term follow-up and patient continuity. The second is a community-level pilot that evaluates preventive and screening strategies for hypertension and diabetes through primary healthcare channels. These projects, though smaller in scale, are strategically significant because they provide models for adapting India's health system to the country's changing epidemiological profile, where chronic diseases now account for the majority of the national disease burden.

Two other projects are categorised as system-evaluation and descriptive studies. These provide cross-sectional insights into service performance, diagnostic utilisation, and institutional coordination. One focuses on evaluating the quality of diagnostic and service systems, while another examines field-level implementation processes and reporting mechanisms. These descriptive studies feed empirical evidence into system-improvement strategies and offer evaluative support to larger ongoing interventions. Their presence in the portfolio ensures that research outcomes are continuously reviewed and adjusted through measurable indicators.

The final category includes four innovation and formative-pilot studies, which are smaller projects listed in the dataset with partial or incomplete titles and status updates. While less detailed, these studies are crucial for maintaining agility within the programme. They act as rapid-response or exploratory mechanisms that test new methodologies or technologies before scale-up. Typically, below ₹10 crore in cost, they serve as the programme's innovation pipeline, supporting emerging areas where evidence is still limited or where quick experimentation is necessary to guide policy design.

Viewed across these eight functional categories, the NHRP's portfolio shows a coherent balance between strategic national platforms and applied operational research. Financially, the five mega projects under national missions and platforms account for around ₹3,230 crore, or nearly half of all funds. The ten implementation and service-delivery projects collectively represent about ₹3200 crore, forming the practical arm of the research system. Clinical and interventional trials contribute another ₹248 crore, while diagnostics, capacity-building, chronic-disease research, evaluation studies, and pilot projects share the remaining portion. The pattern demonstrates that high-investment projects provide national infrastructure and long-term capability, whereas mid-range and smaller studies sustain innovation and local application.

Progress information shows that twenty-nine of the thirty projects have reported current status updates. Twelve projects are in the formative or baseline stage, four are actively in enrolment or implementation, five are undergoing evaluation or review, three are in protocol-development or design phases, and five have completed defined sub-phases. This distribution indicates a healthy project pipeline, with activities spread across all stages of the research cycle. Most service-delivery projects remain in formative stages because they involve multi-site coordination and baseline data collection. By contrast, large national missions and clinical trials have moved to active enrolment and evaluation, showing that field operations and data generation are underway. Diagnostic and capacity-building initiatives are progressing through evaluation, confirming that the programme is transitioning from setup

to measurable outcomes. Reporting completeness is strong: twenty-five projects include last-updated dates, confirming active monitoring, while only five entries lack this detail. The missing updates are limited to a few large projects and do not indicate inactivity but highlight the need for consistent reporting intervals.

The data reveal several consistent themes in the programme's evolution. First, the NHRP is creating a structured continuum of research, moving from evidence generation to system application, across disease domains and service tiers. Second, large national platforms in tuberculosis elimination, respiratory-virus surveillance, vaccine trials, biomedical standards, and disease modelling demonstrate India's commitment to building self-reliant health-research systems. Third, the prominence of implementation research shows that evidence translation into operational practice is now a core focus of public-sector research investment. Fourth, the inclusion of diagnostics, capacity-building, and evaluation projects ensures that the ecosystem grows not only through research outputs but also through institutional learning and workforce strengthening. Finally, the presence of pilot and innovation projects indicates that the NHRP remains adaptive, capable of responding to emerging policy needs or scientific opportunities without waiting for new funding cycles.

Approximately 49% of total expenditure is concentrated in the five national-mission projects. Clinical and interventional research account for roughly ten percent. Implementation and service-delivery projects represent about thirty-six percent, showing the emphasis on translating policy into operational models. The remaining categories, diagnostics, capacity building, NCD research, evaluation, and innovation, share the residual five to six percent but provide essential supporting functions. This proportional structure aligns with the intended design of a national research programme: large strategic investments complemented by multiple smaller initiatives that generate applied knowledge, tools, and human capacity.

The formative and protocol stages emphasise design and baseline data development; enrolment and implementation signify field activity; and evaluation and closure mark the assessment and learning phases. This sequential distribution ensures that projects collectively cover the entire cycle from concept to translation. For policymakers, it confirms that the NHRP is functioning as a coordinated system rather than as isolated studies.

Across all categories, several noteworthy developments can be highlighted. The introduction of electronic data-capture systems, as reported in the Sankalp project, demonstrates how digital tools are becoming integral to implementation research. The completion of formative phases in projects such as structural convergence and multi-state delivery research indicates that groundwork has matured and transition to subsequent stages is occurring.

From a policy standpoint, the NHRP's ongoing portfolio reflects alignment with India's health priorities and global commitments. The TB elimination initiative contributes directly to the national target of ending tuberculosis by 2025. The VRDL network and disease-modelling platform extend India's surveillance and forecasting capacity beyond individual disease programmes, embedding preparedness in the research infrastructure itself. The reference-interval project addresses diagnostic equity by ensuring that laboratory standards reflect Indian biological variability. Implementation research at the district level supports state health systems in achieving better efficiency and accountability. Meanwhile, capacity-building and evaluation studies ensure that the entire ecosystem remains functional and future-ready.

Table 42: Implementation Status of NHRP Projects, FY 2024–25

Status Level	What It Means	Projects
Fully operational / Implementation ongoing	Data collection, interventions being tested at scale	Sankalp Neonatal Mortality, EQUIP-HWC (ICMR-funded sites), CONVERTECH-HWC (Year-2 implementation), MINDS (Model M0 rollout ongoing), Breast Cancer Stage-II implementation, Oral Health – *ANANT MUSKAAN* scale-up, STAR-NCD, UNNATI (screening and follow-up ongoing), Mega TB Elimination, Dengue Phase-III Vaccine Trial, Adaptive Emergency Care Model (site implementation initiation), DIGI-Care (data collection initiation), Oxfendazole Phase-IIa recruitment soon
Formative Phase near completion	Tools built, research completed, pilots beginning	EQUIP-HWC (BMGF-funded sites), STEPS-India (Hypertension & Diabetes Engagement), NECCTAR RCT (Take-home ration), Cancer Screening Implementation Research (Oral, Breast & Cervical cancers), *PRAKASH – Anaemia MuktBharat* 2.0 strategies finalisation
Mid-pipeline: training / co-development ongoing	Mixed-method research done, stakeholder workshops held	Stillbirth Reduction Model: RCN, district emergency care model strengthening (NCD div.), implementation oncology trials under ICMR-NCG, suicide risk reduction among school & college students (formative phase ongoing), reference intervals in Indian population (TERIIP) groundwork
Descriptive / Product development	Prototype/kit design under evaluation	In-vitro diagnostic kits for drug-resistant *Salmonella*, Flu &Pneumococcal Vaccine Effectiveness in Elderly, AMR surveillance expansion in secondary hospitals
Early Implementation Prep	Staff recruitment, approvals, procurement	Respiratory virus surveillance through VRDL network, national disease modelling consortium

In conclusion, the National Health Research Programme's ongoing projects, as recorded in the current dataset, illustrate a well-balanced and advancing research portfolio. Financial and functional diversity within the programme ensures that strategic, operational, and scientific goals are pursued simultaneously. The five national-mission projects represent India's investment in self-reliant scientific infrastructure and global health security. The cluster of implementation and service-delivery studies provides the applied knowledge necessary for improving everyday programme performance. Clinical trials and diagnostic projects contribute evidence and technology that feed directly into national initiatives. Capacity-building, NCD research, and evaluation studies ensure sustainability and relevance, while pilot projects keep the programme innovative and adaptable. In essence, the programme has evolved into a comprehensive framework that connects research, policy, and implementation across scales, ensuring that India's health-research system continues to develop as both a scientific and a strategic national asset.

Chapter 12 : First in the World Challenge: Launching India's Global Leadership in Health Innovation

In 2024, ICMR launched what is arguably one of its most daring and visionary programmes, the First in the World (FIW) Challenge. The FIW Challenge is a strategic national initiative of ICMR aimed at catalysing unprecedented biomedical innovations. It provides a structured mechanism for supporting bold, globally unique ideas at any research stage, from conceptualisation to final product development.

The FIW Challenge addresses the innovation deficit in biomedical science by supporting bold, untested ideas for future health challenges like AMR and emerging diseases. It strengthens India's global scientific leadership, promotes high-risk research culture, and aims to create first-ever diagnostics, vaccines, drugs, devices, and digital health platforms.

With a three-tier funding system (up to ₹8 crore for mature products) and wide eligibility covering academia, industry, and start-ups, the scheme integrates flexibility, inclusiveness, and rigorous review. The first call (2024–25) resulted in 27 projects distributed across 11 states, addressing a broad spectrum of health research areas such as infectious diseases, cancer, medical devices, regenerative medicine, nanotechnology, and AI-based diagnostics.

The FIW Challenge supports projects at three levels of development. Each level corresponds to a specific maturity stage of the proposed research idea, with funding and duration caps defined as follows:

Table 43: First in the World Challenge overview

Stage	Purpose	Maximum Funding (₹ Cr)	Maximum Duration	Description
Proof of Concept	To design and develop a proof of concept from a novel idea	1	2 years	Conceptual or early-stage projects demonstrating feasibility
Prototype Development	To develop prototypes based on successful proof of concept	4	4 years	Shortlisted projects progress to this stage after evaluation
Final Product / Model Development	To develop the final product or implementation model	8	4 years	Mature projects reaching productization or system model design

Each approved project follows the ICMR's established governance structure for extramural research:

i. Institutional ethical clearance (IEC) is mandatory where applicable.

ii. Fund utilisation must adhere to standard Codal formalities and submission of required documentation.

iii. Monitoring of project progress is conducted through periodic reports, mid-term review meetings, and final evaluation by domain experts.

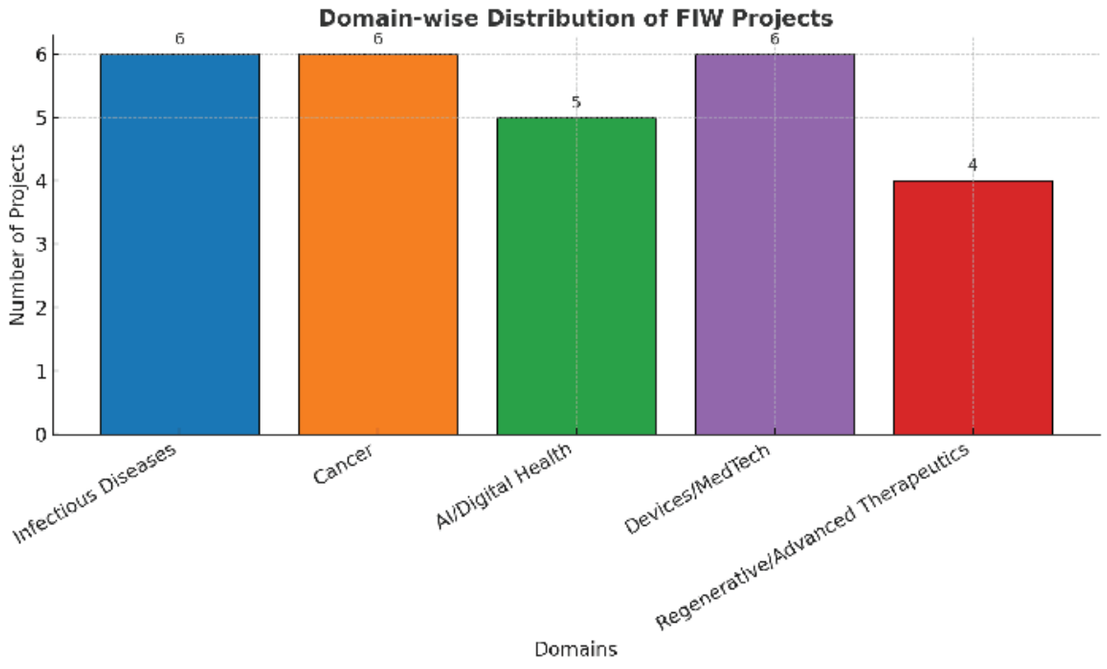


Figure 8: Domain-wise Distribution of FIW Projects

The 27 projects under the first call of FIW Challenge, in the domain of Infectious diseases and cancer together account for nearly half of the portfolio, reflecting ICMR's priority on both high-burden public health challenges and precision medicine frontiers. AI and MedTech projects show strong convergence, with India leveraging its engineering strengths to develop globally novel solutions. Regenerative and frontier science projects such as bioprinting, microbiome engineering, and ingestible systems represent the most disruptive innovations, directly aligning with the programme's moonshot ethos.

Overall, the FIW Challenge portfolio demonstrates a deliberate strategy of balance, convergence, and bold experimentation, with a distinctive Indian signature blending frugal innovation and global-first ambition.

The first call FIW Challenge projects approved under also reveals a wide geographical distribution across India, demonstrating the initiative's reach beyond a few metropolitan centres and its role in energising innovation across states. Karnataka emerged as a leading contributor, with multiple projects spanning neurodegenerative disorders, gene therapy, immuno-oncology, and microbiome engineering, highlighting the state's strong academic and biotech ecosystem. Telangana also featured prominently, with projects on corneal bioprinting, neonatal sepsis diagnostics, and novel radiation-based cancer therapeutics, reflecting its growing biomedical and engineering research base.

Other significant contributions came from Maharashtra, focusing on diabetic complications, lung cancer, and radiation protection, and from Delhi, which hosted projects on AI-enabled diagnostics, transfusion safety, and oral insulin delivery systems. States such as West Bengal, Uttar Pradesh, Kerala, Assam, Haryana, Puducherry, Chandigarh, and Uttarakhand also

contributed innovative proposals across diverse domains ranging from TB detection and IBD therapeutics to minimally invasive cardiac devices and regenerative neural bioprinting.

This distribution underscores two key insights: first, that the FIW Challenge has successfully mobilised a broad and inclusive national research base, extending well beyond traditional biomedical hubs; and second, that regional strengths are being leveraged in distinctive ways, for example, Karnataka in advanced therapeutics and molecular tools, Telangana in translational MedTech, and Maharashtra in oncology and chronic disease solutions. Together, these projects highlight the emergence of a pan-India innovation network capable of delivering globally relevant, first-in-the-world solutions.

Section V
Transformative Collaborations and Support to National Programmes

Chapter : 13 Collaborations & Networks: Expanding the Circle of Innovation

In FY 2024–25, ICMR consolidated its position as the country's principal driver of a collaborative biomedical research ecosystem. The year was defined by multisectoral, multi-ministry, and multi-institutional linkages that expanded from laboratory networks to population registries and clinical trials. Together, these efforts strengthened the interface between science generation, programme delivery, and policy uptake.

13.1 Multisectoral and Inter-Ministerial Integration

The National One Health Mission (NOHM), anchored by National Institute for One Health (NIOH) at Nagpur, stood as the flagship example of ecosystem building. Under the Prime Minister's *Ayushman Bharat* Health Infrastructure Mission (PM-ABHIM), NIOH coordinated the creation of a network of 22 Biosafety Level 3 laboratories across ICMR, ICAR, DBT, CSIR, NCDC, and AIIMS institutes. This initiative harmonised biosafety protocols and enabled rapid outbreak response through shared infrastructure.

A notable achievement was the "*Vishanu Yudh Abhyas*" (Virus War Exercise), a comprehensive national pandemic preparedness mock drill conducted under the aegis of NOHM, in Ajmer from 27 to 31August 2024. The exercise saw multi-ministerial participation, including the Ministries of Health, Animal Husbandry, and Environment along with State Departments. The drill tested the readiness and response capabilities of NJORTwhile validating field coordination protocols. Complementing this, ICMR and NIV trained 42 scientists from 22 institutions in biosafety and biosecurity. The exercise demonstrated ICMR's capacity to act as a nodal platform linking human, animal, and environmental health agencies through operational mechanisms rather than ad-hoc collaboration.

13.2 National Clinical Trials and Registries

The Communicable Diseases Division at ICMR Headquarters spearheaded two major multi-centre clinical trials. The first, a Phase III trial of a tetravalent dengue vaccine in partnership with Panacea Biotech, was conducted across 19 sites in 18 States and Union Territories, making it India's largest dengue vaccine trial to date, with participation from over 10,000 volunteers. The second trial evaluated a single-dose HPV vaccine among 504 girls aged 9–14 years, jointly led by NITVAR, NIRBI, and NICPR. This study aimed to establish the non-inferiority of India's indigenously developed Cervavac compared to its global counterpart, Gardasil. Both initiatives reflect ICMR's collaborative model of industry–academic partnership, conducted under rigorous regulatory oversight and uniform data governance.

Digital registries were another pillar of this ecosystem. The ICMR-MycoNet registry, coordinated by NIMS under NIRDHDS, captured 1,667 ICU cases of invasive fungal infections from eight advanced centres nationwide. Similarly, the *iRegVed* registry on venous thromboembolism, spanning 15 tertiary hospitals, has already logged 2,052 patients. These platforms demonstrate how ICMR's data infrastructure is evolving from discrete studies to real-time national surveillance networks.

13.3 Inter-ICMR Synergy and Hub-and-Spoke Models

Several institutes operated in mutually reinforcing arrangements. NIRT Chennai served as the hub for TB research linking AIIMS, JIPMER, IITs, and CMC Vellore through its satellite units at Madurai and Vellore. These units conducted clinical trials on shorter TB regimens and AI-based diagnostics, while feeding policy evidence to the National TB Elimination Programme (NTEP). NIV Pune functioned as the central hub for 162 VRDLs, mentoring state facilities and serving as a regional reference lab for WHO's Measles–Rubella network.

Within the ICMR family, joint efforts between NIV Pune, NIRBI Kolkata, NIRT Chennai, RMRC Dibrugarh, VCRC Puducherry and NARFBR Hyderabad expanded genomic surveillance and animal model research. These cross-linkages converted ICMR's network of laboratories into a functional ecosystem spanning diagnostics, vaccines, and vector biology.

13.4 National and International Collaborations and Partnerships

ICMR's collaborations at the national and global levels deepened significantly, advancing joint research, disease surveillance, and capacity-building across priority health areas. ICMR - NIV Pune partnered with the CDC (USA), the Coalition for Epidemic Preparedness Innovations (CEPI), and the Bill & Melinda Gates Foundation on vaccine platform development and genomic surveillance. The institute functions as India's WHO-designated National Influenza Centre, monitoring influenza and unusual respiratory events, and serves as an H5 reference laboratory and WHO Collaborating Centre for strengthening capacities in emerging and re-emerging infections. NIV also serves as a CoViNet Reference Laboratory under WHO and joined the International Pathogen Surveillance Network (IPSN) in November 2024. It is further integrated within CEPI's Centralised Laboratory and Animal Model Networks, supporting global pandemic preparedness.

