

**‘Support to Indian Institutes for imparting training’ to the Faculty of Medical Colleges/
Research Institutes under Human Resource Development Scheme of Department of
Health Research**

1. Area of Training: ENVIRONMENTAL HEALTH

2. Name of the Institution and contact details: POST GRADUATE INSTITUTE OF MEDICAL EDUCATION AND RESEARCH, SECTOR 12 CHANDIGARH- 160012.

3. (a) Name of the Principal Investigator and contact details: DR RAVINDRA KHAIWAL (ASSOCIATE PROFESSOR OF ENVIRONMENT HEALTH), SCHOOL OF PUBLIC HEALTH, PGIMER CHANDIGARH.

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(b) Name of the Co- Investigators and contact details: NOT APPLICABLE

4. Training Module

Programme-Duration of the training-Minimum 4 weeks/1 month

- I. Introduction: Department of Health Research (DHR), Ministry of Health and Family Welfare, Govt. of India has launched a health research scheme to provide advanced training to Indian health research personnel in cutting edge research areas concerning health to improve public health in the country. Series of workshops in Environmental Health are planned through this scheme.
- II. Aim of the program: There is increasing evidence that large number of people are suffering due to the adverse effects of environmental pollutants. The prevention, control and abatement of various pollutants require special knowledge of the nature, source and extent of pollution. The proposed course will help to develop the research focus on environment and occupational Health and Exploit existing information for health and policy. During the training special attention will be given on the chemical composition and transformation of pollutants (including emerging pollutants), their sources and association with human health to reduce the burden of diseases and disabilities. Further, case study will be specifically chosen to enhance the linking between researches and teaching to develop the professional skills of participants and build research aptitude.
- III. Existing faculty members, their details, positions, available with the institution for imparting training programme.

Course Coordinator	Dr Ravindra Khiwal (Associate Professor), School of Public Health
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	PGIMER, Chandigarh 160012, INDIA E-mail: khaiwal@yahoo.com
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School of Public Health and PGIMER faculty

S. No.	Faculty - Name and designation	Research interest of faculty
1.	Prof Rajesh Kumar (Professor and Head)	Community Medicine
2.	Prof Amarjeet Singh (Professor)	Community Medicine
3.	Prof J.S.Thakur (Professor)	Community Medicine
4.	Prof Arun Aggarwal (Professor)	Community Medicine
5.	Dr Manmeet Kaur (Additional Professor)	Health Promotion
6.	Dr PVM Lakshmi (Additional Professor)	Epidemiology
7.	Dr Madhu Gupta (Additional Professor)	Community Medicine
8.	Dr Sonu Goel (Associate Professor)	Health Management
9.	Dr Ravindra Khiwal (Associate Professor)	Environmental Health
10.	Dr Shankar Prinja (Associate Professor)	Health Economics
11.	Dr Tarundeep Singh (Assistant Professor)	Community Medicine
12.	Dr Poonam Khanna (Assistant Professor)	Nutrition
13.	Dr Monika Duggal (Assistant Professor)	Community Medicine
14.	Dr Ashutosh Aggarwal (Professor)	Pulmonary Medicine
15.	Dr Bhavneet Bharti (Additional Professor)	Paediatrics Medicine

16.	Dr Savita Verma (Additional Professor)	Paediatrics Medicine
17.	Dr Naresh Panda (Professor)	Otolaryngology
18.	Dr S.K. Jindal	Pulmonary Medicine

Apart from the above, external faculty from Chandigarh Region Innovation and Knowledge Cluster (CRIKC) may also be available-

1.	Dr A.K. Mittal (Professor)	Department of Civil Engineering, IIT Delhi
2.	Dr Suman Mor (Assistant Professor)	Department of Environment Studies, Panjab University Chandigarh
3.	Dr Siby John (Professor)	Civil Engineering Deptt., PEC Chandigarh
4.	Dr Vinayak Sinha (Associate Professor)	Earth Sciences & Chemistry, IISER Mohali
5.	Dr Bhola Ram Gujjar (Professor)	Department of Civil Engineering, IIT Roorkee
6.	Dr Paromita Chakraborty (Assistant Professor)	Department of Civil Engineering, SRM University Chennai

