

UQIDAR: The University of Queensland - IIT Delhi Academy of Research Joint PhD Project Proposal Template

1. Project Title:

Health benefits of air pollution mitigation: A comparative assessment of policies for high (India) and low (Australia) exposure regions

Project ID

UQIDAR-00131

2. Supervision Team

Please visit the IITD website www.iitd.ac.in and UQ Website <http://researchers.uq.edu.au/> to highlight potential collaborators that would be best suited for the proposed project. Complete where possible – advise if you'd like assistance establishing contacts.

	University of Queensland	IIT Delhi	External/Industry (if applicable)
Supervisor Name	Dr. Luke Knibbs	Dr. Sagnik Dey	
School or Department (or company, if applicable)	School of Public Health	Centre for Atmospheric Sciences School of Public Policy	
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URL for more info	https://public-health.uq.edu.au/profile/934/luke-knibbs	web.iitd.ac.in/~sagnik	

3. Other Supervisor Details

Please include other associate supervisors below: NA

Full Name and Title(s):

School/Department/Company details:

Phone/Email/URL:

2. Field of Research CODES:

(Specify up to four four-digit FOR codes for your project – see [here](#) for more detail on FoR codes)

1 0502

3 1603

2 0401

4. 1605

3. Keywords: (this will assist in classifying project and presenting projects to students on the applications portal)

Choose up to 4 keywords for your project.

1 air pollution

3 health benefits

Eg: nanotechnology, data science, novel batteries, etc

2 epidemiology

4 exposure modeling

4. Discipline Background of Candidate: (this will assist in presenting projects to applicants on the apps portal)

Ideally this project requires students with a background in...

1 atmospheric science

3 public health

Eg: organic chemistry, physiology, topology, CFD, etc

2 environmental science

4 biostatistics

5. Project description

Air pollution is the leading environmental cause of mortality and morbidity in the world. Despite significant progress in air pollution epidemiology, uncertainty in estimating the burden remains large, especially in data poor countries like India. Moreover, whether the relative burden of PM_{2.5} exposure is similar in high exposure regions (like India, where annual average PM_{2.5} is >70 µg/m³) and low exposure regions (like Australia where annual average PM_{2.5} is <10 µg/m³) is not known.

This project involves the following key objectives:

1. Improving the ambient PM_{2.5} exposure estimates by integrating *in-situ*, satellite and chemical transport model (CTM) based outputs in a machine learning environment at typical urban scales.
2. Improving the health burden estimates of ambient PM_{2.5} exposure by integrating exposure estimates and local health data in each country.
3. Understanding the expected health benefits from various realistic policies that are being implemented or planned for implementation to curb air pollution.
4. A comparative assessment of different policy scenarios in India (high exposure region) and Australia (low exposure region).

Combining the strengths of *in-situ*, satellite and CTMs, continuous PM_{2.5} exposure data at highly resolved spatial and time scales will be a key part of this project. The short and long-term impacts of air pollution in Indian and Australian cities will be examined using local health data. Several policies are implemented in Delhi NCR to curb air pollution. In this project, the potential health benefits of such policies will be evaluated and compared with other possible mitigation scenarios.

6. Project deliverables/outcomes

1. 'Best possible' PM_{2.5} exposure database for India and Australia
2. Comparative assessment of burden between Indian and Australian cities, including the role of socio-economic and demographic differences in influencing the air pollution impacts
3. Evaluation of the policies (in terms of the effectiveness)
4. Strategic knowledge to improve air quality management in India and Australia through improved exposure data at city through to regional scale, improved frameworks to assess the policies and improved understanding of the changing nature of air pollution in dynamic urban regions.

7. Research Impact Themes:

Highlight which Research Impact Theme(s) this project will address?

(Feel free to nominate more than one. For more information, see <http://www.uq.edu.au/research/impact/>)

1. **Healthy Ageing** ✓
2. Feeding the World
3. **Resilient Environment** ✓
4. Technology for Tomorrow
5. **Transforming Societies** ✓

8. Type of Student: We need one Indian student and one Australian student to cover both the countries

This project is best suited for an:

i-student	✓
a-student	
i- or a-student	

Note that an i-student will be expected to spend year-1 at IIT-D, year-2 at UQ and the remaining time at IIT-D.

An a-student will spend year-1 at UQ, year-2 at IIT-D and the remaining time at UQ.

All students will be required to complete some amount of coursework in their first year.

9. Student capabilities and qualifications

Essential Capabilities: Experience in analysis of remote sensing data and/or climate modelling and computing skills (in Matlab and/or R and/or Python)

Desirable Capabilities: background in this field with essential experience and prior work experience in air pollution research, particularly air pollution measurement. Experience working with large health data sets and/or epidemiological studies is highly desirable.

Expected qualifications (Courses/Degrees etc): M.Tech/Msc (with GATE/NET/DST-INSPIRE) in a relevant discipline (atmospheric science, epidemiology, biotechnology, environmental science, public health, statistics and/or biostatistics)