ICMR - RMRIMS Patna collaborated with the University of Oxford's Infectious Diseases Data Observatory (IDDO) to establish a global data platform on Visceral Leishmaniasis (VL) and Post-Kala-Azar Dermal Leishmaniasis (PKDL), contributing evidence to draft WHO treatment guidelines. ICMR - NIRBI Kolkata partnered with Uppsala University and Okayama University on pathogen epigenetics and *Salmonella* vaccine design, while ICMR–RMRC Bhubaneswar worked with the London School of Hygiene & Tropical Medicine and the University of Edinburgh on vector-borne disease control research.

ICMR - NIIH Mumbai licensed its G6PD point-of-care test and multiplex PCR blood group assay to MYLAB Discovery and conducted advanced training for professionals from Kenya, Uganda, Rwanda, and Tanzania under the NNHF Comprehensive Care Programme. ICMR - NIREH Bhopal reported active partnerships with institutions in South Africa, Russia, Poland, France, Sweden, and Finland, and with national collaborators including AIIMS, NIE, IITs, and RMRCs. ICMR - RMRCNE Dibrugarh established regional and global collaborations with RIMS Imphal, IITs, JNU, RGCB, and Harvard University, focusing on health research relevant to the North-Eastern region.

ICMR–NIOH Ahmedabad worked with DBT, CPCB, MoEF&CC, WHO, and the Global Fund on TB surveillance and occupational health, and withWomen in Informal Employment: Globalising and Organising Self-Employed Women's Association (WIEGO–SEWA) to advance research on women's occupational health and safety.

Collectively, these partnerships strengthened knowledge exchange, enhanced India's contributions to global data repositories, and elevated the nation's visibility in multilateral health platforms such as the Global Health Security Agenda (GHSA).

13.5 Technology Translation and Industry Linkages

The ICMR–NARFBR Hyderabad strengthened translational research by validating orthopaedic implants developed at IIT Delhi, testing them on large animal models. It also collaborated with IISc Bengaluru, CSIR-CDRI Lucknow, ICAR-IVRI, and BRIC-NCCS Pune for preclinical biomedical evaluation.

At the other end of the innovation spectrum, NIRT Chennai advanced low-cost AI and CRISPR-based diagnostic kits for TB in collaboration with C-DAC and DBT. NIRBI Kolkata developed a glycoconjugate vaccine candidate against Salmonella and licensed-ready molecular diagnostics. RMRC Gorakhpur achieved patent filing for a point-of-care chikungunya test. These outputs reveal a growing convergence between academia, industry, and government in India's biomedical technology landscape, coordinated through ICMR's internal grant ecosystem.

13.6 Cross-Disciplinary Networks and Data Infrastructure

ICMR's strength in data science manifested through the integration of disease registries, laboratory networks, and AI-enabled platforms. The DeepCXR tool, developed jointly by ICMR HQ and the Institute of Plasma Research, used 75,000 X-rays from 17 sites to automate pulmonary screening. Likewise, Wadhwani AI's LPA-AI tool, validated by NIRT and nine IRLs1, automated TB drug resistance interpretation and was recommended for integration into the Ni-kshay portal.

Meanwhile, digital registries such as MycoNet and *iRegVed* standardised data collection across institutions, embedding real-time analytics for public health action. Together, these systems demonstrate a deliberate shift toward a national data backbone where AI, digital epidemiology, and policy analytics coexist within a regulated scientific ecosystem.

Table 44: Key ICMR led Public Health Multistakeholder Networks and Research Projects

Initiative	Collaboration Type	Key Partners (Named in Docs)	Geographical Scale or Scope (Centres/ districts/ countries)	Enabled/Status
IHCI – Public sector	Multi-ministry and multi-agency programme	MoHFW, State Govts, ICMR, WHO-India Resolve to Save Lives (technical partner)	154 districts; ~22k facilities; ~51 lakh patients	Standard treatment protocols, supply forecasting, task-sharing, simple info system ~47% BP control; multiple national/ international awards.

[2]Intermediate Reference Laboratories

Initiative	Collaboration Type	Key Partners (Named in Docs)	Geographical Scale or Scope (Centres/ districts/ countries)	Enabled/Status
IHCI – Private sector & ESI hospitals (Ludhiana, Punjab)	Govt–industry- ICMR implementation research	Punjab State Govt; ESI hospitals (12) Industrial hubs & 20 linked SMEs DMC Ludhiana	District-wide hub-and-spoke	NCD desks, protocol adoption, rapid patient flow 22,790 screened in 6 months 7,452 hypertensives on protocol.
STEMI-ACT (ICMR heart-attack network)	Multi-institution health-system network	Medical colleges (hubs) District hospitals/ CHCs (spokes) State governments	Multi-state (Punjab, HP, AP, UP& Rajasthan)	Tele-ECG thrombolysis model Door-to-needle 17–21 min Thrombolysis from 0% to 70–90% Reteplase listed under Rajasthan Govt scheme.
Stroke & Cardio multicentric trials/ registries	National multicentre consortia	AIIMS New Delhi CMC Ludhiana (+45 centres) AIIMS New Delhi (+40 centres) PGIMER (+19 centres)	19–45+ participating centres per trial	Large pragmatic trials (e.g., DIGOXINβHD Intracranial atherosclerosis antiplatelet trial MOBILITY post-stroke care).
Brain Bank Network India Initiative	Multi-institution infrastructure	NIMHANS (lead) AIIMS Bhubaneswar PGIMER Chandigarh	3 national nodes (satellites)	Expansion of brain tissue banking capacity for neuroscience.
SMRUTHI (dementia prevention CMRCT)	MRHRU-enabled multi-site platform	AIIMS New Delhi MRHRUs (Una - HP, Khumulwng - Tripura, Sirwar - Karnataka, Bhanpur Kalan - Jaipur)	1 apex + 4 MRHRUs	Community-embedded cohort multiple RCT platform for dementia prevention.
NHRP Emergency Care Model	National Health Research Programme, multi-institution	AIIMS Bhopal AIIMS Bhubaneswar Parul University JIPMER CMC Ludhiana	5 academic & private partners	Patient-centric integrated emergency care model across districts.

Initiative	Collaboration Type	Key Partners (Named in Docs)	Geographical Scale or Scope (Centres/ districts/ countries)	Enabled/Status
ICMR-CARE consortia (multicentric)	Pan-India translational consortia	AIIMS New Delhi ACTREC/TMH HBCH Varanasi	Multisite, including NE training	Paediatric oncology formulations (e.g 6-MP liquid, isotretinoin), SOPs, 10+ publications, techs & patents centre training, incl. NE.
MRHRU establishment (Kilvani, Silvassa)	DHR–State–ICMR infrastructure	DHR (funding) Local LRAC/IEC	New MRHRU; 5 projects approved	Rural research platform with LRAC & ethics approved projects and staffing in progress.
NIREH – International & national research partners	Multi-country & multi-institution research	Partners in South Africa, Russia, Poland, France, Sweden, Finland AIIMS, IITs, NIE, RMRCs, DHS Mizoram	9 international + 15 national	Environmental health collaborations spanning exposure science to epidemiology.
RMRC-NE partner network	National & global research ties	RIMS Imphal NE state governments IITs JNU RGCB Harvard University NHM Tripura State directorates	Multi-state + 1 global university	Broad NE health research and implementation partnerships.
NIIH – Technology licensing & multi-country training	Industry transfer; Africa capacity-building	MYLAB Discovery KEM Hospital NNHF Trainees from Kenya, Uganda, Rwanda, Tanzania RMRC Sri Vijaya Puram NITHR Jabalpur	4 African countries; pan-India	Licensing of G6PD POC and multiplex blood group PCR Haemophilia Comprehensive care training across Africa & India.
NIOH – Policy & surveillance collaborations	Mult-ministry/industry & global	DBT, CPCB, MoEF&CC, WHO; industry Global Fund ICMR – NIRT WIEGO (UK) & SEWA	National + international	Strengthening the monitoring of TB Elimination in India

Initiative	Collaboration Type	Key Partners (Named in Docs)	Geographical Scale or Scope (Centres/ districts/ countries)	Enabled/Status
NICPR – MRHRUs & national platforms	State - ICMR translational nodes	MRHRU Dadha–Gautam Buddha Nagar (GIMS Noida) MRHRU Karnal (KCG-MC/CHC Khotpura) AIIMS New Delhi	Multiple MRHRUs; national facilities	Cervical/oral cancer implementation studies AMR One Health surveillance OSCC microbiome study.
SCD care & outreach (ICMR-CRMCH)	Clinical ecosystem & NGO interface	ICMR-CRMCH Chandrapur SEARCH Foundation (brainstorm) District outreach	District + national	Comprehensive SCD clinics with screening, genetic counselling, PND pathways National brainstorming for gene-therapy roadmap.
NutriAIDE – Building Smart Food Environments	International	University of Augsburg (Germany), Wuppertal Institute (Germany), Institute of Human Nutrition (Germany), ICMR-NIN, Federal Bureau of Agriculture (Germany)	India–Germany	AI-enabled nutrition behaviour app Fosters sustainable food environments

Through STEMI-ACT, ICMR operationalised a tele-ECG-enabled heart-attack network connecting medical-college hubs with district hospitals across Punjab, Himachal Pradesh, Andhra Pradesh, Uttar Pradesh, and Rajasthan. Similar multicentric cardiovascular and stroke registries engaged 19–45 centres each, producing India-specific data for evidence-based guidelines.

The ICMR-CARE network linked AIIMS New Delhi, ACTREC, TMH, and HBCH Varanasi to develop child-friendly oncology formulations such as liquid 6-mercaptopurine and isotretinoin, yielding multiple patents, SOPs, and 10+ publications. The NHRP Emergency Care Model connected five major institutions (AIIMS Bhopal, AIIMS Bhubaneswar, Parul University, JIPMER, and CMC Ludhiana) to design integrated emergency care systems.

Model Rural Health Research Units (MRHRUs) matured as permanent research rails. A new MRHRU at Silvassa was commissioned with DHR support and five approved projects NICPR's MRHRUs in Noida and Karnal advanced cervical and oral cancer implementation studies, AMR surveillance, and One Health investigations.

Table 45: Major Multistakeholder Collaborations Led by Institutes

Nutrition Atlas 2.0	National Multi-agency	ICMR-NIN with data from NFHS, DLHS, AHS, NNMB, CNNS, LASI	All India	Geo-visualisation of national nutrition projects for decision-making
SAMPADA Survey (ICMR-DHR Project)	National Multicentric	ICMR-DHR network across 35 States/UTs	183 Districts, 81,000+ households	National nutrition and biomarker database Major digital surveillance infrastructure
India Child Growth Standards Research Initiative (UNNATI)	National Multicentric	Six centres across six Indian regions coordinated by ICMR - NIN	Pan-India	Development of child growth standards for 0–24 months
Low Sodium Salt Substitute Trial (LSSS Trial)	International	Resolve to Save Lives (RTSL), ICMR - NIN	Telangana	Blood pressure reduction among hypertensive slum populations
FAO–ENACT Project	International (UN Agency)	Food and Agriculture Organisation (FAO), ICMR - NIN	India	Rolling out FAO's nutrition education course across Indian institutions
ICMR Multicentric Study on Menstrual Hygiene Products	National Multicentric	ICMR - NIRRCH (Lead), ICMR-NIN, other ICMR Institutes	Multi-state	Assessment of menstrual hygiene product usage and disposal
National Network Project on Childhood Tuberculosis	National Multi-institutional	DBT-funded, ICMR-NIRRCH (Lead), BJ Wadia Hospital (Mumbai), St. John's Hospital (Bengaluru), King George Hospital (Lucknow), Assam Medical College (Dibrugarh)	Pan-India	Electronic Patient Record (EPR)-based centralised TB repository
ICMR National Health Research Priority Projects	National Multicentric	PHFI, PGIMER, JIPMER, AIIMS Bibinagar, SRM Trichy, IIHMR Delhi, SJRI Bangalore, INCLEN Delhi, NIIRNCD Jodhpur	National	Bereavement care, stillbirth reduction, anaemia 2.0, and THR improvement trials
Chemicals in Sanitary Pads (National Task Force Project)	Multi-Ministry & Multidisciplinary	ICMR-RCN (HQ), NIRRCH Mumbai, NIOH Ahmedabad, IIT Hyderabad	3 States	Chemical exposure risk evaluation for menstrual hygiene products
NIRRCH National Cancer and Anaemia 2.0 Implementation Research	National Multicentric	ICMR-NIRRCH with NHM-linked institutions	Multiple States	Strengthening oral, breast, cervical cancer and anaemia interventions

13.7 International Training, Standards, and Capacity Building

Capacity strengthening remained integral. Under NOHM, 42 professionals from 22 high-containment labs underwent specialised biosafety training. WHO-linked programmes in Measles and Rubella proficiency testing, hosted by NIV and NIRTH, provided regional reference services across South-East Asia. NIRTH's collaboration with VCRC and RMRC Bhubaneswar delivered training on entomology and insecticide resistance to state-level officers. Collectively, these efforts reinforced India's compliance with International Health Regulations (IHR) through indigenous training capacity.

The 2024–25 reporting cycle marked a pivotal transition in ICMR's institutional evolution from a collection of research centres to an interconnected national system that harmonises laboratory science, public health, and digital analytics. With over 40 active collaborations, 22 biosafety laboratories, and dozens of multicentric registries and trials, ICMR's ecosystem now links domestic institutions, international agencies, and industry players in a single continuum of discovery to delivery.

This collaborative framework not only accelerated innovation in diagnostics and vaccines but also strengthened India's preparedness for emerging infectious diseases, reinforcing the evidence base for public health programmes and institutionalising the concept of 'One Health' as a cross-ministerial operational model. Through these partnerships, ICMR has effectively positioned India's biomedical research enterprise as a globally networked, nationally responsive system, bridging science, surveillance, and society.

Table 46: Major Multistakeholder Collaborations

ICMR Institute/ Division	Collaborating Partners/Agencies	Nature of Collaboration/ Initiative	Scale/Output Indicators (From Documents)
National Institute for One Health (NIOH), Nagpur	ICAR, DBT, CSIR, NCDC, AIIMS network, DAHD, MoEFCC, DGHS, WHO, University of Saskatchewan	NOHM, PM-ABHIM)	22 labs integrated
		Network of 22 BSL-3 labs, biosafety framework and "*Vishanu Yudh Abhyas*" multisector pandemic drill	42 officers trained
			₹23.78 crore fund flow coordinated
ICMR - National Institute for Research in Tuberculosis (NIRT), Chennai	AIIMS Jodhpur & Madurai, JIPMER, CMC Vellore, IIT Madras & Delhi, Boston University, WHO, NIPER Hajipur	Hub-and-spoke TB research model	5 satellite centres
		AI-based diagnostic development, multicentre trials (BPaL, vaccine evaluation), TB Burden estimation at National and Sub national levels	National TB AI tools validated and shared with NTEP
ICMR - National Institute of Virology (NIV), Pune	CDC USA, CEPI, BMGF, Serum Institute of India, Indian Immunologicals, NIRBI, NIRT, RMRCs, VCRC	Joint vaccine R&D (KFD, Chandipura)	Hub for 162 VRDLs
		INSACOG hub lab, multi-pathogen surveillance and VRDL mentorship	International and industry partnerships expanded

ICMR Institute/ Division	Collaborating Partners/Agencies	Nature of Collaboration/ Initiative	Scale/Output Indicators (From Documents)
ICMR HQ - Communicable Diseases Division	Panacea Biotech, NITVAR, NIRBI, NICPR, ICMR Institutes	Phase III Dengue vaccine trial (19 sites/18 states) HPV single-dose trial (Cervavac vs Gardasil)	10,335 subjects (Dengue) 504 subjects (HPV)
ICMR - Regional Medical Research Centre (RMRC), Bhubaneswar	WHO, London School of Hygiene & Tropical Medicine, Univ of Edinburgh, BIRAC, Govt of Odisha, DBT, DST, CCRAS	Outbreak support, TB & Zoonoses projects under PM-ABHIM and NOHP-PCZ	10 states TB lab network 19 measles outbreaks investigated
ICMR - National Institute for Research in Bacterial Infections (NIRBI), Kolkata	ICMR HQ, State Health Dept (WB), NIPER Kolkata, IIT Roorkee, IBSD Imphal, PATH, Okayama & Uppsala Universities	Multicentric SARS-CoV-2 cohort study AMR surveillance TB Elimination with NIRT	>12 projects jointly implemented
ICMR - Rajendra Memorial Research Institute (RMRIMS), Patna	WHO, DNDi, BMGF, Oxford University (IDDO), IIT Patna, NIPER	VL/PKDL clinical trials and data platform (CDISC compliant) WHO guideline inputs	2 Centres of Excellence for VL management
ICMR - Regional Medical Research Centre (RMRC), Gorakhpur	AIIMS Gorakhpur, BRD Medical College, NIV Pune, State Health Dept	One-Health rabies study Dengue/Chikungunya CRISPR diagnostic development	Nationwide animal-bite survey (60 districts)
ICMR - National Institute for Research in Tribal Health (NIRTH), Jabalpur	CCRAS, DBT, CCMB Hyderabad, NHM Bhopal, WHO, BMGF	Sickle Cell Anaemia Mission technical training; vector resistance surveillance	21,570 health workers trained Multi-centric vector study
ICMR - National Animal Resource Facility for Biomedical Research (NARFBR), Hyderabad	IIT Delhi, IISc Bengaluru, CSIR-CDRI Lucknow, ICAR-IVRI Bareilly, BRIC-NCCS Pune	Evaluation of biomedical devices & transgenic animal models	Orthopaedic implant validated for clinical use
ICMR - National Jalma Institute for Leprosy & OMD (NJIL&OMD), Agra	State TB Cell & Central TB Division (MoHFW)	Certification of new TB C&DST labs NTEP/NLEP support	4 new labs certified for LPA assays

ICMR Institute/ Division	Collaborating Partners/Agencies	Nature of Collaboration/ Initiative	Scale/Output Indicators (From Documents)
ICMR - National Institute for Research in Digital Health & Data Science (NIRDHDS)	NACO, MoHFW, 15 Hospitals (VTE Registry), 8 AMDRCs (MycoNet)	HIV Surveillance & India Estimates 2023 National digital registries	2052 VTE cases 1667 MycoNet entries
ICMR - National Institute for Malaria Research (VCRC network integration)	NIRTH, RMRC Bhubaneswar, NVBDCP	Vector control training and insecticide resistance mapping	>3 training batches National data integration
ICMR HQ - Division of Non-Communicable Diseases (linked)	DBT, DST, India Alliance	Cross-agency funding for BIRAC and India Alliance fellowships	Joint grant schemes under PM-ABHIM
Cross - ICMR Networks (internal)	NIV, NIRT, NIRBI, RMRC Dibrugarh, VCRC, NARFBR	Multi-centre pathogen genomics and diagnostics; animal-model validation	11 joint projects documented
International Academic Partners (overall)	WHO, CEPI, PATH, DNDi, Uppsala & Okayama Universities, Oxford University, University of Saskatchewan	Joint studies on vaccines, AMR, infectious diseases	>15 international projects in 2024–25
Public Health Programme Interfaces	CTD (NTEP), NVBDCP, NACO, NHM, MoHFW	ICMR institutes served as NRLs, VRDL mentors, and data partners	Direct support to >12 national programmes

Chapter 14: Support to National Programmes

During FY 2024–25, ICMR's research was deeply aligned with national policy translation and programme implementation across both communicable and non-communicable disease domains. Nearly every ICMR institute functioned as a technical arm supporting flagship health programmes.