- IV. Available infrastructure facilities: The School of Public Health, PGIMER, Chandigarh has the requisite technical expertise for extending the necessary support to facilitate the training work (theoretical as well as practical work) to the fellows. This includes knowledge of water and air pollutants and their chemistry, measurement techniques of pollutant and data interpretation. We also have instruments for analytical work in the field of environment pollutants.
- V. Training schedule with elaborate details day wise or week wise along with the topic.

S.No.	Topic	Duration	Details
1.	Basic Course on Environmental Health	Week 1 & 2	The modules on Health and Environment, Environmental Pollution, Toxicology, Environmental protection and Legislation, Waste Management, Healthy Housing and Workplace, Disaster Management, Environment Epidemiology, Health promotion, Occupational Health, Environment Risk Management, Current Environmental Issues will be covered in 2 weeks.
2.	Advanced Research based Course	Week 3 & 4	Fellow can opt for 1 course in 3 months, 2 for 6 months and all for 12 months training module out of these 4. 1. Water Sanitation & Health 2. Waste Management & Health 3. Air Pollution & Health 4. Indoor Air Pollution & Health
3.	Specialised Research Course	Week 5	Research Project Design, Methodology and Development of research plan
4.	Research Proposal Plan	Week 6	Could be carried out at host or parent institute.
5.	Research Project Work	Week 7-11	
6.	Report and Paper Writing	Week 12	

For detailed overview, please see the Annexure 1.

VI. Relevance in public health: Every year more than 3.4 million people die prematurely because of water related diseases having mainly children below 5 years. Further, around 7 million people are reported to die prematurely because of air pollution including both indoor and outdoor air pollution. This indicates that environmental factors play a major role to define disease and mortality on mass scale which is referred to as Public Health. So, Environmental health plays an important and relevant role in Public Health.

5. Eligibility Conditions

1. Only Indian citizens working in Indian institutes are eligible.
2. They should hold M.D./ M.S./ M.D.S. or MBBS/BDS/ MVSc./M.Sc./M.Pharma/M.Tech or equivalent with Ph.D. in health/biomedical research/Environment.
3. Faculty having at least three experience in the college/institute as a regular employee.
4. Persons up to 45 years of age as on last date of receipt of application will be eligible.

ENVIRONMENTAL HEALTH (Proposed Research Training Plan for 3 months)



ENVIRONMENTAL HEALTH

(Proposed Research Training Plan for 6 months)

Call for Environmental Health Course (Month 1)



Selection of Participants (Month 2)



Preparation for Training (Month 3)



Entry of Fellow to the module



Basic Course on Environmental Health
Duration: Two Weeks (Month 4, week 1 & 2)

- 1. Water Sanitation & Health
- 2. Waste Management & Health
- 3. Air Pollution & Health
- 4. Indoor Air Pollution & Health



2 Advance Research Based Course (Choice from 4 courses)
Duration: Four Weeks (Month 4 & 5, week 3-6)

2.5 month
training at
PGIMER
Chandigarh



Specialised Research Course
arch Project Design, Methodology and Development of research plan
Duration: Two Weeks (Month 5, week 7-8)

Exit if fellow wishes to
conduct research in his
own institute (Online
Support)



Research Proposal Plan
Duration: Two Weeks (Month 6, week 9-10)



Research Project Work
Duration: Ten Weeks (Month 6, 7 & 8, week 11-20)

3.5 month
Research at
PGIMER
Chandigarh or
home Institute



Report and Paper Writing
Duration: Four Weeks (Month 9, week 21-24)



Complete
Course with
Certificate

ENVIRONMENTAL HEALTH

(Proposed Research Training Plan for 12 months)

Call for Environmental Health Course (Month 1)



Selection of Participants (Month 2)



Preparation for Training (Month 3)



