Major Research Areas/Activities of ICMR and its Institutes & Achievements made during last 3 years (2018- Nov 2021)

S.No.	Institute	Major Research Areas

1	National JALMA Institute for Leprosy & Other Mycobacterial Diseases (NJILOMD)	**Leprosy and TB**
		• Clinical trials
		• Epidemiological studies including molecular epidemiology
		• Basic fundamental research
		  • Microbiology and Molecular Biology
		  • Immunology
		  • Biochemistry
		  • Bioinformatics
		• Animal experimentation
		• Operational research
		• Implementation research

2	National Institute of Occupational Health (NIOH)	• Epidemiological and environmental monitoring and corollary toxicological studies in hazardous occupations for recognition and evaluation of risk factors • Development of tools for early diagnosis of health impairment and design of appropriate intervention measures for the prevention of hazards at work places. • Occupational and environmental epidemiology • Toxicology (metal, pesticide, reproductive, geno and neurobehavioral) • Environmental pollution (air, water, noise, thermal) • Development of safety norms (chemical physical agents) • Operational research • Women and children health • Agricultural health
3	National Centre for Disease Informatics and Research (NCDIR)	• Setting up Registries on Cancer, Cardiovascular Diseases, Diabetes, Stroke and Other relevant Non Communicable Diseases • Translational Research through epidemiological and clinical research • Software development, implementation and adaptation for strengthening data capture, transmission, analysis and reporting. • Surveillance of above diseases using Disease informatics approach • Knowledge translation for public health utility.
4	National Institute for Research in Environmental Health (NIREH)	• Health needs of gas exposed population with focus on respiratory diseases, eye related diseases, renal diseases, reproductive and women's health and mental health • Research on cancers, genetic disorders, health status of second and third generation children in the exposed population and community building • Development of tools for biomedical informatics application in predicting disaster outcomes, selection of antidotes and other interventional methods
5	National Institute for Research in Tuberculosis (NIRT)	• Clinical trials in pulmonary &extrapulmonary TB, also addressing co-morbidities for framing guidelines • Innovative & indigenous tools for TB diagnosis & drug susceptibility testing • Socio-behavioural aspects of TB & HIV • Epidemiology & Molecular epidemiology of TB • Pharmacokinetic studies for dose optimisation in TB & HIV

6	National Institute of Epidemiology (NIE)	• Disease Surveillance(Rotavirus, Bacterial Meningitis, Virus Research and diagnostic Laboratory Network and HIV Sentinel Surveillance) • Non-Communicable diseases • Tribal Health • Health System Research • Leprosy epidemiology
7	National Institute of Malaria Research (NIMR)	• Epidemiology of malaria and dengue • Biology and control of vectors of malaria and other vector borne diseases • Evaluation of new insecticides, drugs and diagnostic kits • Biology of malaria parasite • Training, Information Education & Communication and support to National Vector Borne Disease Control Programme
8	National Institute of Pathology (NIP)	• Tumor biology (breast cancer, genitourinary malignancies, lymphoma, cancers in north east region), infectious diseases (chlamydia, leishmania), stem cell biology and environmental toxicology. • Genetic susceptibility for various familial and non-familial tumors, predictive and prognostic biomarkers, molecular pathology, molecular functional pathways and drug targets. • Investigation of the gene-environmental link responsible for very high incidence of several malignancies, especially those associated with tobacco and pesticide (oral, esophageal, gastric, lung and breast cancers) in north eastern states in India. • Studies on chlamydia infection on genital tract and coronary artery disease, including study on role of chlamydial heat shock protein in pathogenesis of genital tract infection in women. • Understanding the process of in vitro differentiation of *Leishmaniadonovoni*. • Studies on role of environmental toxicants especially heavy metal in cases of miscarriage. • Studies on utility of a patented synthetic thermo-reversible hydrogel polymer as supportive matrix towards the development of 3-D composite skin for application in wound healing and other dermatological disorders. • New high priority areas have been identified, viz.: lifestyle diseases, metabolic syndromes, chronic diseases biology and telepathlogy.
9	National Institute of Medical Statistics (NIMS)	• HIV Sentinel Surveillance, Modelling, estimation and projection of HIV/AIDS in India and its States. • Clinical Trials Registry – India (CTRI). • Survey methodology and operations research including programme evaluation.
10	National Institute of Nutrition (NIN)	• Community studies to monitor diet and nutrition status of the country. • Effective intervention strategies and models for prevention and control of nutritional problems in the country. • Operational research with respect to planning, implementation and strengthening of national nutrition programmes. • Outbreak investigations of food borne diseases arising from contaminants and toxicants • Development of food based micronutrient fortification strategies to control hidden hunger in the country • Research in development and dissemination of effective outreach methods for nutrition communication. • Food safety, drug toxicity and safety, dietary management of chronic diseases, preclinical toxicology of drugs, biotech products developed indigenously.