14.1 Communicable Disease Control and Elimination

Under the National TB Elimination Programme (NTEP), ICMR validated and recommended several diagnostic technologies (Truenat, PathoDetect, DeepCXR, LPA-AI) and facilitated the roll-out of the shorter BPaL regimen through NIRT and NJIL&OMD, Agra. NJIL&OMD also developed and certified four new Culture and Drug-Susceptibility Testing (C&DST) laboratories while continuing its leprosy eradication initiatives.

RMRC Bhubaneswar supported the National Vector Borne Disease Control Programme (NVBDCP) by conducting dengue serotyping across all 30 districts of Odisha and post-MDA evaluations for lymphatic filariasis elimination. NOHM institutionalised through NIOH and NIV, established a 22-laboratory national BSL-3 network and a biosafety framework for pandemic preparedness. NICPR Noida's HPV vaccine studies supported India's adoption of the WHO-endorsed one-dose vaccination policy.

NIRDHDS strengthened India's digital public health capacity through national registries (MycoNet, *iRegVed*) and HMIS data-quality tools in collaboration with MoHFW. RMRC Bhubaneswar and NIRTH Jabalpur provided technical and training support to NVBDCP and the Sickle Cell Mission, respectively, while NIRBI, in partnership with the State Health Department of West Bengal, advanced antimicrobial resistance (AMR) stewardship frameworks.

RMRIMS Patna's clinical research contributed to the draft WHO guidelines for kala-azar therapy, and NIRDHDS served as the nodal centre for national HIV estimation under NACO, releasing the India HIV Estimates 2023 under NACO's framework. Its National Data Quality Forum (NDQF) initiative with MoHFW enhanced Health Management Information System (HMIS) data quality through an automated validation tool. Collectively, these initiatives underscore ICMR's pivotal role as India's evidence-to-policy engine, bridging laboratory research with national health missions through validated tools, robust data systems, capacity building, and regulatory support.

Table 47: Support to Communicable Disease Programmes and Policy Implementation

Institute	Programme/ Policy Supported	Nature of ICMR Contribution	Evidence
ICMR - NIRT	National TB Elimination Programme (NTEP)	Reference Lab (NRL & Supranational), lab certification, BPaLM roll-out, AI for chest X-ray, drug-resistance database, National and sub national TB burden estimation	Supported NTEP as NRL and WHO-SEARO Supranational Lab; evaluated BPaL regimen and AI X-ray software for national use
	National Framework for Gender-Responsive Approach to TB	Policy input and document development	Contributed to framework published by Central TB Division
	National AIDS Control Programme	Regional Reference Lab for HIV-1 viral load testing and infant diagnosis	Supported NACO as Regional Reference Laboratory for HIV-1 VL testing and PCR EID
ICMR - NIRTH	National Sickle Cell Anaemia Mission 2047	Technical partner & capacity-building for NHM MP	Trained 21,570 health workers (CHOs, ASHAs, ANMs etc.) under mission
	NVBDCP & National Framework for Malaria Elimination	State-level training on microscopy and entomology	Joint trainings with State VBDCP and NHM M.P.
	Tribal Health (TSP Scheme)	Community-linked integration project with district health system	"Connecting the Unconnected" project to link Baiga tribal healers with public health system
ICMR - RMRC Bhuwaneshwar	NVBDCP (Lymphatic Filariasis & Dengue)	Post-MDA surveys, coverage evaluation, serotype tracking	Evaluated LF elimination and coverage in Odisha; provided dengue serotyping data for 30 districts
	NACO & HIV VL testing	NACO-approved HIV-1 VL lab for Odisha	Tested 18,000 samples from 15 ART centres supporting NACO
	National One Health Programme for Prevention and Control of Zoonoses	Implementation research on Anthrax and Scrub Typhus	Supporting National One Health Programme via district studies
ICMR - RMRC Gorakhpur	NVBDCP (Vector Control for Malaria & VL)	Insecticide resistance data adopted by NVBDCP	Findings incorporated in national vector-control strategy for U.P.

Institute	Programme/ Policy Supported	Nature of ICMR Contribution	Evidence
ICMR - NIRDHDS	NACP-V (NACP-V)	Nodal agency for HIV burden estimates	Released 'India HIV Estimates 2023' for NACO, guiding programme planning
	National Data Quality Forum – HMIS (MoHFW)	Co-developed automated data-validation tool for HMIS	NDQF–HMIS collaboration to improve health data quality
	ICMR National Clinical Registries (MycoNet, iRegVed)	Digital registry for invasive fungal infection and VTE	Registry data to inform treatment and policy planning
ICMR - NIV	WHO MR Lab Network & NVBDCP support	Regional reference lab for Measles–Rubella EQAS and NVBDCP training	Prepared EQAS panels and trained 165 state entomologists for NVBDCP
	NOHM & PM-ABHIM	Developed BSL-3/4 assessment framework and trained labs	Created national network of 22 BSL-3 labs and SOPs for biosafety evaluation
	National iVDPVSurveillance Programme	Developed and established iVDPV surveillance protocol	Implementation and integration with national program of AFP surveillance and rolled out by GOI in 2024
ICMR - NIOH	NOHM	Coordinating institute for network and fund disbursal	Established national network of 22 BSL-3 labs and biosafety framework
ICMR - NARFBR	Animal Welfare & Biomedical Device Testing	Supports regulatory pre-clinical testing	Validated orthopaedical device with IIT Delhi for translational adoption
ICMR - NJIL&OMD	NTEP & NLEP support (Uttar Pradesh)	Serves as DMC for TB and leprosy	Diagnosis, registration, notification and reporting on Nikshay portal
ICMR - RMRIMS	National Kala-Azar Elimination Programme (NVBDCP)	Guideline and COE support for VL/PKDL	Short-term drug regimen included in draft WHO guidelines; COE established for VL case management
ICMR - NIRBI	State Health Dept of West Bengal & AMR Stewardship	Evidence for state AMR policy framework	Findings inform stewardship implementation in primary and secondary tier hospitals
ICMR - CD Division (HQ)	National TB Programme – Diagnostics Policy	Validation of Truenat, PathoDetect, LPA-AI and DeepCXR for NTEP integration	All tests recommended for national use under NTEP
	HPV and Dengue Vaccine Trials	Policy translation toward national licensure	Multisite ICMR trials informing CDSCO regulatory decision on HPV and Dengue vaccines
ICMR - NICPR	Accelerated End TB Project	Direct support to NTEP through active case finding, TPT, and IEC activities	

Institute	Programme/ Policy Supported	Nature of ICMR Contribution	Evidence
ICMR - NITVAR, **ICMR - NIRBI,** **ICMR -RMRCNE,** **ICMR - NIMR**	Cervavac® vs. Gardasil® Vaccine Study	Evidence generation for one-dose HPV vaccination policy, aligned with WHO recommendation. Research conducted in partnership with MoHFW (NTEP), Local Health Dept.	Established non-inferiority of the Indian-made Cervavac compared to Gardasil in a two-dose schedule for adolescents aged 9–14.
	Acceleration of TB Elimination (District Task Force)	Integrated with Chandigarh District Administration and CTD under the National TB Elimination Programme	

14.2 Non-Communicable Disease Prevention and Management

During FY 2024-25, ICMR's research directly informed national health programmes and policy frameworks across non-communicable diseases. The NCD Division led several large-scale, policy-linked initiatives, notably IHCI, implemented jointly with MoHFW, WHO–India, and Resolve to Save Lives, which expanded to 154 districts, covering over 22,000 health facilities and 5.1 million patients, with 47% achieving optimal blood pressure control. The programme standardised treatment protocols, strengthened drug-supply forecasting, and deployed digital monitoring systems nationwide. In Ludhiana, ICMR piloted the IHCI-ESI industrial model, screening 22,790 workers and initiating hypertension management for 7,452 individuals through NCD desks across 12 ESI hospitals within six months. Complementary evidence from INSTRuCT and SMRUTHI–India informed national strategies on stroke care and dementia prevention.

NIIRNCD Jodhpur and RMRCNE Dibrugarh advanced digital models for hypertension, diabetes, and stroke management, supporting integration of NCD and emergency-care pathways into state health systems. NICPR Noida's work as the WHO–FCTC Knowledge Hub influenced DGHS directives on tobacco advertising and waste management. NIREH Bhopal contributed to the Health Chapter of India's First Biennial Transparency Report (BTR-1) under MoEFCC, and NIIH Mumbai's diagnostic innovations were adopted within the National Haemophilia Control and Sickle Cell Anaemia Elimination programmes.

Collectively, ICMR's network functioned as India's science-to-policy interface, translating more than 20 multicentric studies into actionable frameworks adopted by MoHFW, NHM, and state governments, underscoring its pivotal role in driving evidence-based policymaking and nationwide programme scale-up.

Table 48: Support to Non-Communicable Disease Programmes and Policy Implementation

Institute/ Division	Policy/Programme Supported or Influenced	Nature of Policy Translation/ Adoption
ICMR - NICPR	WHO FCTC Knowledge Hub on Smokeless Tobacco	Findings used by DGHS to issue directive to BCCI to stop surrogate tobacco ads during World Cup National consultation led to policy recommendations on tobacco waste management and ESG inclusion

Institute/ Division	Policy/Programme Supported or Influenced	Nature of Policy Translation/ Adoption
ICMR - RMRC NE	Stroke Registry & Pathway Model	Implemented Clinical Stroke Care Pathways integrated with 108 ambulance services under NHM - Assam
	Implementation Research for Oral, Breast & Cervical Cancer Screening Strengthened state-level cancer screening programme in Assam	Strengthened state-level cancer screening programme in Assam
	MRHRUs Network (Assam, Tripura, Mizoram, Meghalaya, Nagaland, Arunachal Pradesh) Provided evidence-based inputs for rural health planning and population-based surveys	Provided evidence-based inputs for rural health planning and population-based surveys
ICMR - NICHDR	OMNIVEC-India (Digital VBD Risk Communication)	Supports national vector-borne disease communication strategy
	Integrated Primary Health Care Models (Palliative, Elderly & Mental Health)	Research inputs for Ayushman Bharat–Health and Wellness Centre Policy
ICMR - NIIRNCD	ICMR Task Force – CRISPI Study	Evidence on chronic respiratory illnesses informs national air pollution and occupational health policies
	Implementation Research – NCD Screening & Digital Tools (DIGI-CARE)	Designed digital health system model for hypertension & diabetes management within public health system
	Implementation Research on HRP & School NCD Prevention	Developed school-based NCD module for integration under Ayushman Bharat and NP-NCD
ICMR - NIREH	Climate Change and Health Project (MoEFCC)	Contributed to Chapter III: Health Section of India's First Biennial Transparency Report (BTR-1) submitted to UNFCCC
	PM–*Ujjwala Yojana* Impact Assessment	Policy feedback on LPG adoption and women empowerment under flagship PMUY scheme

Institute/ Division	Policy/Programme Supported or Influenced	Nature of Policy Translation/ Adoption
ICMR - NCD Division HQ	IHCI	Expanded to 154 districts, directly supporting national hypertension control under NP–NCD
	STEMI–ACT (Heart Attack Care Model)	Integrated tele–ECG–guided thrombolysis model scaled in multiple states; adopted by State Health Depts. (Punjab, HP, Rajasthan)
	Integrated Mobile Stroke Unit Model	Adopted by Assam Government's 108 Ambulance Network, improved thrombolysis rates
	INSTRuCT Clinical Trial Network	Institutionalised national stroke trial framework for evidence-based policymaking
	SMRUTHI–India Dementia Prevention Trial	Developed care bundle for elderly dementia prevention via MRHRUs network
	IHCI Private Sector Model	Demonstrated scalable public–private hypertension control framework in Punjab ESI hospitals
	SHRISTI Stillbirth Reduction Study	Evidence generation for maternal and perinatal health policy refinement
ICMR - NIIH	Haemophilia and von Willebrand's Disease Diagnostic Kit	First-in-world LFIA-based diagnostic Commercialised and DCGI-approved Integrated into National Haemophilia Control Programme
	Sickle Cell Disease Screening & Registry	Supported National Sickle Cell Anaemia Elimination Mission (2023–32)
	WHO–India iVDPVSurveillance Network	NIIH designated as sentinel site for poliovirus surveillance in PIDs
ICMR - NICPR	Tobacco Waste Policy Recommendations	Inputs led to DGHS proposal for hazard classification of tobacco waste under Plastic Waste Rules
ICMR -NCDIR	National cancer control initiatives	Generating national and regional statistics Cancer was made a notifiable disease in Himachal Pradesh

14.3 Nutritional and Reproductive Health

During the reporting period, ICMR's research–policy interface deepened through multiple institutional initiatives translating scientific evidence into actionable policy. At the national level, the Research Capacity and Networks Division at ICMR Headquarters provided policy support to Anaemia Mukt Bharat, reviewed clinical guidelines on intravenous ferric carboxymaltose, and coordinated multicentric implementation

research for stillbirth reduction, developing delivery models embedded within the National Health Mission (NHM).

The National Institute of Nutrition (NIN) made landmark policy contributions through the release of the Dietary Guidelines for Indians (2024), subsequently adopted across ministries including MoHFW, MWCD, and NITI Aayog. NIN's evidence also informed the PM-POSHAN evaluation in Odisha and guided state-level decisions such as the establishment of dialysis units in Telangana.

The National Institute for Research in Reproductive and Child Health (NIRRCH), Mumbai, advanced health technology policy by conducting state-level HTA sensitisation workshops and developing PCOS management recommendations tailored to the Indian health system. Its data-sharing with the National Health Authority contributed to cost inclusion dialogues for infertility care.

Collectively, these initiatives underscore ICMR's pivotal role in ensuring that robust evidence from reproductive, nutritional, and public health research is effectively translated into policy and programmatic action, strengthening India's health and nutrition governance landscape.

Table 49: Support to Programmes and Policy Implementation Pertaining to Nutritional and Reproductive Health

Institute/ Division	Programme/Policy Supported	Nature of Contribution	Outcome/Policy Product
ICMR - HQ (RCN Division)	*Anaemia Mukt* Bharat Programme	Evidence review on interventions and treatment algorithms for pregnant women	Updated intervention framework for anaemia management among pregnant women
	Guidelines on Intravenous Ferric Carboxymaltose (IC-FCM)	Expert committee reviewed clinical guidance on use of IC-FCM during pregnancy and postpartum	Clinical guidelines reviewed and aligned with national maternal health protocols
	Stillbirth Reduction Programme (Implementation Research)	Developed a scalable and sustainable delivery model for stillbirth reduction interventions	Model integrated into implementation strategy under NHM
	Bereavement Care Guidelines	Formulation of national guidelines for bereavement care in perinatal health	National guidelines for Indian healthcare settings developed
ICMR - NIN, Hyderabad	Food Safety and Standards Authority of India (FSSAI) – Scientific Panels on Food Labelling and Nutrition & Fortification	Provided regulatory scientific support for nutrition standards and food fortification	Inputs used for food safety and nutrition regulation frameworks
	ICMR–NIN Dietary Guidelines for Indians, 2024	National guidelines aligned with National Nutrition Policy, National Health Policy, and Agriculture Policy	Adopted as national reference document for nutrition interventions

Institute/ Division	Programme/Policy Supported	Nature of Contribution	Outcome/Policy Product
	Rapid Evaluation of PM–POSHAN Scheme (Odisha)	Rapid evaluation to assess nutritional and operational performance	Evidence integrated into scheme improvement
	CKD Dialysis Unit Establishment (Translational Output)	Research findings on CKD led to establishment of a dialysis unit	Model for state-level health infrastructure planning
	Nutrition Garden Evaluation (BIRAC-MSSRF)	Evidence-based recommendations for integration of nutrition gardens into food security policy	Policy recommendation for integrating Nutri-Gardens with rural nutrition programmes
ICMR - NIRRCH, Mumbai	Health Technology Assessment (HTAIn)	Conducted sensitisation meetings with State Officials (Goa, Daman, Maharashtra) on HTA for evidence-based policymaking	Capacity building for evidence-informed health policy
	National Health Authority (NHA)	Dissemination of cost-of-infertility study findings to NHA for inclusion in insurance coverage deliberations	Data shared to support financial inclusion under national health insurance
	Polycystic Ovary Syndrome (PCOS) Guidelines	Developed recommendations for diagnosis and multidisciplinary management of PCOS in Indian healthcare	Guidance document used in clinician training and programme planning
ICMR - NIRT, Chennai	Drug resistant TB management guidelines	Expert committee reviewed the DR TB guidelines and provided supportive evidence for BPaL regimen with Linezolid dose optimisation	Inputs for the National guidelines for the management of DR TB

Chapter 15: Scientific Support Units

ICMR's scientific and administrative systems are supported by specialised scientific support units that provide cross-cutting expertise in areas such as data management, bioethics, research quality assurance, biostatistics, health informatics, and communication. These units strengthen ICMR's research implementation and governance.