Entry of Fellow to the module



Basic Course on Environmental Health
Duration: Two Weeks (Month 4, week 1 & 2)



4 Advance Research Based Courses
Duration: Eight Weeks (Month 4, 5 & 6, weeks 3-10)



Specialised Research Course
Research Project Design, Methodology and Development of research plan
Duration: Two Weeks (Month 7, week 11-12)



Research Proposal Plan
Duration: Eight Weeks (Month 7-8-9, weeks 13-20)



Research Project Work
Duration: Twenty Weeks (Month 9-14, weeks 21-40)



Report and Paper Writing
Duration: Eight Weeks (Month 15-16-17, weeks 41-48)



Complete Course with Certificate

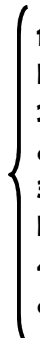
5 months training at PGIMER Chandigarh



7 months Research at PGIMER Chandigarh or home Institute



- 1. Water Sanitation & Health
- 2. Waste Management & Health
- 3. Air Pollution & Health
- 4. Indoor Air Pollution & Health



Exit if fellow wishes to conduct research in his own institute (Online support)



Modules	<i>Days</i>	Training events title/Theme
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Specialised Course: Water, Sanitation and Health

1. Microbiology Laboratory: Basic Rules and Requirements	<i>Day 1 & 2</i>	Lectures / Case studies Microbiological contamination of domestic water, growth of microbes in water and waste water, bacteriological evidences of pollution, safe laboratory practices and management of microbiology laboratory, microbiological culture preparation for MPN analysis
		Hands on training: Bacteriological examination of water: The Coliform MPN test
2. Water and Waste-water Microbiology	<i>Day 3 & 4</i>	Lectures / Case studies Strategies for sampling, collection, preservation of samples for water testing, discussion on few other water quality parameters like Dissolved Oxygen (DO) and Biochemical Oxygen Demand (BOD)
		Hands on training: Laboratory analysis of DO and BOD
3. Microbiological Analysis: Routine Monitoring	<i>Day 5 & 6</i>	Lectures / Case studies Common bacteriological culture media, water analysis for total bacterial population by standard plate count, H ₂ S –strip test method
		Group discussion/Project work! Hands on training 1. Laboratory analysis for confirmatory test for MPN 2. Practical for H ₂ S- strip test, standard plate count
4. Microbiological Analysis : Advance Technique	<i>Day 7 & 8</i>	Lectures / Case studies Overview of membrane filtration technique (MFT), detection of coliform bacteria by MFT, Comparison of MPN and MFT methods for analysis of the coliform detection.
		Field Visit 1. Laboratory analysis for confirmatory test 2. Hands on training for collection of bacteriological samples from field including strategies and precaution
5. Standard Operating Parameter, Quality Assurance and Control	<i>Day 9 & 10</i>	Lectures / Case studies Basic concepts for suitable water quality and standards of water, quality control (QC) and quality assurance (QA), disposal of laboratory waste and culture, Overview of disinfection methods
		Group discussion/Project work/ Hands on training Open Discussion