11	National Animal Resource Facility for Biomedical Research (NARFBR)	• Care, Breeding, Management and Experimentation using laboratory animals in biomedical research
12	National Institute for Research in Tribal Health (NIRTH)	• Hemoglobinopathies • Malaria with specific focus on tribal populations • Tuberculosis specific focus on tribal populations of the region • Viral diseases of public health importance in central India • Health related Social and behaviouralpractises of Tribal population
13	National Institute of Cholera and Enteric Diseases (NICED)	• Behavioural intervention trials and trials of drugs and/or vaccines against cholera and other enteric infections • Identification of emerging diarrhoeal pathogens, investigating outbreaks, developing diagnostics and monitoring antimicrobial resistance in them with exploration of associated genotypic changes and linked mechanisms • Exploring various aspects of pathophysiology and host pathogen relationships in virus and bacterial diarrhoea including tracking of novel pathoges infecting humans, which have implications for intervention development and policy advocacy • Research on Arboviruses, such as Dengue, Japanese Encephalitis, Chikungunya, West Nile virus for rapid and reliable detection as well as molecular characterization
14	National Institute for Research in Reproductive Health (NIRRH)	• Fundamental, clinical and operational research on various aspects of reproductive health • Identification of cytogenetic abnormalities in developmental disorders • Diagnosis and management of metabolic disorders • Elucidation of genetic abnormalities in neuro-developmental and neuro-psychiatric disorder • Development of cellular model for various genetic neurodevelopmental disorders
15	National Institute of Immunohaemotology (NIIH)	• Hemoglobinopathies including beta thalassemia and sickle cell anemia and red cell enzymopathies and membranopathies • Human blood group systems and transfusion medicine • Inherited bleeding disorders including haemophilia and thrombotic disorders • Primary Immunodeficiency disorders • Inherited and acquired marrow failure syndromes including MDS, aplastic anemia and Fanconi's anemia • Hematolymphoid malignancies including ChrnoicMeyloid Leukemia and acute myeloid leukemia • Autoimmunde disorders • Transfusion transmitted disorders
16	National Institute of Cancer Prevention and Research (NICPR)	• Cytology • Epidemiology • Molecular biology • Bioinformatics • Molecular Diagnostics
17	Rajendra Memorial Research Institute of Medical Sciences (RMRIMS) , Patna	• Kala-azar (Visceral leishmaniasis) • Tuberculosis • Viral diseases (AES/JE, Dengue, Chikungunya etc) • Other vector borned disease like malaria, filarial • Diarrheal diseases
18	Vector Control Research Centre (VCRC)	• Vector biology, ecology and Integrated Vector management • Bio-diversity of vectors and parasites • Development of tools/agents for surveillance and control of vector/parasite/pathogen