15.1 Policy and Communications (P&C) Division

In the reporting period, the P&C Division strengthened ICMR's institutional visibility and governance framework by leading strategic communications and public engagement initiatives that enhanced transparency, collaboration, and scientific outreach across the Council's network.

i. **Launch of the New ICMR Website:** Marking a significant step forward in public engagement and accessibility, ICMR unveiled its completely revamped website on 24 September 2024. The new website features a modern UI/UX design, enriched and updated content, and seamless integration of Bhashini technology for real-time Hindi translation, ensuring inclusivity for a diverse audience. The website also features enhanced search engine optimisation through strategic metatag implementation, alongside full compliance with VAPT and Government of India's GIGW guidelines.

ii. **ICMR's First Podcast Series:** Launched on 15 August 2024, ICMR Radio: Unpacking Health Research in India was designed to make complex research ideas more engaging and accessible through digital media. The five-episode series featured conversations with senior ICMR leaders and scientists, including Director General Dr. Rajiv Bahl, covering topics such as the future of health research, initiative to support MedTech innovators, the clinical trial network (INTENT), the innovative iDrone service delivery model, and the relevance of interdisciplinary collaborations such as the ICMR-AcSIR partnership. The series became ICMR's most-watched multimedia product to date.

iii. **DHR-ICMR Health Research Excellence Summit 2024:** Held on ICMR's 113th Foundation Day, a high-level summit was organised to celebrate the achievements of biomedical researchers supported by ICMR's intramural and extramural funding programs. The event was attended by the Minister of State for Health & Family Welfare, Smt. Anupriya Patel; Member (Health), NITI Aayog, Dr. V.K. Paul and Secretary DHR & Director General ICMR, Dr. Rajiv Bahl among other distinguished experts. It witnessed the launch of several significant initiatives designed to bolster ICMR's contributions to healthcare innovation. Additionally, the P&C Division was recognised as the Best Scientific Support Unit during the event.

iv. **ICMR Health Communications Internship Program (IHCIP):** The second cohort of IHCIP was implemented with the objective of building a skilled pipeline of young professionals in public health communication. 20 interns were selected from a pool of 284 applicants with backgrounds in communications and public health, through a revised and streamlined application process. The selected

interns underwent a comprehensive orientation process (6-7 June) and were then placed at 17 ICMR institutes across the country. They began their work at assigned institutes, with additional training sessions and activities organised to further build their knowledge and skills. The internship culminated with them presenting capstone projects at a valedictory ceremony, at ICMR Headquarters (HQ) in Delhi, in September.

v. **Annual NCO Meeting:** To strengthen coordination and knowledge-sharing across ICMR's communication network, the Annual Meeting of Nodal Communication Officers (NCOs) was held at ICMR-NIMR2, Dwarka on 2 and 3 May 2024. Sessions focused on mapping target audiences, refining media and social media strategies, building skills in science writing and research dissemination, and crafting compelling health narratives.

vi. **ICMR Health Communications Course (IHCC):** To build internal capacity in health communication, ICMR in partnership with Global Health Strategies (GHS) and CDMC-MICA trained 30 scientists from across its institutes through the second edition of IHCC. The course concluded in January 2025 with group presentations of capstone projects at ICMR-NIOH, and a valedictory ceremony with expert sessions on public health communication at MICA Campus in Ahmedabad.

vii. **ICMR History Book:** A comprehensive chronicle celebrating ICMR's 100-year legacy was completed and launched during the DHR-ICMR Research Excellence Summit. This publication captures the remarkable contributions of ICMR and its network of institutes, highlighting their pivotal role in shaping India's public health landscape. The book was presented to high-level dignitaries to provide an overview of ICMR's journey and impact.

viii. **Media and Collateral Development:** To amplify visibility and outreach of ICMR's research and key initiatives, key communication initiatives were led, including strategic media engagements, press release dissemination, and the development of opinion articles by experts, as well as social media engagement. New logos were developed for 6 institutes and ICMR-CCoE to ensure alignment with ICMR's branding and enhance institutional recognition.

ix. **National Joint Outbreak Response Team (NJORT) Film:** A film was produced to document the mock drill exercise VishanuYuddh Abhiyas, showcasing India's pandemic preparedness under NOHM. The film highlights the coordinated efforts of the NJORT in simulating real-time outbreak scenarios, demonstrating the country's capacity for rapid response, inter-agency collaboration, and effective management of public health emergencies.

x. **ICMR-CDC Webinar Social Media:** Webinars conducted under the ICMR-CDC Webinar Series (on Nipah Virus Disease, Avian Influenza and Foodborne Disease Surveillance) were supported with key contributions in livestreaming the sessions via YouTube and enhancing their visibility through social media. Key insights and takeaways were shared in real time across platforms to ensure wider dissemination and engagement with relevant stakeholders.

xi. **ICMR-National Institute of Traditional Medicine (NITM) 18th Foundation Day support:** On-ground support was extended to NITM for the successful conduct of

[3]ICMR-National Institute of Malaria Research

its 18th Foundation Day celebrations, inaugurated by the Hon'ble Vice President of India, Shri Jagdeep Dhankhar, and attended by senior officials including Dr. Rajiv Bahl, Director-General, ICMR, and Ms. Anu Nagar, Joint Secretary, Department of Health Research (DHR). This included coordination support for dignitary participation, preparation of event briefing materials, and overall facilitation of proceedings.

xii. **Performance Evaluation Report:** The Performance Evaluation Interim Report was finalised. This comprehensive document outlines the observations and interim recommendations of the committee reviewing ICMR's mandate, impact, and strategic direction, with the aim of aligning its work with the national vision of Viksit Bharat. Efforts were made to ensure the report's clarity and accessibility for key stakeholders, including enhancements to language and visual presentation to support wider engagement and facilitate actionable outcomes.

xiii. **Communications Mainstreaming Framework:** A draft communications framework was developed to support the ICMR Institute Directors and NCOs in mainstreaming and integrating communications at their respective institutes by making it an essential part of their daily schedule. The framework acts as a guide to conceptualise, implement, and monitor communications and outreach efforts with internal and external stakeholders by ICMR and its institutes.

xiv. **Launch of Medical Innovations Patent Mitra:** Support was provided for the launch of ICMR's flagship initiative, Medical Innovations Patent Mitra, during the International Symposium on Health Technology Assessment (ISHTA) 2025. In addition to developing briefing materials for panel members, social media support was extended to amplify the event, including livestreaming key highlights and promoting the initiative to a wider audience.

xv. **High-Level Visits and Showcasing of ICMR's Innovations:** Several high-level events and dignitary visits were supported during the year, including the visit of the Principal Scientific Adviser to the Government of India and Gates Foundation leadership. These engagements focused on showcasing ICMR's key innovations and breakthroughs, particularly in the areas of pandemic preparedness, infectious diseases, maternal and child health, and healthcare delivery. Curated presentations and briefing materials were developed to highlight ICMR's research excellence and institutional milestones.

xvi. **Health Research & Innovation Conference – RESEARCH Platform:** As part of its commitment to advancing regional collaboration in health research and innovation, preparations for a conference to exchange good practices in health research and innovation are underway. Preparatory efforts during the year included presenting the conference concept to regional partners and initiating coordination to ensure high-level participation from member countries

xvii. **Strategic Communications Guidelines Update:** Recognising the evolving public health communication landscape in the post-pandemic context, a comprehensive revision of the Media and Social Media Guidelines was initiated. As part of this process, a consultation was held with NCOs from across ICMR's network to gather inputs on necessary updates. Based on the feedback received, the guidelines are currently being revised and are expected to be released in the coming year.

xviii. **Capacity Building Workshops:** An in-person workshop series was initiated to build skills in communicating public health research among the scientists

and technical staff members across ICMR institutes. The first workshop was conducted at ICMR-NIN, Hyderabad, with over 70 participants. This ongoing initiative is designed to enhance the visibility and reach of ICMR's scientific work by equipping staff with knowledge of current dissemination strategies and best practices for public engagement and outreach.

xix. **Dissemination Strategy:** A draft strategy was developed to amplify ICMR's research and initiatives across areas like outbreak response, surveillance, innovation, and health systems in March. It outlines targeted outreach to diverse audience groups such as funders, policymakers, scientists, industry associates, healthcare workers, media, the general public, and vulnerable communities.

15.2 International Health Division (IHD)

IHD strengthened ICMR's global engagement by advancing collaborative research partnerships, facilitating international fellowships, and consolidating India's role as a trusted partner in global health research and innovation.

i. **International Collaborations and Activities:** The division continued to play a pivotal role in fostering global health research cooperation and partnerships during the reporting year.

ii. **Memoranda of Understanding (MoUs) and Agreements:** During the year, 1 new MoU was signed and several existing MoUs were renewed to strengthen bilateral and multilateral engagements in health research and capacity building.

iii. **International Fellowships:** A total of 65 international fellowships were facilitated by the Division, promoting scientific exchange and skill enhancement among Indian researchers and international institutions.

iv. **Transferof Human Biological Material (THBM):** The Division processed 6 cases involving the transfer of human biological material in accordance with national ethical and regulatory frameworks.

v. **Health Ministry's Screening Committee (HMSC) Projects (2024–25):** During the year 123 projects were reviewed and facilitated under the Health Ministry's Screening Committee (HMSC) mechanism for international collaboration in biomedical and health research.

vi. **Other Activities:** Regular meetings were organised with various countries, international institutes, and organisations to review, develop, and finalise joint collaborative programmes, identify priority research areas, and plan future actions.

In addition, the IHD represented ICMR in various bilateral and multilateral Joint Committee Meetings coordinated by the Ministry of External Affairs (MEA), Department of Science and Technology (DST), and Ministry of Health and Family Welfare (MoH&FW), Government of India, to strengthen cooperation with partner countries and global organisations.

15.3 Indian Journal of Medical Research (IJMR)

IJMR strengthened its global and national scientific presence through expansion of its editorial team, reviewer recognition, thematic special issues, and a new publishing platform.

i. **Impact Factor:** The Impact Factor of the Indian Journal of Medical Research (IJMR) for the year 2023 as released in 2024 was 2.7.

ii. **Workforce Expansion:** IJMR workforce was expanded with 4 Screening Editors and 12 Associate Editors engaged since April 2024 onwards and an Editor (Non-Communicable Diseases) to aid in decreasing the article turnaround timelines.

iii. **Reviewer Renumeration:** Starting from August 2024 onwards, IJMR under the guidance of the Competent Authority, ICMR now remunerates its Reviewers to acknowledge their contributions towards peer-review as well as to stipulate timelines for peer-review.

iv. **Geographical Distribution of Published Articles:** Of the total articles published in this financial year, roughly 83% were from India, 3.4% from USA, 2.6% from Australia and 2% articles were published from UK, Indonesia and Switzerland.

v. **Special Issues:** A Special Issue on Implementation Research (Health, Safety & Emergency) was published as the March & April 2024 issue featuring programme relevant topics of relevance to national programme such as trauma and road safety. A Special issue on Vaccine and Immunisation (An IJMR-WHO SEARO Collaboration on 50 Years of expanded programme on Immunisation) was released as the September &October 2024 issue which published articles from a wide range of authors from different countries of public health importance.

vi. **New Publisher:** Starting from March 2024, IJMR is associated with a new publisher. The new IJMR manuscript submission platform is accessible at https://editorialassist.com/ijmr

vii. **Author Engagement Initiatives:** Two IJMR-published articles were featured on Medical Dialogues as part of efforts to enhance author visibility and public engagement. Links to these interviews are provided below:

- https://ijmr.org.in/lung-cancer-screening-in-india-preparing-for-the-future-using-smart-tools-biomarkers-to-identify-highest-risk-individuals/
- https://ijmr.org.in/hospital-level-interventions-to-improve-outcomes-after-injury-in-india-a-lmic/

15.4 Innovation and Translation Research (ITR) Division

The Innovation and Translation Research (ITR) Division was strengthened to provide structured support to ICMR scientists for expedited patent filing, prosecution, and technology transfer, functioning as the central technology transfer office of ICMR. Dedicated IT systems were developed to enable a transparent, paperless workflow, ensuring efficiency and traceability across all processes.

i. **IP Portfolio Management and Digitalisation:** A comprehensive exercise was undertaken to extract and consolidate data from the past ten years related to ICMR's research outcomes under both Extramural and Intramural projects, encompassing various forms of Intellectual Property (IP) such as patents, copyrights, trademarks, and industrial designs. The legacy records, previously maintained in physical form, were systematically digitised and integrated into a centralised database. This digital repository has been showcased on the ICMR website, enhancing ICMR's visibility and positioning within the national IP and innovation ecosystem.

ii. **ICMR IPR Website:** All legacy IP data of ICMR was digitised and compiled for the launch of the ICMR IPR websitehttps://itr.icmr.org.in/, which now publicly displays the complete portfolio of Intellectual Property held by ICMR, thereby promoting accessibility, transparency, and visibility of ICMR's innovations.

iii. **Online IP Management software:** A software development vendor was onboarded through the Expression of Interest (EoI) route for the design and development of an online IP management system tailored to ICMR's requirements. The software was conceptualised and customised to enable end-to-end management of ICMR's Intellectual Property portfolio, covering patent filing, prosecution, technology transfer, and post-licensing activities. It provides real-time updates and tracking for innovators and stakeholders, thereby enhancing transparency, accountability, and monitoring efficiency across the entire IP management process.

iv. **Launch of ICMR Policies and Guidelines to strengthen Innovation ecosystem in the country:** The following key policies and guidelines on November 14, 2024, during the DHR - ICMR Health Research Excellence Summit 2024 to bridging the gap in industry academia collaboration.

- ICMR Intellectual Property Policy
- ICMR Guidelines for Technology Development and Collaboration
- ICMR Guidelines on Utilisation of Corporate Social Responsibility (CSR) Funds

v. **Launch of Medical Innovations Patent Mitra:** The ITR Division serves as the key coordinator for ICMR's flagship initiative, Medical Innovations Patent Mitra, which was launched on March 8, 2025, by the Hon'ble Union Minister of Health and Family Welfare, Shri Jagat Prakash Nadda. The Division also facilitated a high-level panel discussion on the theme 'Medical Innovations Patent Mitra: A Catalyst for Boosting the Innovation Ecosystem for *Viksit Bharat* 2027'.

vi. **Law firm Empanelment:** An extensive exercise was undertaken to identify and assess law firms based on their technical proficiency, IP attorney profiles, and subject-domain expertise. Following this evaluation, 10 law firms were formally empanelled to support ICMR's intellectual property and technology transfer activities. To ensure objectivity and transparency in work allocation, a dedicated software system was developed for the automated assignment of cases to empanelled firms, eliminating human intervention and streamlining the overall management and monitoring of legal engagements.

vii. **Standardisation of Agreement Templates:** Following Agreement templates have been standardised:

- Memorandum of Agreement (MoA) for clinical trial
- Clinical Trial Agreement with sites
- Contract Research Agreement
- Memorandum of Agreement (MoA) for validation
- Confidentiality, non-disclosure, and conflict of interest agreement
- License Agreement
- Material Transfer Agreement
- Non-Disclosure Agreement

viii. **Standardisation and Simplification of Expression of Interest (EoI) and Technology Transfer Process:** The ICMR Expression of Interest (EoI) template was standardised and subsequently revised following detailed consultations with industry stakeholders to make it more facilitative and user-friendly. The technology transfer process was further streamlined through the introduction of a single-bid system and reduction in processing timelines, enabling a simplified, transparent, and expedited mechanism for licensing and transfer of ICMR-developed technologies to industry partners.

ix. **IP Filing activities:** The ITR Division facilitated the filing of 55 Indian patent applications, 4 copyright applications, and 7 industrial design applications during the reporting period. The Division also undertook prosecution of multiple patent applications, resulting in the grant of 8 Indian and foreign patents and the registration of 3 copyrights.

Additionally, trademarks for ICMR and the One Health logo were successfully registered, securing legal protection for ICMR's identity and initiatives that were previously unrecognised. These measures have strengthened ICMR's positioning in the national innovation ecosystem and reinforced its commitment to effective intellectual property management and brand protection.

x. **Technology transfers facilitated:** ITR Division published Expression of Interest for seven technologies and facilitated technology transfer of 2 technologies.

xi. **Facilitation of National Evaluation Study on Innovation Excellence Indicators:** The ITR Division facilitated ICMR's participation in the national study titled "Evaluation of Innovation Excellence Indicators of Centrally Funded Research & Development", undertaken by the Office of the Principal Scientific Adviser (O/o PSA) at the behest of the Prime Minister's Office (PMO). The study aimed to assess innovation performance, strengths, and socio-economic impact across publicly funded R&D organisations in India.

The ITR Division served as the nodal coordinating unit for ICMR, overseeing data compilation, validation, and submission for the study. Inputs were coordinated from 27 ICMR Institutes, each of which nominated a data officer to ensure accuracy and completeness. The final report presented an in-depth analysis of ICMR's R&D capacity, innovation ecosystem, translational outcomes, and alignment with national missions and the Sustainable Development Goals (SDGs).

This collaborative effort positioned ICMR as a key contributor to the national innovation landscape, underscoring its role in advancing public health research, technology development, and institutional readiness for impactful innovation.

15.5 Data Centre and e-Governance Cell

Electronic Project Management System (ePMS)

The purpose of the ICMR extramural ePMS portal (https://epms.icmr.org.in) is to facilitate online submission and evaluation of proposals submitted under the various schemes' vis. Investigator Initiated Research Proposals - Small Grant (SG), Investigator Initiated Research Proposals - Intermediate Grant (IG), Centres for Advanced Research (CAR), First in World Challenge (FiW)and National Health Research Programme (NHRP) from Research and Development institutions. The system supports the entire life cycle of extramural funding, including online submission, review, monitoring and reporting.

The portal has seen widespread adoption, with over 70000 registered researchers and institutional users actively utilising its services. During the financial year 2024–25, the portal facilitated numerous proposal submissions across various categories.

15.6 Solution Clinic

The Solution Clinic, established in 2024, is a dedicated support mechanism to assist Principal Investigators (PIs) in resolving project-related online queries efficiently through the ePMS.

This initiative is accessible to registered Principal Investigators (PIs) on the ePMS portal who have approved, sanctioned, or ongoing projects. It enables investigators to raise queries directly through the system, to which Program Officers are expected to respond within 72 hours. In instances where a PI is unable to view a specific project on their dashboard, the portal also allows submission of a request to add the relevant Proposal ID.

Overall, the ICMR e-Solution Clinic operates as a two-way interactive platform, promoting transparency, timely resolution of issues, and enhanced communication between investigators and the ICMR administrative team.