Specialised Course: Air Pollution and Health

Modules	Days	Training events title/Theme
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Modules 1 Air pollution and metro / megacities	<i>Day 1 & 2</i>	<p>Lectures (including moderated discussions): Composition and structure of atmosphere, type of air pollutants, history of causes and consequences of air pollution, source and sink of major pollutants (particles and gaseous), Hydrocarbon and photochemical smog, PAN formation, secondary aerosol and sea-salt particles</p> <p>Group exercise: Identify the key sources and associated issues of air pollution in your city</p> <p>Group discussion: Site selection, sampling plan, selection and preparation of sampling media, sampling process, transport and storage of collected samples</p> <p>Field visit : Visit to a air pollution monitoring station</p>
Modules 2 Air pollution sampling and analysis	<i>Day 3 & 4</i>	<p>Field visit: Chandigarh Met office to have hands on meteorological instruments and visit weather station</p> <p>Lectures (including moderated discussions): Sampling and analysis of particles, oxides of nitrogen, sulphur dioxide, ozone, volatile/semi-volatile organic compounds, sample preservation, extraction and clean-up</p> <p>Air pollution and meteorology: Ambient weather parameters, adiabatic lapse rate, atmospheric stability, temperature inversion, subsidence,</p> <p>Hands on training: Unit of measurement and conversion (e.g. conversion from ppm to $\mu\text{g}/\text{m}^3$), precision and accuracy,</p> <p>Group discussion: Good lab practices including safety measure while handling toxic chemicals in lab</p> <p>Laboratory: Analysis of particles (PM10, PM2.5), oxides of nitrogen, sulphur dioxide and others</p>
Modules 3 Atmospheric dispersion and modelling	<i>Day 5 & 6</i>	<p>Lectures (including moderated discussions): atmospheric dispersion (mixing heights, smokestack plume behaviours), Gaussian plume model, line source dispersion model and area source model</p> <p>Field visit including group discussion: Effect of meteorological conditions on air pollution (watch inclinor plume from SPH building and group discussion)</p> <p>Hands on training: plotting wind rose and hands on simple air pollution models</p>
Modules 4 Environmental impact of air pollution	<i>Day 7 & 8</i>	<p>Lectures (including moderated discussions): Impact of air pollution on plant and build material, acid rain, corrosion of metal and non-ferrous metals, air pollutants accidents, greenhouse gases, radiation budget and health impact of climate change, occupational diseases (silicosis, asbestosis), respiratory system, epidemiological studies, specific diseases (COPD, lung cancer) and specific pollutants (lead, CO)</p> <p>Group discussion including short movie: Air pollution and occupational health, personal protective equipments</p> <p>Group discussion: Dialogues with Doctors is an open forum on</p>

		health issues
Module 5: Air quality standard, control and implementation	<i>Day 9 & 10</i>	Lectures (including moderated discussions): Technological options (e.g. gravitational chambers, centrifugal collector, wet collectors, scrubbers, filters, condensation, combustion, Non-technological options (e.g. low emission zone, improved standards, public transport priority measure, dynamic route planning, fuel duty) Air quality standards, legislation, Acts (prevention and control of air pollution, 1981) and implementation issues
		Case study: Impact of introduction of CNG in Delhi Group work: Open forum to discuss issues and challenges remain uncovered

Specialised Course: **Waste Management and Health**

Modules	<i>Days</i>	Training events title/Theme
1. Biomedical Waste Management	<i>Day 1 & 2</i>	Lectures/Case studies Biomedical waste quantification, infectious and non-infectious biomedical waste, categories, segregation, storage, transportation, treatment technologies for biomedical waste and their comparisons, Biomedical Waste management and Handling Rules in India, Case study of Chandigarh on Biomedical Waste Management practices
		Project work Training on segregating different types of biomedical waste into colour coded bins Open discussion
		Field visits Visit to the Biomedical Waste Management and Treatment (Incinerator) Facility in PGI.
2. Hazardous Waste Management	<i>Day 3 & 4</i>	Lectures/Case studies Properties and classification of hazardous waste, sources and types of hazardous waste, toxicity of hazardous waste, hazardous waste handling, separation and storage at the source, treatment and disposal options for hazardous waste, hazardous waste reduction methods, Resource Conservation and Recovery Act (RCRA) and Rules for the management of waste and its implementation in India, Case study of Nimbua Secured Landfill Site.
		Project work Enlist the types and approximate quantity of hazardous waste generated at household and working places. Open Discussion
		Field visits Visit to Nimbua Landfill, Chandigarh
3. Municipal Solid Waste (MSW) Management	<i>Day 5 & 6</i>	Lectures/Case studies Municipal solid waste composition, collection ,disposal, source reduction, recycling, generation and composition of landfill gases and leachate from landfills, sanitary landfill designs, landfill management and operation, Waste to energy technologies,4R's for effective waste management planning, Municipal Solid Waste Management and Handling Rules in India, Case study of Municipal Waste Management in Chandigarh.
		Group discussion/Project work/Hands on training Enlist the quantity of municipal waste generated at their household, trend of waste collection, training on composting the kitchen waste in bins or small containers, Open Discussion and suggestions from the participants for planning an effective