		• Development of tools for decision support • Optimization of intervention strategies for prevention and control • Surveillance of vector borne diseases for development of early warning system • Development and evaluation of diagnostic tools of vector borne diseases • Understanding the molecular mechanisms of vector-pathogen interactions under different ecological, vector behavioural and changes in climatic conditions • Research on emerging and re-emerging vector borne diseases especially on tribal areas • Knowledge translational and product development for novel and effective vector borne diseases control strategies
19	National Institute of Virology (NIV)	• Outbreak investigation including COVID-19, Nipah, Zika etc. • Precise assessment of prevalence of different viruses in different populations at different time points, identifying risk groups requiring interventions. Conducting similar studies in animals / mosquitoes and other insects. • Development of diagnostics, both serological and molecular. • Understanding of the genetic variation in viruses with time, location and clinical presentation • Development of vaccines employing different approaches • Pathogenesis of viral infections in animal models and humans • Partner to several national and international studies assessing efficacy of antivirals / vaccines, prevalence of viral infections and characterization of viruses. • To suggest preventive and control strategies for viral infections discovering viral diseases, outbreak investigations, diagnostic kits preparation and developing therapeutic • AFP Surveillance • Environmental Surveillance • Molecular epidemiology of polio and other Enteroviruses • Immunological studies on Enterovirus infections • Serosurveillance and vaccination strategies
20	National AIDS Research Institute (NARI)	• Conduct clinical trial of antiretroviral drugs, microbicides and vaccines • Basic studies on HIV and its immunopathogenesis and identify correlates of immune protection • Epidemiology of HIV infection • HIV and co-infections and comorbidities such as TB, STIs, Hepatitis and HPV, HIV related cancers. • Social and behavioural studies to identify factors related to the risk of HIV acquisition and drug adherence
21	Regional Medical Research Centre Bhubaneswar	• Vector borne Diseases & Neglected tropical diseases • Infectious Diseases (Bacterial & Tuberculosis) • Viral Diseases • Non communicable diseases, Nutrition &Haemoglobinopathy • Social Epidemiology & Maternal and child health
22	Regional Medical Research Centre Dibrugarh	• Cancer studies in NE India • Cardiovascular diseases • Malaria and trematode infection • Tuberculosis and other bacterial diseases • Viral diseases and other vector borne diseases
23	Regional Medical Research Centre, Port Blair	• Vector-borne diseases –diurnally sub-periodic filariasis, malaria dengue, chikungunya, ZIKA virus • Leptospirosis • Tuberculosis • Tribal health and traditional medicine or ethno medicine

		• Translational research: Development of DNA vaccine and DNA antibodies and diagnostic and herbal formulations
24	National Institute for Implementation Research on Non-Communicable Diseases, Jodhpur	• Silicosis and measures of its prevention useful for workers of sandstone quarries of Rajasthan. • Identifying and Implementing various Strategies for Screening, Management and Prevention of Sickle Cell Disease in Rajasthan • Strengthening State Health System for early detection of Breast Cancer involving strategic education and awareness among the women. • Management and control of vector borne diseases. • Improving Health and nutritional status of vulnerable segment of population by implementing multi-component health & nutrition education intervention.
25	National Institute of Traditional Medicine, Belgavi	• Traditional Medicine • Ethnopharmacology • Integrative Medicine • Regional Diseases: Water-borne infections and AMR • Regional Diseases: Vector-borne diseases
26	Regional Medical Research Centre Gorakhpur	• Japanese Encephalitis/AES • Scrub Typhus • Regional Health Issues

Major Achievements of ICMR and its institutes for last three years

Achievements in COVID-19: Various activities undertaken

I. Testing for COVID-19:

a. In January 2020, ICMR-NIV, Pune standardized the RT-PCR based diagnostic test and was the standalone lab for COVID testing, whereas today we have close to 2400 labs with testing capacity close to 14 lakh per day. 530/536 Medical Colleges are now testing for COVID-19 and 659/741 districts have a RTPCR testing facility whereas all 741 districts have RAT testing available. Proactive efforts are being made to establish facility in remaining districts through PM cares funds and other resources.

b. Resources in labs have been augmented by providing multiple RT-PCR machines, high throughput machines, automated RNA extraction platforms, increased manpower etc. This has led to a reduced turnaround time of testing wherein > 85% of the results are provided within 48 hours.

c. Immense efforts have been made to establish labs in difficult terrains like Ladakh, Sikkim, Arunachal Pradesh, Nagaland as well as other NER states, islands like Lakshwadeep and Andaman & Nicobar.

d. For remote and rural areas, TrueNat/CBNAAT platform, validated by WHO for TB, have been repurposed for COVID testing. Currently, close to 3000 TrueNat (indigenous platform)machines have been deployed.

e. High throughput machines (testing capacity of >1000 per day) were set up at 10 different locations in India and were inaugurated by Honb'le PM. Mobile testing labs were inaugurated by Hon'ble HM and deployed in collaboration with Spicehealth.

