COLLABORATORY
Universities Partnership

How can childhood health inequalities be reduced by improving indoor home environments in Leicester, Leicestershire, and Rutland?

About the Project

The role of the environment on children's health is still unclear. A lot of research on environmental health focuses on the outdoor environment, but people, especially children, spend a large proportion of their lives at home, indoors. Our homes are, in quite a literal sense, a barrier between the outdoor environment and our indoor environment. So, understanding how the quality of housing controls the indoor environment, and therefore how the environment affects children's health, is important. It's clear that factors such as building quality may be affected by social deprivation. Therefore, understanding these factors help us to reduce health inequalities, especially in an area such as Leicester, Leicestershire and Rutland (LLR) where there are places facing extreme poverty, particularly in parts of Leicester city. Leicester is in the bottom quarter of UK Counties for Asthma prevalence, childhood hospital admissions for asthma, infant and child mortality rate. In contrast, Leicestershire has moderate to good childhood health relative to the wider England population. Reducing these health inequalities is vital.

The indoor environment can affect child health in many ways. The heat, humidity and air pollution we directly experience while inside can all affect health. Temperature has been shown to affect childhood mortality, respiratory diseases such as asthma and allergic diseases such as eczema. Additionally, mould growth in homes is affected by the outdoor environment, building materials and behaviours such as opening windows to air the house out. Exposure to mould can increase the risk of asthma and other diseases in children. Overall, the East Midlands has the second highest proportion of non-decent homes in England, with over 15% of homes being substandard.

About the Project

This project will explore how housing materials and behaviours such as heating use interact with the outdoor environment to control the indoor environment within homes. AI methods will then be used to find areas in LLR that are particularly susceptible to unhealthy indoor environments, linking these to child health data. These combined datasets will be used to examine how important the indoor environment actually is in controlling the health of children. These results will be used to work with local charities and local government to produce guidance for the most cost-effective ways to improve housing and, therefore, childhood health in LLR.

This project has been co-created and is supported by researchers from the University of Leicester, Loughborough University and partners at Midlands Asthma and Allergy Research Association. The successful candidate for this project will be enrolled at the University of Leicester.

Project Aims

The overall aims of this project are :

1. To evaluate the risks of mould growth and overheating for the housing stock in Leicestershire, and determine what methods are most cost-effective for mitigating these risks. The focus will be on the housing of lower-income families.
2. To quantify the effects of winter and summer climate, housing stock, and indoor behaviours on the hospitalisation rate of children in Leicestershire.
3. To improve the health of children in Leicestershire by improving the indoor environment in homes.

Supervisory Team

1. Lead Academic Supervisor: Dr. Tim Lucas(University of Leicester)
2. Academic Co-Supervisor(s): Professor David Allinson(University of Loughborough)
3. Academic Co-Supervisor(s): Dr Sarah Seaton (University of Leicester)
4. Community Supervisor(s): Steve Watson(Midlands Asthma and Allergy Research Association)

Key Details

Host University:	University of Leicester
School / department:	Department of Population Health Sciences
Start date:	Monday 28 September 2025
Financial offer:	Tuition fees covered in full (worth approx. £15-17k across full PhD programme). Monthly stipend based on £19,237 per annum, pro rata, tax free.
Working hours	Full-time (minimum 37.5 hrs per week)
Working Style:	Primarily in-person at host university. Flexible working supported. Working pattern to be agreed between successful candidate and lead supervisor.

Competencies

Collaboratory Core Competencies		
Category	**Competency**	**Assessed: Application (A), Interview (I)**
Comprehension and evaluation	Strong understanding of the project and its subject matter.	A / I
	Analytical, researcher mindset with keen attention to detail.	A / I
	Communicate complex concepts with clarity and precision.	A / I
	Able to identify connections, patterns, gaps, and irregularities in information/data.	I
	Able to interpret data/information confidently with logic and empathy to derive meaning.	I
Social and emotional	Demonstrable experience of responding effectively changing contexts, information and demands.	A
	Ability to persevere in the face of challenges/failures and to remain constructive in developing solutions.	A
	Demonstrable passion for learning with clear drive and curiosity to undertake this specific research project.	A / I
	Willingness to immerse oneself in the research subject matter and make a contribute to new knowledge through a PhD.	A / I
	Strong desire to make a positive community impact through the research.	A / I
	Willingness to think deeply about complex concepts and engage with academic ideas and theory.	A / I
Preparedness and potential for success	Experience of working, collaborating and communicating effectively with different stakeholders.	A
	High level of self-motivation and ability to work with minimal guidance.	A / I
	Strong organisational and time-management skills with the ability to balance and prioritise multiple tasks.	A / I
	Ability to identify potential challenges and complexities and thoughtfully consider possible solutions.	A / I
	Able to identify the technical, personal, or professional skills required for a task and take action to develop these.	A / I

Competencies

Collaboratory Core Competencies			
Category		**Competency**	**Assessed: Application (A), Interview (I)**
Community Context		Genuine desire to undertake community-engaged research over more traditional approaches to research.	A
		Understand the impact of and need for the inclusion of diverse experiences and points of view in research.	A / I
		Appreciation/understanding of the importance of community insight and experience in the generation of new knowledge.	A / I
		Awareness/understanding of the broader societal context related to the subject matter of the project.	A / I

Project Specific Competencies			
Essential	**Assessed: Application (A), Interview (I)**	**Desirable**	**Assessed: Application (A), Interview (I)**
Strong computer literacy with the ability to learn and use new software and digital tools (like Ngene, R-studio, and Python).	A / I	Working knowledge of or experience of machine learning.	A / I
Strong mathematical skills with the ability to quickly learn new statistical knowledge and skills.	A / I	Experience working with environmental data such as temperature grids or air pollution monitoring data.	A / I
Appreciation for and understanding of contexts relevant to the research project such as health inequalities, challenges with UK building quality, etc.	A / I	Experience of using statistical tools and software to interpret data, draw conclusions, and make informed decisions.	A / I
Understanding of the challenges associated with working with vulnerable groups of society.	A / I		

References for Further Reading

- https://publications.ersnet.org/content/errev/27/148/170137.abstract
- https://publications.ersnet.org/content/erj/38/4/812.abstract
- https://bmjopen.bmj.com/content/11/6/e046333
- https://www.thelancet.com/journals/eclinm/article/PIIS2589-5370(24)00355-9/fulltext