15.7 ICMR Website

The ICMR website (https://www.icmr.gov.in) has undergone a comprehensive revamp in the year 2024, introducing a suite of advanced features aimed at enhancing functionality, security, and user experience.

This newly redesigned platform is a secure, scalable, and fully compliant digital solution built on a Django-based CMS framework, aligned with the Government of India's Web Guidelines (GIGW). The website emphasises accessibility, inclusivity, and robust security, offering bilingual support, a disabled-friendly interface, SSL certification, and successful clearance of a comprehensive security audit. It is also fully prepared for STQC Certification, ensuring adherence to all mandatory compliance standards.

Visually, the website features a clean, responsive, and aesthetically aligned design that reflects ICMR's branding while enhancing user engagement. It has been extensively tested for cross-browser and cross-device compatibility, ensuring consistent performance on desktops, tablets, and smartphones.

Additional resources on the website include:

- **Publications and Reports:** A repository of research publications, annual reports, and newsletters that highlight ICMR's contributions to medical science.
- **Career Opportunities:** Listings of current job openings, internships, and fellowships available across ICMR and its affiliated institutions.
- **Health Programs and Guidelines:** Information on national health initiatives, ethical guidelines for biomedical research, and relevant health advisories.
- **Events and Training:** Updates on upcoming conferences, workshops, and training programs in medical research and public health.
- **Social Media Integration:** Direct links to ICMR's official social media platforms to enhance outreach and community engagement.

Together, these features position the ICMR website as a vital platform for researchers, healthcare professionals, policymakers, and the public, fostering transparency, collaboration, and progress in the fields of medical research and public health.

15.8 Central Procurement Cell (CPC)

In the reporting period, CPC facilitated procurement for all research activities across ICMR and its Institutes, coordinating with multiple stakeholders to ensure the timely acquisition of equipment, consumables, and services essential for uninterrupted research operations. A total of 1,343 proposals were processed and executed for the procurement of equipment, consumables (kits and reagents), and services, achieving nearly 100% utilisation of the ₹300 crore budget allocated for the year.

i. **Recognition:** CPC received the 'Recognition of Excellence for Research Support Team' award at the DHR–ICMR Health Research Excellence Summit 2024, held at Sushma Swaraj Bhawan, New Delhi, on November 14, 2024.

ii. **Awards:** The team was also awarded a Certificate of Appreciation by DHR, ICMR and Quality Council of India (QCI) for successfully organising a Capacity Building Programme on public procurement.

iii. **Operational Efficiency:** Ensured full compliance with Government of India's public procurement policies by conducting 100% of procurement activities for ICMR and its 27 Institutes through the Government e-Marketplace (GeM) portal.

iv. **Strategic Procurement:** Mission mode procurement executed to support critical research activities, including:

- Executed time-bound procurement of major equipment and consumables for the multinational CRTIC Study, involving Sri Lanka, Nepal, Indonesia, Bhutan, and India, ensuring adherence to international standards and timelines.
- Supported critical research programmes in mission mode, including projects on tuberculosis, malaria, viral outbreaks (such as Nipah and Mpox), and the National Family Health Survey (NFHS) under the National Health Mission.
- Facilitated procurement for the ICMR Drone (iDrone) Project, enabling the use of drones for emergency medical supply delivery and transport.

v. **Promotion of Indigenous Innovation:** Advanced the 'Make in India' initiative by prioritising procurement of domestically manufactured equipment and consumables in line with MII policy guidelines. Supported the international deployment of Indian-developed technologies such as handheld X-ray devices, PathoDetect machines, and Cy-TB kits for the CRTIC Study, contributing to cost efficiency and promoting Indian medical innovation globally.

Chapter 16: Publications

During the year, ICMR continued to demonstrate its scientific leadership through an impressive body of research publications across its national institutes and regional centres. Collectively, the Council's scientists authored 3052 peer-reviewed research papers. Besides these peer reviewed publications book chapters, and conference proceedings, were also published.

Publications spanned a wide spectrum of disciplines, ranging from communicable and non-communicable diseases to reproductive and child health, nutrition, epidemiology, and health systems research. Notably, several papers were published in high-impact international journals such as The Lancet, underscoring ICMR's global research relevance. Institutes like ICMR - NIRT, ICMR - NIE, and NIV Pune contributed substantially to these high-impact outputs.

Table 50: Consortium Publications

Name of ICMR Institute	Publication Title	Authors	Publication Type	Journal Name	Impact Factor
NIN	General and abdominal adiposity and hypertension in eight world regions: a pooled analysis of 837 population-based studies with 7·5 million participants	Zhou, B., Bennett, J.E., Wickham, A.P., Singleton, R.K., Mishra, A., Carrillo-Larco, R.M., Ikeda, N., Jain, L., Barradas-Pires, A., Heap, R.A. and Lhoste, V.P., 2024.	Original	The Lancet	88.5
NIE	Global fertility in 204 countries and territories, 1950–2021, with forecasts to 2100: a comprehensive demographic analysis for the Global Burden of Disease Study 2021	Bhattacharjee, N.V., Schumacher, A.E., Aali, A., Abate, Y.H., Abbasgholizadeh, R., Abbasian, M., Abbasi-Kangevari, M., Abbastabar, H., Abd ElHafeez, S., Abd-Elsalam, S. and Abdollahi, M., 2024	Original	The Lancet	88.5
NIE	Global burden of 288 causes of death and life expectancy decomposition in 204 countries and territories and 811 subnational locations, 1990-2021: a systematic analysis for the Global Burden of Disease Study 2021	Naghavi, M., Ong, K.L., Aali, A., Ababneh, H.S., Abate, Y.H., Abbafati, C., Abbasgholizadeh, R., Abbasian, M., Abbasi-Kangevari, M., Abbastabar, H. and Abd ElHafeez, S., 2024	Original	The Lancet	88.5

Name of ICMR Institute	Publication Title	Authors	Publication Type	Journal Name	Impact Factor
NIE	Burden of disease scenarios for 204 countries and territories, 2022-2050: a forecasting analysis for the Global Burden of Disease Study 2021	Vollset, S.E., Ababneh, H.S., Abate, Y.H., Abbafati, C., Abbasgholizadeh, R., Abbasian, M., Abbastabar, H., Abd Al Magied, A.H., Abd ElHafeez, S., Abdelkader, A. and Abdelmasseh, M., 2024.	Original	The Lancet	88.5
NIE	Global age-sex-specific mortality, life expectancy, and population estimates in 204 countries and territories and 811 subnational locations, 1950-2021, and the impact of the COVID-19 pandemic: a comprehensive demographic analysis for the Global Burden of Disease Study 2021	Baker, J.L. and GBD 2021 Demographics Collaborators, 2024	Original	The Lancet	88.5
NIE, NIRT	Global burden and strength of evidence for 88 risk factors in 204 countries and 811 subnational locations, 1990-2021: a systematic analysis for the Global Burden of Disease Study 2021	Brauer, M., Roth, G.A., Aravkin, A.Y., Zheng, P., Abate, K.H., Abate, Y.H., Abbafati, C., Abbasgholizadeh, R., Abbasi, M.A., Abbasian, M. and Abbasifard, M., 2024.	Original	The Lancet	88.5
NIE	Global incidence, prevalence, years lived with disability (YLDs), disability-adjusted life-years (DALYs), and healthy life expectancy (HALE) for 371 diseases and injuries in 204 countries and territories and 811 subnational locations, 1990-2021: a systematic analysis for the Global Burden of Disease Study 2021	Ferrari, A.J., Santomauro, D.F., Aali, A., Abate, Y.H., Abbafati, C., Abbastabar, H., Abd ElHafeez, S., Abdelmasseh, M., Abd-Elsalam, S., Abdollahi, A. and Abdullahi, A., 2024	Original	The Lancet	88.5

Name of ICMR Institute	Publication Title	Authors	Publication Type	Journal Name	Impact Factor
NIE	Global burden of bacterial antimicrobial resistance 1990-2021: a systematic analysis with forecasts to 2050	Naghavi, M., Vollset, S.E., Ikuta, K.S., Swetschinski, L.R., Gray, A.P., Wool, E.E., Aguilar, G.R., Mestrovic, T., Smith, G., Han, C. and Hsu, R.L., 2024.	Original	The Lancet	88.5
NIE, NIREH,	Global, regional, and national stillbirths at 20 weeks' gestation or longer in 204 countries and territories, 1990-2021: findings from the Global Burden of Disease Study 2021	Comfort, H., McHugh, T.A., Schumacher, A.E., Harris, A., May, E.A., Paulson, K.R., Gardner, W.M., Fuller, J.E., Frisch, M.E., Taylor, H.J. and Leever, A.T., 2024.	Original	The Lancet	88.5
NIE	Global, regional, and national prevalence of child and adolescent overweight and obesity, 1990-2021, with forecasts to 2050: a forecasting study for the Global Burden of Disease Study 2021	Kerr, J.A., Patton, G.C., Cini, K.I., Abate, Y.H., Abbas, N., Abd Al Magied, A.H., Abd ElHafeez, S., Abd-Elsalam, S., Abdollahi, A., Abdoun, M. and Abdulah, D.M., 2025.	Original	The Lancet	88.5
NIRT	Global, regional, and national prevalence of adult overweight and obesity, 1990–2021, with forecasts to 2050: a forecasting study for the Global Burden of Disease Study 2021	Ng, M., Gakidou, E., Lo, J., Abate, Y.H., Abbafati, C., Abbas, N., Abbasian, M., Abd ElHafeez, S., Abdel-Rahman, W.M., Abd-Elsalam, S. and Abdollahi, A., 2025.	Original	The Lancet	88.5
NIRT	Global, regional, and national progress towards the 2030 global nutrition targets and forecasts to 2050: A systematic analysis for the Global Burden of Disease Study 2021	Arndt, M.B., Abate, Y.H., Abbasi-Kangevari, M., Abd ElHafeez, S., Abdelmasseh, M., Abd-Elsalam, S., Abdulah, D.M., Abdulkader, R.S., Abidi, H., Abiodun, O. and Aboagye, R.G., 2024.	Original	The Lancet	88.5

Name of ICMR Institute	Publication Title	Authors	Publication Type	Journal Name	Impact Factor
RMRC NE	Global burden of 288 causes of death and life expectancy decomposition in 204 countries and territories and 811 subnational locations, 1990-2021: a systematic analysis for the Global Burden of Disease Study 2021.	Naghavi, M., Ong, K.L., Aali, A., Ababneh, H.S., Abate, Y.H., Abbafati, C., Abbasgholizadeh, R., Abbasian, M., Abbasi-Kangevari, M., Abbastabar, H. and Abd ElHafeez, S., 2024.	Original	The Lancet	88.5
NIE	Global, regional, and national burden of disorders affecting the nervous system, 1990-2021: a systematic analysis for the Global Burden of Disease Study 2021.	Steinmetz, J.D., Seeher, K.M., Schiess, N., Nichols, E., Cao, B., Servili, C., Cavallera, V., Cousin, E., Hagins, H., Moberg, M.E. and Mehlman, M.L., 2024.	Original	The Lancet Neurology	45.5
NIRT, NIE	Global, regional, and national burden of stroke and its risk factors, 1990-2021: a systematic analysis for the Global Burden of Disease Study 2021.	Feigin, V.L., Abate, M.D., Abate, Y.H., Abd ElHafeez, S., Abd-Allah, F., Abdelalim, A., Abdelkader, A., Abdelmasseh, M., Abd-Elsalam, S., Abdi, P. and Abdollahi, A., 2024.	Original	The Lancet Neurology	45.5
NICPR	Global burden of oral cancer in 2022 attributable to smokeless tobacco and areca nut consumption: a population attributable fraction analysis.	Rumgay, H., Nethan, S.T., Shah, R., Vignat, J., Ayo-Yusuf, O., Chaturvedi, P., Guerra, E.N., Gupta, P.C., Gupta, R., Liu, S. and Magnusson, C., 2024.	Original	The Lancet Oncology	35.9
NIRT	Global, regional, and national burden of asthma and atopic dermatitis, 1990–2021, and projections to 2050: a systematic analysis of the Global Burden of Disease Study 2021	Oh, J., Kim, S., Kim, M.S., Abate, Y.H., Abd ElHafeez, S., Abdelkader, A., Abdi, P., Abdulah, D.M., Aboagye, R.G., Abolhassani, H. and Abtahi, D., 2025.	Systematic Review / Meta-analysis	The Lancet Respiratory Medicine	32.8

Name of ICMR Institute	Publication Title	Authors	Publication Type	Journal Name	Impact Factor
NIE	Global, regional, and national burden of upper respiratory infections and otitis media, 1990-2021: a systematic analysis from the Global Burden of Disease Study 2021	Sirota, S.B., Doxey, M.C., Dominguez, R.M.V., Bender, R.G., Vongpradith, A., Albertson, S.B., Novotney, A., Burkart, K., Carter, A., Abdi, P. and Abdoun, M., 2025.	Original	The Lancet Infectious Diseases	31
NIE	Forecasting the effects of smoking prevalence scenarios on years of life lost and life expectancy from 2022 to 2050: a systematic analysis for the Global Burden of Disease Study 2021	Bryazka, D., Reitsma, M.B., Abate, Y.H., Abd Al Magied, A.H., Abdelkader, A., Abdollahi, A., Abdoun, M., Abdulkader, R.S., Zuniga, R.A.A., Abhilash, E.S. and Abiodun, O.O., 2024	Original	The Lancet Public Health	25.2
NIE	Global, regional, and national burden of HIV/AIDS, 1990-2021, and forecasts to 2050, for 204 countries and territories: the Global Burden of Disease Study 2021	Carter, A., Zhang, M., Tram, K.H., Walters, M.K., Jahagirdar, D., Brewer, E.D., Novotney, A., Lasher, D., Mpolya, E.A., Vongpradith, A. and Ma, J., 2024.	Original	The Lancet HIV	13

Table 51: Top Publications Intramural (IF>10)

Name of ICMR Institute	Publication Title	Authors	Publication Type	Journal Name	Impact Factor
NIRTH	Perinatal risk in India's Scheduled Tribes	Singh, T. and Kumar, D., 2024.	Original	The Lancet	88.5
NIIRRCH	Strengthening global snakebite data for WHO's goal for 2030.	Munshi, H. and Gajbhiye, R.K., 2024.	Correspondence	The Lancet	88.5

Name of ICMR Institute	Publication Title	Authors	Publication Type	Journal Name	Impact Factor
NITVAR	Oral Regimens for Rifampin-Resistant, Fluoroquinolone-Susceptible Tuberculosis.	Guglielmetti, L., Khan, U., Velásquez, G.E., Gouillou, M., Abubakirov, A., Baudin, E., Berikova, E., Berry, C., Bonnet, M., Cellamare, M. and Chavan, V., 2025.	Original	New England Journal of Medicine	78.5
NIRTH	The Leprosy	Grijsen, M.L., Nguyen, T.H., Pinheiro, R.O., Singh, P., Lambert, S.M., Walker, S.L. and Geluk, A., 2024.	Review	Nature reviews Disease primers	60.6
NICPR	Effect of impaired autophagic flux on breast carcinogenesis through the enhanced LC3-p62-NRF2 feedback loop.	Aftab, M., Waidha, K., Gopas, J. and Hussain, S., 2024.	Original	Journal of Clinical Oncology	42.1
NIRT	Long-term efficacy and safety of two short standardised regimens for the treatment of rifampicin-resistant tuberculosis (STREAM stage 2): extended follow-up of an open-label, multicentre, randomised, non-inferiority trial.	Goodall, R.L., Nunn, A.J., Meredith, S.K., Bayissa, A., Bhatnagar, A.K., Chiang, C.Y., Conradie, F., Gopalan, N., Gurumurthy, M., Kirenga, B. and Kiria, N., 2024.	Original	The Lancet Respiratory Medicine	32.8

Name of ICMR Institute	Publication Title	Authors	Publication Type	Journal Name	Impact Factor
NIE	Estimates of the burden of human rabies deaths and animal bites in India, 2022-23: a community-based cross-sectional survey and probability decision-tree modelling study	Thangaraj, J.W.V., Krishna, N.S., Devika, S., Egambaram, S., Dhanapal, S.R., Khan, S.A., Srivastava, A.K., Mishra, A., Shrinivasa, B., Gour, D. and Madhukar, M., 2025.	Original	The Lancet Infectious Diseases	31
NIOH	Interim analysis of SARS-CoV-2 vaccine NVX-CoV2601 as a heterologous booster dose.	Yadav, P.D. and Patil, D.Y., 2025.	Original	The Lancet Infectious Diseases	31
NIV PUNE	Measures to prevent and treat Nipah virus disease: research priorities for 2024-29	Moore, K.A., Mehr, A.J., Ostrowsky, J.T., Ulrich, A.K., Moua, N.M., Fay, P.C., Hart, P.J., Golding, J.P., Benassi, V., Preziosi, M.P. and Broder, C.C., 2024	Review Article	The Lancet Infectious Diseases	31
NIIRNCD	Sickle cell disease (SCD)-related stigma among Indian SCD patients: Findings of a multicentric study.	Babu, B.V. and Jena, R.K., 2024.	Original	Blood	23.1
NIRT	Effectiveness of the primary Bacillus Calmette-Guérin vaccine against the risk of Mycobacterium tuberculosis infection and tuberculosis disease: a meta-analysis of individual participant data.	Pelzer, P.T., Stuck, L., Martinez, L., Richards, A.S., Acuña-Villaorduña, C., Aronson, N.E., Bonnet, M., Carvalho, A.C., Chan, P.C., Huang, L.M. and Fang, C.T., 2025.	Meta analysis	The Lancet Microbe	20.4