f. Rapid antigen testing was approved in last week of June. This point of care test has tremendously improved access and ease of testing. India became the first country to deploy COVID-19 RAT in program.

g. Strategy for pooled testing of samples was standardized and disseminated.

h. 24 validation centers have been set up for fast track validation of newer diagnostic commodities. So far, more than 1150 different diagnostics have been validated of which 577 are approved. In line with the "Atmanirbhar Bharat" initiative of the Hon'ble PM, ICMR has approved 416 (72%) indigenous test kits. Indigenous manufacturers are also being hand-held to improvise their products. Tenfold cost reduction has occurred.

i. Un-interrupted supply of testing commodities to states through 20 ICMR depots has been ensured.

j. ICMR- NIV team travelled to Iran to help in the evacuation of Indian shia pilgrims (>6000) stranded in Iran in Feb. 2020. RTPCR lab was set-up in Tehran and 2028 samples were collected from 5 cities (Qom, Tehran, Shiraz, Mashhad, Isfahan).Special flights operated by Indian Air Force & Iranian Airlines for repatriation of Indian Nationals.

k. A quarterly Quality Control program has been implemented for more than 1250 RTPCR laboratories. With the help of WHO External Quality Assurance program has been also been implemented. This effort is envisaged to improve the quality of testing.

l. A uniform data entry portal is hosted by ICMR. This database carries India's COVID-19 testing data for more than 20 crores tests.

m. A common sample referral form (SRF) has been developed and deployed with the help of National Information Centre (NIC) through the RTPCR application.

II. Nationwide serosurvey to determine the seroprevalence of SARS-CoV-2:

Blood samples from a total of 24000 samples from 71 districts were collected and tested for IgG antibodies against SARS-CoV-2. Three Nationwide serosurveys have been conducted from May 11 to June 4, 2020; August 17 to September 2 and December 17 to January 8. The nationwideadjusted sero-prevalence was found to be 0.73%; 7.1% and 21.5% respectively.The third serosurvey also included 7000 healthcare workers.

III. Isolation of SARS-CoV-2 virus by ICMR-NIV, Pune:

a. Three different strains of SARS-CoV-2 have been isolated and cultured:
   - India became the 5th country to isolate the virus in March 2020.
   - UK variant strain was isolated in December 2020
   - Brazil variant strain was isolated in February 2021
b. Virus isolation paved the way for development of following technologies:
   - Indigenous ELISA IgG kit by NIV, Pune. Technology was transferred to 7 Indian companies.
   - Hyper-immune horse serum, which offers a promising tool for prophylaxis and treatment of SARS-CoV-2 exposed/ infected individuals. ICMR has provided the virus and is working closely with three companies for clinical development of this product.
   - Development of indigenous whole virion inactivated vaccine by Bharat Biotech International Ltd.
   - Laboratory assays like the gold standard Plaque Reduction Neutralization Test (PRNT) was established.
   - Animal challenge experiments were conducted to understand the efficacy of vaccines and therapeutics.

IV. Drug Trials:

a. **World's largest Plasma Therapy Trial (PLACID):**The trial was conducted in a total of 464 participants across 39 hospitals. A set of clinical and laboratory parameters were monitored over 28-day period in patients enrolled in intervention (235) and control arms (229). The trial has revealed no significant benefit of plasma therapy in terms of reducing severity of disease and mortality.

b. **WHO Solidarity Trial:** India: ICMR-National AIDS Research Institute led the trial which was initiated trial in April 2020 across 26 hospitals and 1048 adults randomized. The globa trial in >11000 individuals concluded that Remdesivir, Hydroxychloroquine, Lopinavir and Interferon - little or no effect on overall mortality, initiation of ventilation and duration of hospital stay in hospitalized.

