

Mathematical Modelling for Control of Infectious diseases in India: An Introductory Certificate Course

SUMMARY:

The Certificate Course on Mathematical Modelling of Infectious Diseases (CCMMID) is an introductory certificate programme aimed at building national capacity in mathematical modelling among public health professionals. The course is being conducted jointly by the National Institute of Health and Family Welfare (NIHFW) and ICMR – National Institute of Translational Virology and AIDS Research (ICMR-NITVAR), Pune, under the Pradhan Mantri Ayushman Bharat Health Infrastructure Mission (PM-ABHIM). It aims to strengthen surveillance of infectious diseases and enhance India's biosecurity research capacity to identify and respond to biosecurity risks from emerging and reemerging pathogens. The programme seeks to train 100 health professionals over a three-year period (2024–2027), thereby strengthening analytical and modelling capabilities within the public health system

AIM: To build national capacity by training 100 health professionals in mathematical modelling over a period of three years.

OBJECTIVE:

- Strengthen the analytical and modelling capacity of early/ mid-level public health professionals.
- Build foundational and applied skills in mathematical modelling.
- Enable participants to apply modelling tools for outbreak prediction and intervention planning.
- Enhance data interpretation and evidence-based decision making.

COURSE DURATION:

The six-month programme follows a hybrid learning model, comprising as follows:

- Online Self-Paced Modules and learning through a dedicated e-learning portal (~ 1 hour/ week)
- Three In-Person Contact Sessions (3 + 3 + 2 days)
- Assessments: Pre- and post-training evaluations

The contact sessions include lectures, group work, hands-on modelling exercises and model simulations, supported by faculty from the NIHFW, ICMR-NITVAR and invited national experts. Participants continue in their respective workplaces during the course, facilitating application of the acquired knowledge to real-world public health programmes.

ELIGIBILITY AND SCREENING PROCESS:

The course is designed primarily for early- and mid-career professionals engaged in infectious disease surveillance, outbreak response, data analysis, programme implementation and research. Professionals like Public health experts, epidemiologists, statisticians, entomologists, programme officers, data managers, or technical personnel engaged in infectious disease control.

The screening process includes the following:

- Nominations are sought from States, Programme Divisions, Academic Institutions and Development Partners. (Candidates can only apply on basis of a nomination from their State/ Institution)
- A scrutiny committee from NIHFV and ICMR–NITVAR screens applications based on eligibility and program needs
- Candidates are selected based on minimum eligibility criteria, i.e., 5 years of work experience post minimum qualifications, experience of working in the area of infectious diseases/surveillance and their ability to contribute to the health system.

COURSE FEES: Fully sponsored course under PM-ABHIM. No tuition fee for participants

COURSE OUTLINE AND RELEVANCE:

The course aims to enable participants to use modelling tools for outbreak prediction, disease trend forecasting and intervention planning, and to strengthen evidence-based decision-making at the state and district levels. By enhancing the availability of trained professionals with modelling expertise, CCMMID contributes to improved epidemic preparedness, disease control and the broader national goals for elimination of infectious and vector-borne diseases.

COURSE MODULE:

- Foundational knowledge of mathematics, including algebra, calculus and differential equations.
- Concepts and applications of mathematical modelling such as population dynamics, outbreak analytics and compartmental models.
- Disease-specific modelling is covered for Tuberculosis, HIV/Syphilis, Measles-Rubella, Malaria and Lymphatic Filariasis.
- Article critique and presentations.

PROGRESS:

Three cohorts comprising 55 participants have been trained by the end of August 2026. The fourth cohort comprising 26 participants has completed the first contact session and is scheduled to complete the course by December 2026. The final cohort of this course (Cohort 5) has been constituted in September 2026 and is currently undergoing the online training modules. Training of 100 participants will be completed by Jan/ Feb 2027.

Snapshots from Contact Sessions



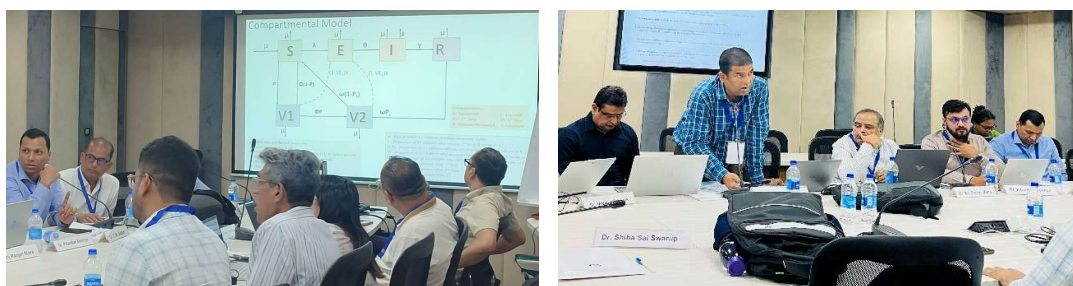
Problem solving on infectious models and hands-on session on R software by the resource persons



Guest lectures from ICMR faculty as a resource person



Group discussions for the critical review and the final presentation for assessment



Model presentations by participants as a part of final contact session also valedictory function



Group Photograph of participants with resource persons and NIHF staff (Cohort 3)



Group Photograph of participants with resource persons and NIHF staff (Cohort 4)