Name of ICMR Institute	Publication Title	Authors	Publication Type	Journal Name	Impact Factor
NIE	National prevalence of vision impairment and blindness and associated risk factors in adults aged 40 years and older with known or undiagnosed diabetes: results from the SMART-India cross-sectional study	Gurudas, S., Vasconcelos, J.C., Prevost, A.T., Raman, R., Rajalakshmi, R., Ramasamy, K., Mohan, V., Rani, P.K., Das, T., Conroy, D. and Tapp, R.J., 2024.	Original	The Lancet Global Health	18
NIRT	Economic aspects of shortening the duration of tuberculosis treatment.	Muniyandi, M. and Nagarajan, K., 2024.	Original	The Lancet Global health	18
NIRT	Estimating the epidemiological and economic impact of providing nutritional care for tuberculosis-affected households across India: a modelling study.	McQuaid, C.F., Clark, R.A., White, R.G., Bakker, R., Alexander, P., Henry, R., Velayutham, B., Muniyandi, M., Sinha, P., Bhargava, M. and Bhargava, A., 2025.	Original	The Lancet Global health	18
NITVAR	WHO global research priorities for sexually transmitted infections.	Gottlieb, S.L., Spielman, E., Abu-Raddad, L., Aderoba, A.K., Bachmann, L.H., Blondeel, K., Chen, X.S., Crucitti, T., Camacho, G.G., Godbole, S. and de Leon, R.G.P., 2024.	Review Article	The Lancet Global health	18
NICHDR	Changing the paradigm of AML care in India.	Singh, A., Jain, A., Tabbassum, H., Siraj, F., Rishi, B. and Misra, A., 2024.	Corrsepondence	The Lancet Haematology	17.7

Name of ICMR Institute	Publication Title	Authors	Publication Type	Journal Name	Impact Factor
NIIH	Sickle cell disease in India: current status and progress	Jain, D., Gupta, M., Madkaikar, M., Jena, R.K., Khargekar, N., Saraf, S.L., Krishnamurti, L. and Gupta, K., 2024.	Review	The Lancet Haematology	17.7
ICMR-HQ	One-year mortality and re-admission rate by disease etiology in National Heart Failure Registry of India.	Harikrishnan, S., Bahl, A., Roy, A., Mishra, A., Prajapati, J., Manjunath, C.N., Sethi, R., Guha, S., Satheesh, S., Dhaliwal, R.S. and Sharma, M., 2025.	Original	Nature	15.7
RMRC BB	Water, sanitation, and hygiene among transgender population living in urban informal settlements: a qualitative study in Odisha, India	Sahoo, K.C., Suman, S.S., Mishra, M., Sinha, A., Das, D. and Pati, S., 2025.	Original	International Journal of Transgender Health	14.8
NIRT	Helminth Infections and Diabetes: Mechanisms Accounting for Risk Amelioration	Rajamanickam, A. and Babu, S., 2024.	Review Article	Annual Review of Nutrition	13.4
NIE	International prevalence patterns of low eGFR in adults aged 18-60 without traditional risk factors from a population-based cross-sectional disadvantaged populations eGFR epidemiology (DEGREE) study	Rutter, C.E., Njoroge, M., Cooper, P.J., Prabhakaran, D., Jha, V., Kaur, P., Mohan, S., Tatapudi, R.R., Biggeri, A., Rohloff, P. and Hathaway, M.H., 2025.	Original	Kidney international	12.6

Name of ICMR Institute	Publication Title	Authors	Publication Type	Journal Name	Impact Factor
ICMR-HQ	ROS-responsive nucleobase conjugated chitosan: Synthesis and evaluations for biomedical applications.	Kulkarni, N., Jadhav, G.S., Kombe, P.R., Dewangan, B., Apparao, C.V., Patra, S., Sakla, A.P., Borah, S. and Sahu, B., 2025.	Research article	Carbohydrate Polymers	12.5
NIRT	Inflammatory cytokine responses in pediatric tuberculosis with or without SARS-CoV-2 seropositivity	Kumar, N.P., Balaji, S., Devi, P.G., Ramraj, B., Nancy, A., Selvaraj, N., Ahamed, S.F., Gunasundari, A., Seetha, A., Varadarajan, P. and Venkataraman, A., 2024.	Original	Journal of Infection	11.9
NIOH	Genomic analysis confirmed the importation of first mPox Clade Ib case in Kerala, India from Dubai, UAE.	Shete, A.M., Chenayil, S., Sahay, R.R., Sindhu, C.B., Yadav, S., Gawande, P., Patil, D.Y., Kumar, A., Mohandas, S. and Yadav, P.D., 2024	Original	Journal of Infection	11.9
NITVAR	Monkeypox virus - An evolutionary perspective from India.	Patil, A. and Kurle, S., 2024.	Review Article	Journal of Infection	11.9
	Trans-nasal brain delivery of anti-TB drugs using methyl-βcyclodextrin microparticles for CNS tuberculosis	Jadhav, K., Jhilta, A., Singh, R., Sharma, S., Negi, S., Ahirwar, K., Shukla, R., Singh, A.K. and Verma, R.K., 2025.	Original	Journal of Controlled Release	11.5
NIOH	Sexual dimorphism in neurobehavioural phenotype and gut microbial composition upon long-term exposure to structural analogues of bisphenol-A	Singh, D.P., Kumar, A., Prajapati, J., Bijalwan, V., Kumar, J., Amin, P., Kandoriya, D., Vidhani, H., Patil, G.P., Bishnoi, M. and Rawal, R., 2024.	Original	Journal of Hazardous Materials	11.3

Name of ICMR Institute	Publication Title	Authors	Publication Type	Journal Name	Impact Factor
NIRBI	Rotavirus rewires host cell metabolic pathways toward glutamine catabolism for effective virus infection	Mitra, S., Datta Chaudhuri, R., Sarkar, R., Banerjee, S., Mukherjee, A., Sharma, R., Gope, A., Kitahara, K., Miyoshi, S.I. and Chawla-Sarkar, M., 2024.	Original	Gut Microbes	11

Table 52: Top Publications Intramural (IF>10)

Publication Title	Authors	Journal Name	Impact Factor
Actinium-225-PSMA radioligand therapy of metastatic castration-resistant prostate cancer (WARMTH Act): a multicentre, retrospective study	Sathekge, M.M., Lawal, I.O., Bal, C., Bruchertseifer, F., Ballal, S., Cardaci, G., Davis, C., Eiber, M., Hekimsoy, T., Knoesen, O. and Kratochwil, C., 2024.	The Lancet Oncology	35.9
Recompensation of Chronic Hepatitis C Related Decompensated Cirrhosis Following Direct-Acting Antiviral Therapy: Prospective Cohort Study From a Hepatitis C Virus Elimination Program	Premkumar, M., Dhiman, R.K., Duseja, A., Mehtani, R., Taneja, S., Gupta, E., Gupta, P., Sandhu, A., Sharma, P., Rathi, S. and Verma, N., 2024.	Gastroenterology	25.1
Sickle Cell Disease (SCD)-Related Stigma Among Indian SCD Patients-Findings of a Multicentric Study.	Babu, B.V. and Jena, R.K., 2024.	Blood	23.1
Innovative spiral nerve conduits: Addressing nutrient transport and cellular activity for critical-sized nerve defects	Zennifer, A., Kumar, S.P., Bagewadi, S., Unnamalai, S., Chellappan, D., Abdulmalik, S., Yu, X., Sethuraman, S., Sundaramurthi, D. and Kumbar, S.G., 2025.	Bioactive Materials	20.3
Hepatitis e virus induced metabolomic and immune shift in acute liver failure is associated with obstetric complications during pregnancy	Saxena, A., Minal, Pahwa, P., Maras, J., Siddiqui, H., Sevak, J.K., Mala, Y.M., Tyagi, S., Sarin, S.K. and Trehanpati, N., 2024, October.	Hepatology	15.8

Publication Title	Authors	Journal Name	Impact Factor
Immune-metabolic shifts in acute liver failure caused by HEV infection during pregnancy and their association with obstetric outcomes	Saxena, A., Pahwa, P., Maras, J.S., Siddiqui, H., Sevak, J.K., Manikya, Y., Tyagi, S., Sarin, S.K. and Trehanpati, N., 2025.	Hepatology	15.8
PAM-flexible Engineered FnCas9 variants for robust and ultra-precise genome editing and diagnostics	Acharya, S., Ansari, A.H., Kumar Das, P., Hirano, S., Aich, M., Rauthan, R., Mahato, S., Maddileti, S., Sarkar, S., Kumar, M. and Phutela, R., 2024.	Nature Communications	15.7
A randomised controlled non-inferiority trial to compare the efficacy of 'HPV screen, triage and treat'with 'HPV screen and treat'approach for cervical cancer prevention among women living with HIV	Joshi, S., Muwonge, R., Bhosale, R., Chaudhari, P., Kulkarni, V., Mandolkar, M., Deodhar, K., Kand, S., Phadke, N., Rajan, S. and Kumar, B.K., 2025.	Nature Communications	15.7
Structural visualization of small molecule recognition by CXCR3 uncovers dualagonism in the CXCR3-CXCR7 system	Saha, S., Sano, F.K., Sharma, S., Ganguly, M., Dalal, A., Mishra, S., Tiwari, D., Akasaka, H., Kobayashi, T.A., Roy, N. and Zaidi, N., 2025.	Nature Communications	15.7
The Psu protein of phage satellite P4 inhibits transcription termination factor β by forced hyper-oligomerization	Gjorgjevikj, D., Kumar, N., Wang, B., Hilal, T., Said, N., Loll, B., Artsimovitch, I., Sen, R. and Wahl, M.C., 2025.	Nature Communications	15.7
Taenia solium cysticerci's extracellular vesicles Attenuate the AKT/mTORC1 pathway for Alleviating DSS-induced colitis in a murine model	Rawat, S.S., Keshri, A.K., Arora, N., Kaur, R., Mishra, A., Kumar, R. and Prasad, A., 2024.	Journal of Extracellular Vesicles	14.5
Pincer-Ruthenium-Catalyzed Direct Formation of Fuel-Grade Alkanes via a Net-Decarboxylative Coupling of Alcohols	Nandi, P.G., Maity, P. and Kumar, A., 2024.	ACS Catalysis	13.1
CD40 agonist engineered immunosomes modulated tumor microenvironment and showed pro-immunogenic response, reduced toxicity, and tumor free survival in mice bearing glioblastoma	Gaur, V., Tyagi, W., Das, S., Ganguly, S. and Bhattacharyya, J., 2024.	Biomaterials	12.9

Publication Title	Authors	Journal Name	Impact Factor
Pathology of idiopathic pulmonary fibrosis with particular focus on vascular endothelium and epithelial injury and their therapeutic potential	Lu, W., Teoh, A., Waters, M., Haug, G., Shakeel, I., Hassan, I., Shahzad, A.M., Callerfelt, A.K.L., Piccari, L. and Sohal, S.S., 2025.	Pharmacology & Therapeutics	12.5
Modulation of Donor in Purely Organic Triplet Harvesting AIE-TADF Photosensitizer for Image-guided Photodynamic Therapy	Barman, D., Rajamalli, P., Bidkar, A.P., Sarmah, T., Ghosh, S.S., ZysmanβColman, E. and Iyer, P.K., 2025.	Small	12.1
Coconut water induces clinical remission in mild to moderate ulcerative colitis: double-blind placebo-controlled trial	Kedia, S., Virmani, S., Bajaj, A., Markandey, M., Singh, N., Madan, D., Kaushal, K., Sahu, P., Vuyyuru, S.K., Kante, B. and Kumar, P., 2024	Clinical Gastroenterology and Hepatology	12
Base editing of key residues in the BCL11A-XL-specific zinc finger domains derepresses fetal globin expression.	Rajendiran, V., Devaraju, N., Haddad, M., Ravi, N.S., Panigrahi, L., Paul, J., Gopalakrishnan, C., Wyman, S., Ariudainambi, K., Mahalingam, G. and Periyasami, Y., 2024.	Molecular Therapy	12
Deciphering the molecular pathways of saroglitazar: A dual PPAR Î±/Î³ agonist for managing metabolic NAFLD	Ezhilarasan, D., 2024.	Metabolism	11.9
Engineered nanomicelles inhibit the tumour progression via abrogating the prostaglandin-mediated immunosuppression	Yadav, P., Rana, K., Nardini, V., Khan, A., Pani, T., Kar, A., Jain, D., Chakraborty, R., Singh, R., Jha, S.K. and Mehta, D., 2024.	Journal of Controlled Release	11.5
Sexual dimorphism in neurobehavioural phenotype and gut microbial composition upon long-term exposure to structural analogues of bisphenol-A	Singh, D.P., Kumar, A., Prajapati, J., Bijalwan, V., Kumar, J., Amin, P., Kandoriya, D., Vidhani, H., Patil, G.P., Bishnoi, M. and Rawal, R., 2024.	Journal of Hazardous Materials	11.3
Integrated genome-transcriptome analysis unveiled the mechanism of Debaryomyces hansenii-mediated arsenic stress amelioration in rice	Kaur, J., Tiwari, N., Asif, M.H., Dharmesh, V., Naseem, M., Srivastava, P.K. and Srivastava, S., 2024	Journal of Hazardous Materials	11.3

Publication Title	Authors	Journal Name	Impact Factor
CD33 targeted EzH1 regulated nanotherapy epigenetically inhibits fusion oncoprotein (AML1 ETO) rearranged acute myeloid leukemia in both in vitro and in vivo Patient Derived Xenograft models.	Kushwaha, A.C., Mrunalini, B., Ghosh, D., Malhotra, P., Karmakar, S. and Choudhury, S.R., 2024.	Nano Today	10.9
Polymeric optical fiber biosensor with PAMAM dendrimer-based surface modification and PlGF detection for pre-eclampsia diagnosis	Chaudhary, R.K., Madaboosi, N., Satija, J., Nandagopal, B., Srinivasan, R. and Sai, V.V.R., 2024.	Biosensors and Bioelectronics	10.5
QR-code enabled additive manufactured multiplex-immunosensor to detect DENV serotypes in dengue patient validate with indirect fluorescence antibody test (IFAT).	Hasan, M.R., Sharma, P., Mehta, Y., Angel, A., Angel, B., Joshi, V. and Narang, J., 2024.	Biosensors and Bioelectronics	10.5
Silver Shelled Gold Nanorods for Sensitive Detection of Cholesterol and Triglycerides	Basak, M., Nemade, H.B. and Bandyopadhyay, D., 2025.	Biosensors and Bioelectronics	10.5
Nanocatalysis of silver-nanobioprobe based supersensitive electrochemical detection of Salmonella serotypes targeting virulence protein	Bisht, B., Bhardwaj, P., Chauhan, S., Basnal, N. and Bhalla, V., 2025.	Biosensors and Bioelectronics	10.5
Common single nucleotide polymorphisms associated with idiopathic pulmonary fibrosis: a systematic review	Dhooria, S., Sharma, R., Bal, A., Sehgal, I.S., Kashyap, D., Muthu, V., Prasad, K.T., Agarwal, R. and Aggarwal, A.N., 2024.	European Respiratory Review	10.4
Genomic landscape of gallbladder cancer: insights from whole exome sequencing	Awasthi, S., Kumar, R., Pradhan, D., Rawal, N., Goel, H., Sahu, P., Sisodiya, S., Rana, R., Kumar, S., Dash, N.R. and Das, P., 2024.	International Journal of Surgery	10.1
Arsenic removal using de-oiled mentha biomass biochar: Adsorption kinetics and the role of iron modification	Nand, S., Kumar, S., Pratap, B., Dubey, D., Naseem, M., Patel, A., Shukla, S. and Srivastava, P.K., 2024.	Journal of Cleaner Production	10

Chapter 17: Technology & Innovations

ICMR serves as the nation's leading institution driving technology-based innovation across the entire health research spectrum, from conceptualisation and development to validation, scale-up, and societal impact. Through its expansive network of national institutes and regional research centres, ICMR undertakes every facet of technological advancement, ensuring that science translates into solutions that strengthen India's healthcare ecosystem.

ICMR's approach to technology is comprehensive and mission driven. It develops cutting-edge diagnostics, vaccines, therapeutics, medical devices, and digital health platforms tailored to national priorities. Technologies emerging from ICMR laboratories are rigorously validated through multicentric and field-level evaluations, ensuring accuracy, reliability, and suitability for India's diverse health systems. Once validated, these technologies are transferred to industry partners through a robust framework that promotes rapid commercialisation and large-scale deployment.

From developing CRISPR-based molecular assays, point-of-care diagnostic kits, and AI-enabled decision support systems to advancing indigenous vaccine candidates and biosafety innovations, ICMR's portfolio covers all stages of the innovation pipeline. Its emphasis on Design in India, Develop in India, and Deploy in India aligns closely with national missions such as *Atmanirbhar Bharat*, One Health, and *Viksit Bharat* 2047.

Complementing its scientific excellence, ICMR has institutionalised technology governance through the establishment of an online IPR and technology transfer management system, standardised licensing templates, and transparent evaluation mechanisms. This ensures that every innovation, whether emerging from a high-containment laboratory or a field research unit, follows a clear pathway from discovery to delivery.

In essence, ICMR does all kinds of technology-related work: it conceptualises, develops, validates (also developed by partners, collaborators, grantees etc.), and transfers technologies that redefine public health preparedness and healthcare accessibility. By integrating research, innovation, and translation under one umbrella, ICMR continues to position India as a global leader in health technology development and deployment.

ICMR institutes advanced multiple technologies in 2024–25 across diagnostics, therapeutics, devices, digital tools, and vaccines with clear movement along the translation pathway. ICMR - NIV, Pune converted lab innovation to impact by transferring rapid LAMP assays for Monkeypox and Nipah viruses to industry, submitting KFD PoC field-validation data to CDSCO, and readying a Chandipura IgG ELISA for tech transfer; it also progressed a KFD inactivated vaccine candidate with Indian Immunologicals. ICMR - RMRC Gorakhpur filed an Indian patent (202411042360) for a TRL-4 chikungunya PoC kit and validated a TRL-4 one-tube CRISPR Pan-DENV assay. ICMR - NIRT filed a patent (202411042426) for a carnosine nano-peptide TB delivery platform and reported a pipeline of TB diagnostics (real-time PCR, tNGS, CRISPR-Cas13a, ddPCR) at varying validation stages. ICMR - RMRC Bhubaneswar validated three TB diagnostic kits, began validating a CRISPR TB assay from RMRC Dibrugarh, and developed/field-piloted digital tools (MAMA, e-partogram). ICMR - NARFBR completed pre-clinical porcine validation of IIT-Delhi's multi-material orthopaedic screws. ICMR - NIRTH is filing a CRISPR-Cas POC for leprosy and built an SCD decision-support system. Programmatically, ICMR-HQ (CD Division) completed national validations

and recommended PathoDetect™ and Quantiplus® TB assays, validated three indigenous handheld X-ray systems, and integrated AI tools (DeepCXR, LPA-AI) into NTEP workflows. Large vaccine trials progressed: a 19-site dengue phase-3 (~65% enrolled) and an academic single-dose HPV RCT.