V. COVID-19 Vaccine trials supported by ICMR/DHR:

a. COVAXIN of Bharat Biotech International Ltd (BBIL):

- Provided virus strain
- Characterized vaccine strain
- Conducted preclinical studies in hamsters & monkeys

- Technical & Lab support for phase 1 & 2 trials.
- Technical & lab and financial support for phase 3 trials

b. COVID-19 vaccines manufactured by Serum Institute of India:

- Phase 2/3 studies of COVISHIELD (AstraZeneca)
- Phase 2/3 studies of COVOVAX (Novavax)
- Preclinical Hamster studies: indigenous candidates

c. ZyCoV-D of Zydus Healthcare:

- Preclinical studies in monkeys at ICMR-NIV, Pune

d. Proposals in pipeline:

- Preclinical studies in Monkeys of Biological Evans vaccine candidate
- Preclinical studies in rats and hamsters of vaccine candidates of Reliance Industries

VI. Other activities:

a) ICMR-NIV was the first in India to detect the presence of UK, Brazil and South African variants of SARS-CoV-2 in India.

b) As part of INSACOG and independently ICMR-NIV has sequenced more than 5000 sequences of SARS-CoV-2.

c) Vaccine portal of India was inaugurated recently by Hon'ble HFM in September 2020.

d) Laboratory studies for development of monoclonal antibodies for COVID-19 prophylaxis and treatment have been successfully completed. Clinical evaluation and next steps are being taken up.

e) COVID-19 clinical registry across 40 tertiary medical institutes of eminence have been established. Aim is to understand the demographic features, clinical outcome and design suitable treatment modalities for COVID-19 affected patients.

f) Ten COVID-19 biorepositories for helping industry/academia with appropriate samples of SARS-CoV-2 for developing indigenous diagnostics etc. have been established.

g) Sewage surveillance has been standardized to detect presence of SARS-CoV-2 as early warning signal to predict increase in disease prevalence in a particular zone.

h) ICMR has been issuing timely advisories, treatment modalities, discharge guidelines, testing advisories etc. through the National Task Force chaired by Member Niti Aayog.

i) More than 100 antiviral drugs/compounds have been screened for their antiviral potential.

j) Good quality research projects with high translational potential in areas of epidemiology & surveillance, laboratory diagnostics, clinical and operational research have been funded.

Other Achievements of ICMR in past 3 years
• **Successful Outbreak/ Epidemic Investigation & Mitigation:** COVID-19, Nipah, Zika; CDV in Gir Lions
• **Mission Mode Projects & Successful Demonstration projects in eliminable disease:** Establishment of MERA (Malaria Elimination Research Alliance) India & India Tuberculosis Research Consortium.Successful demonstration of CCMP &Mandla in Malaria Elimination; Triple Drug Therapy for Filariasis; Vaishali Model for Kala Azar; MIP in Leprosy.
• **National Prevalence &Sero-surveillance Surveys:** COVID-19, Tuberculosis, Dengue, Chikungunya, Diptheria, Rotavirus, Antimicrobial Resistance, Diabetes, Hypertension, Stroke, Cancer.
• **Affordable Technologies: Diagnostics:** TrueNAT for Covid-19, Nipah, Tuberculosis & Leptospirosis; COVID Kawach ELISA, Crimean-Congo haemorrhagic fever (CCHF) Sheep and Goat, Crimean Congo haemorrhagic fever (CCHF) in Cattle, Japanese Encephalitis virus (JEV) from Mosquito, Magnivisualizer. **Vaccines:** Covaxin for COVID-19; Shigella Vaccine; JENVAC for JE
• **Digital Interventions in Tackling NCDs:** Mission DELHI for heart attack, Mobile Stroke Unit in NE for stroke
• **Policy Interventions:** White paper on ENDS; Recommended Dietary Allowances; Bioethics & Stem Cell Guidelines.
• **Research Support to Ayushman Bharat:** Standard Treatment Workflows; Health Technology Assessment; National list of Essential Diagnostics, medicines & assistive technologies.
• **Infrastructure Development:** NIIH-Centre for Research, Management and Control of Haemolglobinopathies, Chandrapur; Centre for One Health, Nagpur; Regional Medical Research Centre, Gorakhpur; Samrat Ashok Tropical Disease Research Centre at RMRI, Patna; a field station at Keylong in Lahaul&Spiti district of Himachal Pradesh; NIN- Tata Centre of Excellence in Public Health Nutrition, Eco-friendly building of National Institute for Research in Environmental Health, Bhopal