		municipal waste management
		Field visits Visit to Municipal Solid Waste Processing (RDF) Plant and Dumping Site, Dadumajra (Chandigarh)
4. Plastic Waste Management	Day 7 & 8	Lectures/Case studies Definition of Plastic Waste, source of plastic waste generation, chlorinated plastics, environmental effects of plastic waste, Thermal and non-thermal techniques for plastic waste management, rag pickers and their role in recycling of plastics, Plastic Waste Management Handling Rules in India.
		Group discussion/Project work/Hands on training Open Discussion on Role of Rag pickers in the society?
5. Electronic Waste Management	Day 9 & 10	Lectures/Case studies Sources and type of e-waste, Constituents of E-waste and its harmful effects, recycling and recovery options for e-waste management, e-waste exporting to developing countries, legislation for effective e-waste management like Basel Convention and The Batteries (Management and Handling) Rules, 2001, Best Practices/case studies of E-waste management in India
		Group discussion/Project work/Hands on training List down the type of electronic waste generated at household level and its ultimate fate. Open Discussion on effective implementation of e-waste rules.

Specialised Course: **Indoor Air Quality and Health**

Modules		Training events title/Theme
1. Indoor Air Pollution and Healthy housing	<i>Day 1 & 2</i>	<p>Lectures (including moderated discussions) Lighting, infiltration, ventilation, disinfection of air, sources of indoor air pollution, biomass fuel emissions, Environmental tobacco smoke (ETS), box model for indoor air pollution, Health effects on the respiratory system, immune system, reproduction, psychological problems and susceptible population, building related illness (BRI), exposure pathways and dose concentration relationship.</p>
		<p>Hands on training: Unit of measurement and conversion (e.g. conversion from ppm to $\mu\text{g}/\text{m}^3$), time activity pattern</p> <p>Field visit: Visit to PEDA (Punjab energy Development Agency), Sector 33 D Chandigarh for designed healthy house.</p>
2. Monitoring and Analysis of Indoor air Quality	<i>Day 3 & 4</i>	<p>Lectures (including moderated discussions) : Sampling and analysis of particles, carbon monoxide, oxides of nitrogen, sulphur dioxide, volatile/semi-volatile organic compounds, sample preservation, extraction and clean-up, precision, accuracy and quality control</p> <p>Case study: Specific case study of carbon monoxide, Asbestos, radon and bio-aerosols</p>
		<p>Hands on training: Hands on CO monitor, Particle counter and other instruments</p> <p>Laboratory: Analysis of oxides of nitrogen, sulphur dioxide etc. Including biomarkers like CO-Hb</p>
3. Indoor Air Quality Standards, policy and implementation	<i>Day 5 & 6</i>	<p>Lectures (including moderated discussions): Precision and accuracy, Good lab practices including safety measure while handling toxic chemicals in lab (Group discussion) National and international guideline values and standard on indoor air quality, implementation and policy concern, Interventions such as cleaner-burning cookstoves, processed biomass fuels, fuel-switching, education, training, or other.</p>
		<p>Case study (including a short movie): to discuss the rural biomass cooking emissions, risk assessment including role in climate change and co-benefits of interventions (health and climatic).</p> <p>Group work: Open forum to discuss issues and challenges remain uncovered</p>

<p>4. Household Air Pollution Measurements</p>	<p><i>Day 7 & 8</i></p>	
<p>5. Personal Exposure Monitoring</p>	<p><i>Day 9 & 10</i></p>	<p>Demonstration: Practical demonstration of personal exposure monitoring and measurement for air pollution including bio-markers</p> <hr/> <p>Field Exercise / Hand-on training: Practice to monitor personal air pollution including bio-markers</p> <p>Group work: Open forum to discuss practicalities of field measurement and challenges</p>