Across FY 2024–25, multiple ICMR units working in the area of noncommunicable disease advanced translational outputs. NICPR progressed three HPV screening technologies, two validated self-sampling approaches (one with a provisional patent; another with IDF filed) and a low-cost dual-specimen RT-PCR kit now under analytical validation with industry partnering; it also advanced an IND-cleared anti-HPV therapeutic in Phase-1 (Indo-US) with tech-transfer documentation underway. NIREH secured two granted industrial designs (cell-culture plate; AI mosquito identifier), filed/advanced a device design (RAY blood feeder), and filed a process patent for an optical NICHDR filed two leukaemia-linked patents (DBS RNA extraction; cfDNA yield) and launched a multicentric validation for a DBS leukaemia transcript kit under ICMR - NHRP. RMRC-NE filed a patent for a low-cost molecular DNA extraction kit (RAPIDBACT) and is progressing transfer. NITM filed patents on a palliative nutraceutical and a hepatitis-B herbal formulation. Critically, NIIH executed two licenses with MYLAB-G6PD qualitative POC (Mar 2025) and multiplex minor antigen PCR (Apr 2025), with commercialisation ongoing. Finally, under CARE-CP, the 6-mercaptopurine paediatric liquid (PREVALL) moved from granted patent to transfer and launch at one-tenth cost, enabling nationwide availability.

Patents Applications by ICMR Grantees (Intra & Extramural)

Table 53: Indian Patent Applications

S. No.	Title of the Invention	Patent Application No.	Filing Date	Intramural/ Extramural
1	Iron-based metal-organic framework (MOF) electrode for Posaconazole and Voriconazole by electrochemical detection	202411028898	4/9/2024	Extramural
2	An Immunogenic Molecule Against *Helicobacter pylori* and Method of Preparation Thereof	202411029436	4/11/2024	Intramural
3	A process for dried blood spot-based extraction of RNA	202411030217	4/15/2024	Intramural
4	A process of Identifying Potent vaccine candidate against human glioblastoma and method of preparing thereof	202411030588	4/16/2024	Extramural
5	A method for preparation of modified ultra-high molecular weight polyethylene (UHMWPE)	202411037161	5/10/2024	Extramural
6	A Chemical chaperone compound and method of preparation thereof	202411037892	5/14/2024	Extramural
7	Real-time analgesia for drug delivery by assessing chemical mediators	202411040159	5/23/2024	Extramural
8	System and method for determining breathing patterns of a user	202411041475	5/28/2024	Extramural
9	Carnosine Nano peptides For Drug Delivery System	202411042426	5/31/2024	Intramural

S. No.	Title of the Invention	Patent Application No.	Filing Date	Intramural/ Extramural
10	Development of cell-based immunofluorescence assay for Sero-diagnosis of scrub typhus infection.	202411042583	5/31/2024	Extramural
11	An assay and kit for in-vitro identification of Chikungunya Virus	202411042360	5/31/2024	Intramural
12	CRISPR-CAS based ultra-sensitive molecular detection kit for *Plasmodium falciparum* and artemisinin resistance	202411043609	6/5/2024	Intramural
13	A self-sampling method kit for detecting *human papilloma virus* infection	202411043608	6/5/2024	Intramural
14	A lateral flow multiplex assays and Kit for simultaneous detection of SARS-CoV2, *Influenza A* and *Influenza B* antigens	202411044028	6/5/2024	Intramural
15	Glow-TB PCR – a Rapid, near Point-of-Care CRISPRCas-based Ultrasensitive Molecular Detection kit for *Mycobacterium tuberculosis* complex.	202411043686	6/5/2024	Intramural
16	Inhaled Pyridine nano compositions and their uses in pulmonary, airway and pleural disease conditions	202411044031	6/6/2024	Extramural
17	Anti-Obesogenic functional food and method of preparation thereof	202411045411	6/12/2024	Intramural
18	A Metal Nanoparticle based formulation of AuNPWTA for the Management of HIV-1 Infection	202411045412	6/12/2024	Intramural
19	Polysaccharide-based hydrogels for bone healing and methods thereof	202411048031	6/22/2024	Extramural
20	A palliative nutraceutical supplement formulation and a method of preparation thereof	202411048649	6/25/2024	Intramural
21	Peptide Bio-therapeutics as Decoy to Inhibit Entry of *Herpes Simplex Virus*	202411050266	7/1/2024	Extramural
22	Mutant strain of *C. albicans* SC5314 and its uses in therapeutics or vaccines against Candidiasis	202411050602	7/2/2024	Intramural
23	Development of HCV antigen-based early detection system	202411050707	7/2/2024	Extramural
24	Alcohol-free sanitiser-cum-aerosol sprays for crowded areas	202411050605	7/2/2024	Extramural
25	A sensor for vitamin D detection and process for fabrication thereof	202411051686	7/5/2024	Extramural
26	A composition and a process for synthesis of a bio adhesive	202411051699	7/5/2024	Extramural
27	A biodegradable paper-based device and process for preparation thereof	202411052486	7/9/2024	Extramural

S. No.	Title of the Invention	Patent Application No.	Filing Date	Intramural/ Extramural
28	A system for bite force measurement and a calibrating method thereof	202411052526	7/9/2024	Extramural
29	Biomarker-based assay for intraoperative detection of nodal metastasis in head and neck squamous cell carcinoma	202411052722	7/10/2024	Extramural
30	Herbal formulation for the management of hepatitis B virus infection and its associated complications.	202411053444	7/12/2024	Intramural
31	A sensor for the detection of Amikacin and process of fabrication thereof	202411053486	7/12/2024	Extramural
32	Graphene oxide wrapped zeolitic imidazolate framework composite based working electrode for electroanalytical detection of anidulafungin	202411057822	7/12/2024	Extramural
33	An injectable composition for sustained release of ocular therapeutics	202411053400	7/12/2024	Extramural
34	A nano-emulsion based insecticidal paint and method of preparation thereof	202411054306	7/16/2024	Intramural
35	A Modified Patterned Surface and a Process for Preparation Thereof	202411070832	9/19/2024	Extramural
36	A device for detection of a biomarker in a biological fluid	202411073452	9/28/2024	Extramural
37	Producing a chimeric recombinant multi-stage vaccine for preventing *Plasmodium vivax* infection and its community transmission	202411095680	12/4/2024	Intramural
38	Carbon screen printed electrode-based sensor for detection of methylglyoxal in biological fluids. Project titled Homemade Carbon Screen Printed Electrode Based Biosensor for the Detection of Methylglyoxal in Urine	202411073848	9/30/2024	Extramural
39	Cloning and expression of recombinant human CC16 protein and antibodies against the same	202511006301	25.01.2025	Intramural
40	RAPIDBACT: A fast, low-cost DNA extraction kit for the use in molecular diagnostics	202511026919	3/24/2025	Intramural
41	Chemical lure composition for attracting mosquitoes	202511040223	4/25/2025	Intramural

Table 54: Copyright Applications

S. No.	Title of the Invention	Patent Application No.	Filing Date	Intramural/ Extramural
1	Adaptive model to strengthen facility-based emergency care system for providing quality emergency care among red triage patients (Time sensitive and other emergencies) at all levels of health care facilities.	21822/2024-CO/L	7/9/2024	Intramural
2	AI-driven smart nanomaterial - based quantum sensing method for CVD monitoring	22391/2024-CO/SW	7/16/2024	Intramural
3	Sentence-Picture Module for Kannada Dative and Locative Case Markers to Treat Grammatical Deficits in People with Language Impairment	27094/2024-CO/L	8/29/2024	Extramural
4	Myocarditis Diagnostic Calculator	19849/2024-CO/SW	6/24/2024	Extramural

Table 55: Industrial Design Applications

S. No.	Title of the Invention	Industrial Design Application No.	Filing Date	Intramural Extramural
1	Solid Teeth Integrated Porous TLIF Spinal Fusion Cage	418133-001	5/27/2024	Extramural
2	Light-weight carbon-fabric reinforced Prosthesis: Making a cost-effective Implant for the physically challenged.	420917-001	6/22/2024	Extramural
3	Medical device for detection of HR-HPV	419168-001	6/6/2024	Intramural
4	Microscopic Utility Noval Image Stabilising Holder set	416769-001	5/13/2024	Intramural
5	Electrochemical Detection and On-Demand Drug Release Device	416770-001	5/13/2024	Extramural
6	Micro-Dissector Instrument Set	454136-001	4/3/2025	Extramural
7	Trocar Cut Needle 304 LV Copper Wiring and Connector	462647-001	6/18/2025	Extramural

Table 56: Granted Indian and Foreign Patents

S. No.	Title of the Invention	Patent No.	Grant Date	Intramural Extramural
1	Plant extract-based composition useful for *Leishmania promastigotes*	Indian Patent no. 539301	5/27/2024	Intramural
2	Device for developing germfree and gnotobiotic mosquitoes.	Indian Patent no. 543698	6/28/2024	Intramural

S. No.	Title of the Invention	Patent No.	Grant Date	Intramural Extramural
3	Herbal formulation for the treatment of menopausal syndrome	Indian Patent no. 540527	5/31/2024	Intramural
4	Quantitative sensory testing system thereof	Indian Patent no. 541264	6/10/2024	Intramural
5	High precision surgical robotic platform for cooperative and teleoperated minimal invasive surgeries	Indian Patent no. 554978	11/25/2024	Extramural
6	A paper based diagnostic method for differentiating Asthma-COPD Overlap Syndrome (ACOS) from Asthma and COPD	Korean Patent no. 10-2737280	12/3/2024	Intramural

Table 57: Copyright Registered

S. No.	Title of the Copyright	Registration No.	Registered on	Intramural Extramural
1	IEC material on snakebite (IEC materials, MO flow Chart, Healthcare workers training booklet and information brochure for community)	L-138918/2023	12/19/2024	Intramural
2	Technique to optimise perception of spatial cues and spatial release from masking; Title of copyright: A software for assessing spatial hearing acuity	SW-19280/2024	8/9/2024	Extramural
3	Adaptive model to strengthen facility-based emergency care system for providing quality emergency care among red triage patients (Time sensitive and other emergencies) at all levels of health care facilities.	L-153640/2024	9/12/2024	Intramural

Transfer / Commercialisation Stage:

Table 58: Indian Transfer/Commercialisation Details

Institute	Technology / Product	Area	Transfer / Commercialisation Details
NIIH	Point-of-Care Qualitative G6PD Test	Haematology Diagnostics	Licensed to MYLAB Discovery Solutions Pvt Ltd
NIIH	Multiplex PCR for Minor Blood Group Antigens	Transfusion Medicine	Licensed to MYLAB Discovery Solutions Pvt Ltd
NCD	Liquid Suspension of 6-Mercaptopurine ("PREVALL") for Paediatric ALL	Therapeutics / Formulation	Technology transferred to industry (with TMC-ACTREC); formulation launched at ~1/10 cost; nationwide pharmacy roll-out

Section VI
Outreach and Governance

Chapter 18: Outreach Activities

18.1 Integrating Digital Campaigns with Ground-Level Action

In 2024-25, ICMR's outreach strategy reflected a powerful synthesis of digital innovation and field engagement, transforming scientific awareness into public participation. Digital platforms were leveraged for real-time health communication during outbreaks. Rapid online updates during Chandipura virus encephalitis in Gujarat, awareness campaigns on antimicrobial resistance, and dissemination of findings from cholera, dengue, diphtheria, and measles investigations bridged the gap between laboratories and citizens. Together, these integrated communication efforts made ICMR's outreach more agile and transparent, turning every public campaign into an opportunity for civic learning and behavioural transformation.

18.2 Community Outreach and Citizen Engagement

ICMR's outreach in 2024-25 was grounded in direct citizen engagement, where communities became both recipients and partners in health action. This approach translated scientific findings into accessible, culturally relevant formats, ensuring that knowledge flowed from the laboratory to the household.

Large-scale public events such as health exhibitions, school programmes, and village awareness drives exemplified this approach. At state exhibitions, over 2,650 students and citizens interacted with displays on disease prevention and health innovation, transforming research into experience-based learning.

Health awareness extended into schools and community spaces through interactive learning formats, street plays, role-plays, and hands-on demonstrations that engaged children and families alike. These participatory methods empowered youth as health ambassadors within their households, nurturing long-term attitudinal change.

ICMR's community-based interventions also strengthened local health systems. Teachers, ASHAs, ANMs, and frontline workers were trained in disease prevention and maternal health, ensuring that knowledge transmission reached every home. In several districts, digital tools like an e-simplified partogram were piloted in community health centres, introducing simple technology for safer deliveries and data-informed decision-making.

Epidemiological surveys were integrated into outreach, transforming research into dialogue. A landmark rabies study estimated 6.3 dog bites per 1,000 people and 5,700 rabies deaths annually, with findings directly communicated to communities and local authorities to prompt preventive action. Similarly, mass drug administration drives for lymphatic filariasis in Odisha engaged thousands, blending programme delivery with trust-building.

Additionally, over 21,000 frontline workers were trained under the National Sickle Cell Anaemia Mission, spanning ASHAs, ANMs, Anganwadi workers, and community health officers. This vast network represents health delivery as well as social learning at scale.

Cleanliness drives, preventive health check-ups, and waste segregation workshops for sanitation workers also reflected a holistic view of public health, one that linked disease prevention with dignity, environment, and occupational well-being.

Through these activities, ICMR's community outreach matured into a multidimensional system of grassroots empowerment, behavioural change, and institutional trust.

18.3 Professional and Scientific Engagement

Parallel to its citizen outreach, ICMR expanded its professional and academic engagement to strengthen India's scientific ecosystem. Conferences, workshops, and symposiums became platforms for knowledge translation, bridging research with policy and practice.

National-level workshops on AI in medical imaging, environmental health, data visualisation, and biosafety attracted hundreds of participants from diverse domains, clinicians, data scientists, environmental researchers, and policy professionals. These forums demonstrated how cross-disciplinary learning can accelerate innovation in disease prevention, diagnostics, and environmental health management.

Training activities played a central role. Over 165 state entomologists were trained for vector surveillance, 35 technical staff for laboratory GLP standards, and officers from the Indian Statistical Service on national data quality guidelines. Collectively, these efforts elevated technical competence across India's health research and implementation frameworks.

Scientific convenings, including the Annual TCS Conference and International Sickle Cell Disease Management Conference, underscored India's leadership in advancing global health dialogue. Workshops on gene therapy, antimicrobial resistance, and environmental hazards positioned ICMR as both a knowledge producer and a convening power in the international scientific community.

The Advanced Epidemiology Course under the EpiCap initiative was hosted by ICMR - NIE, Chennai, in collaboration with the Centre for Intervention Science in Maternal and Child Health, University of Bergen, Norway, from January 16 to 24, 2025, in Chennai.

These professional engagements reaffirmed that public health advancement depends on nurturing a networked, learning-oriented scientific culture.

18.4 Programme-Linked Outreach and System Preparedness

ICMR's outreach also strengthened the core architecture of national health programmes, linking research outputs directly to system capacity.

Large-scale simulation exercises such as *Vishanu Yuddh Abhyas,* which was a five-day multi-sectoral pandemic preparedness drill, demonstrated the power of coordinated response across human, animal, and environmental health. Conducted with 22 BSL-3 laboratories and observed by independent experts, it identified strengths and gaps in national outbreak response mechanisms.

Parallel capacity-building continued across major public health missions. ICMR laboratories provided diagnostic support for dengue surveillance in 30 districts, HIV viral load testing of 18,000 samples, and outbreak response for Zika, Nipah, diarrhoeal diseases, and diphtheria. Quality assurance systems were reinforced for TB diagnostics in 5 states and 5 Union Territories, integrating gender-responsive frameworks and psychosocial counselling support for patients.

At the same time, research innovation was applied directly to programmatic needs, such as developing machine-learning systems to predict sickle cell complications and piloting decision-support tools for vector control and maternal care.

These initiatives showcased how ICMR's science is not confined to laboratories, but it is embedded in the machinery of public health governance, directly informing surveillance, diagnostics, and preparedness.

18.5 A Convergent Model of Outreach

ICMR's outreach in 2024–25 crystallised around a three-tiered convergence model:

i. Digital Engagement, leveraging communication technologies for awareness, transparency, and rapid information flow

ii. Community Mobilisation, deepening behavioural change and local participation through hands-on, inclusive outreach

iii. Professional Capacity Building, strengthening the competencies and networks that sustain India's scientific and programmatic leadership.

Whether through digital storytelling, participatory learning, or simulation-based training, every initiative reinforced one message: research achieves purpose only when it reaches people.

From training tens of thousands of health workers to engaging rural students, from mobilising urban sanitation drives to coordinating pandemic simulations, ICMR demonstrated that communication, participation, and evidence are the three pillars of effective public health leadership.

In this way, outreach in 2024–25 was treated as a natural extension, ensuring that every discovery finds its resonance in public understanding, community ownership, and institutional trust.

Chapter 19: E-Governance & Digital Transformation

ICMR continued to strengthen its digital and e-governance ecosystem during 2024–25, consolidating both administrative and research information systems across headquarters and institutes. Verified records from the annual reports of ICMR headquarters and the constituent institutes show steady progress in the use of online platforms, data repositories, and secure digital infrastructure to support research administration, programme implementation, and public communication.

The Council's digital transformation operates through two main layers. The first comprises centralised administrative and governance systems such as electronic project management, finance and accounting, recruitment, infrastructure sharing, and data repositories hosted at the ICMR Data Centre. The second includes research and programme-linked digital tools and national health-data platforms for disease surveillance, diagnostics, and registries. Collectively, these systems represent a unified digital environment that connects research management, data analytics, and public health reporting under a secure and compliant technological framework.

19.1 Administrative e-Governance Systems

19.1.1 Digital Governance Framework

At headquarters, a suite of in-house digital platforms provides end-to-end automation of administrative processes. The balance finance accounting software supports financial management and fund tracking across institutes through electronic billing, real-time reconciliation, and integration with government payment gateways. The IRRAS (ICMR Research Repository and Analytics System) serves as a central repository of institutional, project, and personnel data and functions as a unified authentication layer for other ICMR platforms. The iRISE (ICMR Research Infrastructure Sharing Ecosystem) portal enables sharing of high-end research instruments and facilities across the ICMR network, promoting resource optimisation and transparency in utilisation.

The Online Recruitment Portal digitises the entire recruitment workflow, from application submission to document verification, ensuring transparency and reducing administrative delays. The Electronic Project Management System (ePMS) manages proposal submission, review, sanction, and monitoring for all extramural research schemes, while the e-Solution Clinic, integrated with ePMS, provides a digital helpdesk for investigators and programme officers. Each of these systems is hosted at the central Data Centre and operates with secure logins, audit trails, and defined response protocols.

The Health Research Data Repository, introduced in 2024, provides a structured platform for the storage and controlled sharing of processed health-research projects. It functions within an air-gapped environment with role-based access and built-in query tools for researchers. All data access requests are reviewed and approved by a Data Access Committee, ensuring transparency, traceability, and ethical compliance.

Together, these platforms constitute ICMR's administrative e-governance backbone, replacing manual workflows with integrated digital systems that enable paperless recordkeeping, standardised formats, and centralised data availability across all institutes.

19.1.2 Implementation across Institutes

All ICMR institutes have adopted e-Office-based workflows for file processing and correspondence, reducing reliance on paper records. Administrative transactions, procurement, and accounting activities are now managed through electronic systems under the oversight of the central Balance Finance platform and the ICMR Central Procurement Cell. Institutes also maintain their project and staff records through IRRAS and use standardised digital templates for annual reporting.

Periodic training sessions were organised across institutes to ensure uniform familiarity with these systems, including demonstrations on secure login procedures, document upload, and digital record validation. The headquarters IT Division continues to provide centralized support for e-Office and related systems, ensuring that all institutes operate under a consistent governance protocol.

19.2 Core Digital Infrastructure and Cybersecurity

19.2.1 Modernised Data Centre and Disaster Recovery System

The ICMR Data Centre underwent substantial modernisation to meet growing computational demands and ensure secure hosting of all institutional platforms. The facility now provides scalable computing clusters with virtualisation and cloud capabilities, high-speed and archival storage tiers, and a fully operational disaster-recovery site with off-site replication. This infrastructure enables high availability of critical systems such as Balance Finance, IRRAS, iRISE, ePMS, and the Health Research Data Repository.

The Data Centre also supports the hosting of the ICMR website, which was comprehensively revamped in 2024 on a Django-based content management system compliant with the Government of India's Guidelines for Indian Government Websites (GIGW). The website is bilingual, disabled-friendly, SSL-enabled, security-audit cleared, and ready for STQC certification. It serves as the single gateway to institutional information, publications, fellowship announcements, project opportunities, and public updates from all ICMR institutes.

19.2.2 Cybersecurity Governance

A robust cybersecurity framework safeguards all digital assets within the ICMR network. Headquarters implemented an endpoint detection and response (EDR) system, next-generation firewalls, and a 24×7 Security Operations Centre with AI-based monitoring. Multi-factor authentication, role-based access control, and encryption have been made mandatory across all platforms. Vulnerability assessment and penetration testing of applications were completed by CERT-In–empanelled agencies, and a Cyber Crisis Management Plan was prepared in accordance with CERT-In guidelines.

ICMR also collaborated with the Centre for Information and Resource Assurance (CIRA), Ministry of Defence, for a comprehensive review of cybersecurity posture. Proposals developed by Bharat Electronics Limited were placed before the Governing Council for approval. Details of critical IT systems were submitted to the National Critical Information Infrastructure Protection Centre (NCIIPC)for classification under the Critical Information Infrastructure (CII) framework.

A secure workflow for COVID-19 sample data continues under a memorandum with the National Informatics Centre (NIC), covering registration, testing, and anonymised research data dissemination. Additionally, Secure Coding Best Practices and developer checklists have been institutionalised across all software projects.

Cybersecurity awareness programmes are now embedded in the annual Vigilance Awareness observances of ICMR institutes. Staff at various centres participated in sessions on safe digital practices, email security, and data protection, reinforcing compliance with the Council's information-security policy.

19.3 Digital Systems Supporting Research and Programmes

19.3.1 Research Data Management and Analytics

As detailed above, the ICMR's digital environment for research governance is anchored by its integrated platforms: Balance Finance, IRRAS, iRISE, ePMS, and the Health Research Data Repository. Collectively, these systems have established a unified digital backbone for scientific research management within ICMR.

19.3.2 Institute-Level Application in Research

Several institutes reported operational research applications that extend the digital ecosystem to field and laboratory environments. NIREH Bhopal, developed open-source analytical software, GCM2MAXENT for climatic data processing and Harvest Ease GUI for genetic data visualisation, along with an AI-based model for cardiovascular disease risk analysis. The National Institute for Research in Tuberculosis (NIRT), Chennai, maintains the Indian Mutation Catalogue v2.0, a digital registry of genomic mutations associated with drug-resistant tuberculosis, built on data from thousands of isolates.

At the NIV Pune, a High-Performance Computing (HPC) Next-Generation Sequencing Hub was established under the Prime Minister's *Ayushman Bharat* Health Infrastructure Mission (PM-ABHIM). The hub includes a centralised genomic repository supporting network laboratories and nationwide genomic surveillance.

NIE Chennai, reported two digital applications: an API-based integration system for automated two-way data exchange between laboratory systems and national IDSP/IHIP servers, and the AI-VRDLN recommender system for laboratory test ordering within the VRDL network. A mobile application for stroke-patient coordination was also developed and field-tested by the institute.

NIRDHDS Delhi implemented the Unified Smart COD digital system for electronic cause-of-death coding and a national clinical registry on invasive fungal infections, both serving as operational digital databases.

Regional Medical Research Centres have also contributed field-based innovations. RMRC Bhubaneswar developed the e-Simplified Partogram App for real-time labour monitoring, the Mobile Application for Mothers' Assistance (MAMA) for maternal self-care education, and a regional Acute Febrile Illness Surveillance Database for outbreak tracking. RMRC Dibrugarh introduced the MosquiTracker app for entomological mapping and the My Heart App for cardiovascular awareness, along with field-based registries such as a stroke registry and a health and demographic surveillance system.

All systems listed above are recorded as functional within the respective institute reports and reflect documented, verifiable use cases.

19.4 Integration with National Digital Health Programmes

ICMR's digital systems are actively linked with multiple national health information platforms. The SOCH portal under the NACP receives HIV-1 viral-load data from ICMR's regional laboratories. The *Ni-kshay* portal of the NTEP integrates diagnostic results via ICMR's LPA-AI and Deep CXR tools, automating entry of line probe assay results and AI-based chest X-ray interpretations. The API interface with IDSP/IHIP servers maintained by NIE Chennai ensures real-time data exchange for notifiable diseases.

Under PM-ABHIM, ICMR contributes to national bio-surveillance through its AI-enabled dashboards for zoonotic spillover risk assessment and the NIV-led genomic data repository. The *e-Pehchan* platform, developed with NCDIR Bengaluru, standardises electronic civil-registration data for mortality reporting. Collectively, these verified linkages position ICMR as a key data contributor within India's national digital health architecture.

19.5 Capacity Building, Awareness, and Digital Outreach

Throughout FY 2024–25, ICMR placed strong emphasis on building digital capacity, enhancing awareness, and strengthening outreach across its institutes. A series of training programmes and orientation sessions were conducted to ensure efficient and secure use of digital platforms. Staff were trained on e-Office operations, data upload procedures, and system navigation, while researchers received specialised instruction on using tools such as the AI-VRDLN prototype, the Mutation Catalogue data interface, and mobile health applications developed for field deployment.

To promote cyber safety, institutes conducted dedicated sessions on cybersecurity during vigilance awareness week. The training covered safe data-handling practices, phishing prevention, and password management. Technical teams also received internal briefings on cybersecurity compliance and coding best practices, reinforcing a culture of digital responsibility.

In the domain of research, capacity-building extended to field-level users as well. Investigators under IHCI and DIGI-CARE projects were trained on mobile-based data capture systems, while frontline workers in Odisha and the North-East learned to operate health applications such as e-Partogram, MAMA, MosquiTracker, and My Heart for real-time reporting and monitoring.

At the level of public interface, the revamped ICMR website provided an integrated, bilingual interface for research updates, fellowship announcements, and publications. Institutes documented public events, such as health-awareness campaigns, *Swachhta* activities, and Yoga Day observances, using digital photography and online uploads, ensuring compliance with transparency and communication requirements.

These activities show that ICMR's digital progress is complemented by continuous human-capacity development and awareness of secure technology use.

19.6 Operational Compliance and Audit

During the reporting period, ICMR strengthened its operational compliance framework through systematic security audits, data governance practices, and inter-agency coordination. All centrally hosted digital platforms underwent periodic security audit and vulnerability remediation during the reporting year. The Data Centre infrastructure and web portals were audited by CERT-In–empanelled agencies, with high-risk vulnerabilities addressed before release. The public website and portals completed security clearance and were awaiting STQC certification at the close of the year.

In line with government archival standards, audit logs and backup schedules for all critical applications were maintained and periodically verified. Major systems were mirrored at the disaster-recovery site to ensure continuity and data integrity. Across all platforms, robust data protection measures, including encryption, multifactor authentication, and restricted access, remained in effect across all user levels.

Each digital platform maintained a built-in audit trail to ensure full accountability and verifiability of transactions, data exchanges, and user activities. Periodic reviews were conducted jointly with NIC, CIRA, and BEL to evaluate compliance with national cybersecurity guidelines.

The empirical evidence from the annual reports confirms that ICMR's e-governance and digital transformation initiatives have evolved into a comprehensive operational framework connecting administration, research, and national health programmes. Centralised platforms now manage finance, records, projects, and data repositories, while research institutes have developed digital applications tailored to their thematic areas. Cybersecurity, data management, and ethical governance form integral parts of this ecosystem.

Through consistent implementation, secure infrastructure, and inter-agency linkages, ICMR has achieved a functioning, transparent, and auditable digital governance environment. This system now forms the technological foundation supporting health research administration, national disease surveillance, and policy data integration across the Council's network for the year 2024–25.

Chapter 20: Contribution to Government of India Flagship Initiatives

During 2024 - 25, ICMR continued to actively align with flagship initiatives of the Government of India. Through the coordinated observance of *Swachhata Hi Seva, Hindi Pakhwada,* International Yoga Day, National Sports Day, and Vigilance Awareness Week, ICMR reaffirmed its commitment to national priorities, institutional ethics, and community participation. These initiatives strengthened ICMR's organisational culture by integrating health, environment, inclusivity, and integrity within the framework of scientific excellence.

20.1 Swachhata Hi Seva (Cleanliness Campaigns)

Under the *Swachhata Hi Seva* 2024 campaign, all ICMR institutes undertook extensive cleanliness drives, plantation programmes, and community engagement activities. Clean campus initiatives were complemented by public outreach, lectures on sanitation and hygiene, and tree plantation drives under the *Ek Ped Maa Ke Naam* initiative.

Staff, students, and community volunteers participated in *Shramdaan* for maintaining cleanliness in laboratories, hospitals, and neighbouring areas. Awareness sessions on waste segregation, biosafety, and environmental sustainability were integrated into daily operations, linking research infrastructure with the broader goals of the *Swachh Bharat Mission*.

Several centres organised *Safai Mitra Suraksha Shivirs,* preventive health check-ups, and felicitation ceremonies for sanitation staff, recognising their critical role in public hygiene. Plantation drives, school-based awareness programmes, and handwashing demonstrations connected scientific institutions with local communities. Through these integrated actions, ICMR transformed the *Swachhata* initiative from a symbolic observance into a continuous institutional practice, anchored in behavioural change, environmental stewardship, and collective responsibility.

20.2 Official Language Activities of the Council Headquarters

To ensure compliance with the Official Language Policy of the Union, several important steps were taken at the Council Headquarters. During the year 2024-25 to promote the progressive use of the Official Language Hindi including holding regular quarterly meeting and continuing the Council's own to incentive schemes (for all cadres) in addition to the incentive scheme operated by Department of Official Language.

In addition, the Council organised three workshops/scientific lectures during the year. Under this initiative, a technical lecture was organised at the Council headquarters on April 12, 2024, on the topic of "Cancer Screening: Unveiling Essential Strategies for Detection" Dr. Kiran Agarwal, Director, Professor and Head of the Department of Pathology, Lady Hardinge Medical College and Kalawati Hospital, New Delhi, was invited to deliver a lecture on this topic. They provided extremely valuable information on this topic, benefiting everyone.

The same order, a technical lecture was organized on May 27, 2024, on the topic "Preparing for Aging health: A strong need of the current hour". Professor Dr. Prasun

Chatterjee, Professor and Head of Department, Geriatric Medicine, All India Institute of Medical Sciences (AIIMS), New Delhi – 110029, was invited to deliver a lecture on this topic. They provided extremely valuable information on this topic, benefiting everyone.

In addition to these two workshops, another workshop/scientific lecture was organised on July 3, 2024, on the topic "Spine Pain - From Prevention to Treatment". Professor Dr. Bhavuk Garg, Professor and Head of Department, Orthopaedics, All India Institute of Medical Sciences (AIIMS), New Delhi 110029, was invited to deliver a lecture on this topic. They provided extremely valuable information on this topic, benefiting everyone.

In all three workshops mentioned, the lecturers provided extremely important scientific information on their respective subjects, benefiting everyone. In order to promote the progressive use of Hindi as the Official Language, the Hindi Fortnight and Hindi Day celebrations were organised this year as well, from September 16th to September 30th, 2024. During the Hindi Fortnight, various competitions were organised for the headquarters staff, including:

1. Hindi General Knowledge and Essay Writing
2. Hindi Note and Draft Writing,
3. Hindi Dictation
4. Hindi Typing
5. Hindi Elocution Competition
6. Hindi Poetry Recitation Competition.

Two competitions were organised also for the permanent staff of the Council's Centres/ Institutes: Hindi elocution and poetry recitation competitions.

On October 3, 2024, a Hindi Day celebration and award ceremony was organised under the chairmanship of Dr. Rajiv Bahl, Secretary to the Government of India and Director General of the Council, and in the presence of Ms. Manisha Saxena, Senior Deputy Director General (Administration), Dr. R. Lakshminarayanan, Deputy Director General (Administration), and Mr. Jagdish Rajesh, Assistant Director General (Administration).

The Secretary to the Government of India and Director General, ICMR, inaugurated the programme by addressing the gathering.

Inaugurating the Hindi Day celebrations and Kavi Sammelan (poet's gathering), the

Secretary to the Government of India and Director General of the Council, in his address to the Officers and Employees of the Council, emphasised the importance of the Hindi language, stating that Hindi is a scientific, comprehensive, affluent, powerful, and vibrant language, and it is very easy to work in it. He appealed to all Officers and Employees of the Council headquarters and all centres/institutes to conduct all their daily official work primarily in the Official Language, Hindi. Furthermore, he requested the Council and all the directors of the Council's centres/institutes to strictly comply with all the Official Language Act and Rules and to motivate and encourage Officers/Employees to use the Official Language.

Prize Distribution Hindi Diwas Celebration at NIMR

Following the poetry recitation and award ceremony, Dr. R. Lakshminarayanan, Deputy Director General (Administration) of the Council, delivered the vote of thanks, stating that Hindi unites the country and that this language maintains our unity and integrity. Hindi expresses Indian culture. Therefore, we should all ensure compliance with the constitutional provisions by conducting all our government work in our Official Language, Hindi.

Along with this, various activities and competitions were organised on the occasion of Hindi Diwas in almost all the institutions of the Council and pioneering work was done towards compliance of the Official Language Rules Act throughout the year in all the institutions.

20.3 International Day of Yoga

The International Day of Yoga 2024, observed under the theme Yoga for Well-being, was celebrated across all ICMR institutes through guided sessions, lectures, and demonstrations. Faculty, scientists, technical staff, and students participated in yoga practices that promoted mindfulness, posture correction, and stress management.

The observance reinforced the importance of integrating physical and mental wellness into institutional life. By adopting yoga as a collective activity, the Council nurtured a culture of balance and self-care, complementing its scientific mission with practices rooted in preventive health and holistic well-being.

20.4 National Sports Day and Fit India Activities

Aligned with the Fit India Movement, ICMR institutes celebrated National Sports Day through a range of indoor and outdoor sporting events. Competitions such as badminton, chess, table tennis, tug-of-war, and marathon runs were organised across campuses, encouraging teamwork and fitness among staff.

The Fit India Pledge was administered across institutes, followed by health talks and walkathons aimed at integrating physical activity into daily routines. These activities fostered camaraderie, morale, and unity within the workforce, while promoting a healthier and more productive workplace.

The observance strengthened ICMR's institutional commitment to employee well-being and reinforced the message that scientific excellence thrives in an environment of health, vitality, and collaboration.

20.5 Vigilance Awareness Week

ICMR institutes across the country observed Vigilance Awareness Week 2024 in alignment with the Central Vigilance Commission's theme, "Cultivating Integrity for Nation's Prosperity." The week-long observance featured a range of activities aimed at promoting transparency, accountability, and ethical conduct among staff, students, and the wider community.

Across institutes, employees participated in integrity pledges, interactive seminars, and competitions centred on good governance and ethical responsibility. Institutes conducted essay writing, slogan creation, and quiz competitions focused on transparency and good governance. Walkathons and outreach programmes in schools and communities expanded the campaign beyond institutional boundaries. Online integrity pledges further broadened participation, ensuring that every member of the ICMR family reaffirmed their commitment to honesty and ethical responsibility.

This annual observance has evolved into a defining feature of ICMR's governance framework, embedding integrity, accountability, and fairness into the daily conduct of research and administration.

20.6 Integration and Impact

The synchronised observance of Government of India initiatives across the ICMR network reflected a deep institutional culture of participation and purpose. Each campaign, whether focused on cleanliness, language, wellness, fitness, or integrity, was not an isolated activity but part of a coherent ecosystem of values guiding the Council's operations.

These initiatives strengthened internal cohesion, motivated staff, and enhanced public engagement. They demonstrated that scientific institutions are also societal institutions that are capable of inspiring change, promoting inclusion, and modelling ethical cond uct.

Through these integrated efforts, ICMR reaffirmed its identity as a national organisation that connects laboratories with communities, science with society, and institutional excellence with civic virtue.

The observance of national initiatives during 2024–25 showcased ICMR's unwavering alignment with the vision of Viksit Bharat at 2047. By embedding the ideals of Swachhata (cleanliness), Swasthya (health), Sahabhagita (participation), and Satya (integrity) into its institutional framework, the Council demonstrated how science and service can advance hand in hand. Through sustained participation in these Government of India programmes, ICMR not only strengthened its organisational fabric but also contributed meaningfully to a cleaner, healthier, and ethically driven India, one where research excellence and social responsibility progress together.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