

The research to practice gap in IAQ building design

Dr Monica Mateo Garcia
Lecturer in Built Environment, BCU

Practice gap to IAQ

IAQ being produced as a result of other problems (e.g. energy conservation).

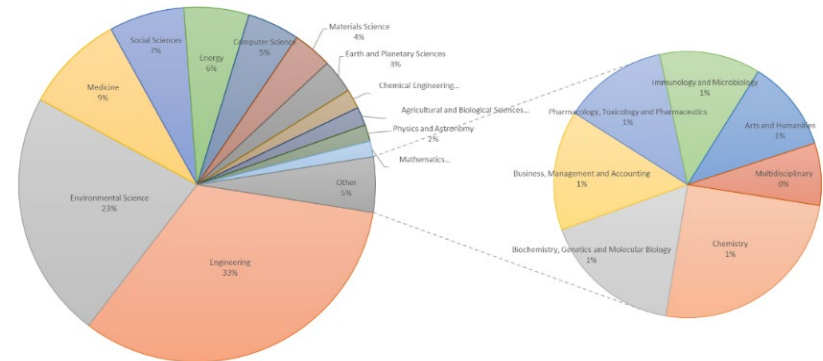
IAQ in buildings, complex problem (studied by 28 subject areas).

Breaking down the IAQ problem into its parts gets bogged down in detail and by different perspectives.

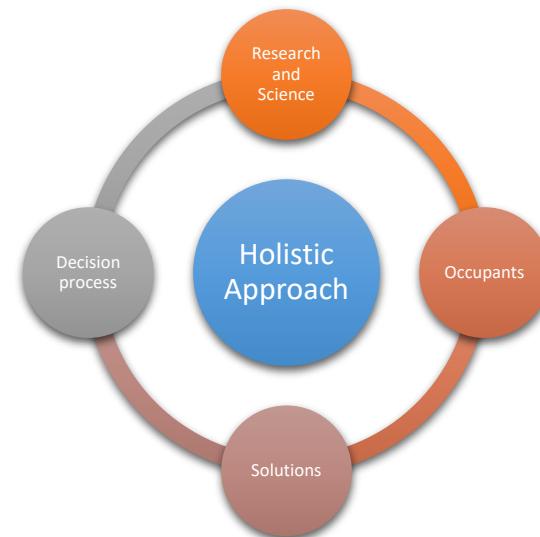
Research into IAQ tries to inform regulations and codes, but it fails to acknowledge the problems of designers and builders.

There is a need to act but every action is problematic and so practitioners tend to adopt limited and defensive actions that can be accountable.

Need of a more holistic view to address the complexity of the interactions occurring in indoor environments, and to better understand barriers, challenges and bottle necks for effective implementation.




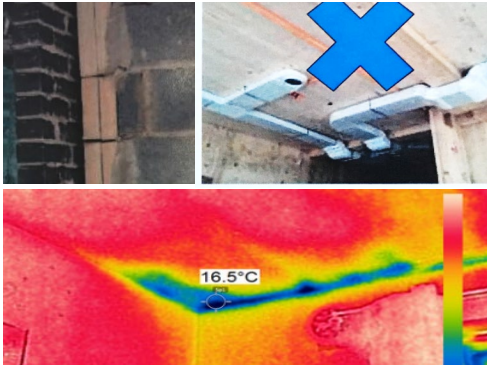
Bibliometric study. Using “indoor air quality” and “buildings” as search words gives 8,305 research outputs divided into 28 subject areas, showing the multifaceted and unbounded nature of IAQ.



IAQ and housing development

Stage	Land	Dev Plan	Design	Construction	Operation
Decisions that affect IAQ	Natural features	Layout	Fenestration	Adhesives, method statements	Occupancy
	Adjacent pollution	House types	Thermal mass	Quality	Cooking
	Value proposition	Landscape	Materials	Understanding of system	Cleaning
	Section 106	Roads	Ventilation	Cleanliness	Use of ventilation
	LA policy and practice	LA policy and practice	Shading	Commissioning	Use of space
			Gardens	Supply chain	Maintenance of equipment
			Layout for use		Misuse?

Decisions that can contribute to poor IAQ in homes

DESIGN	CONSTRUCTION	USE
 <p>Layout:</p> <ul style="list-style-type: none"> • Plot efficiency: <ul style="list-style-type: none"> • Single aspect apartments • Small living spaces • Open-plan • Lack of adaptability • Repurpose of buildings <p>Regulations: Energy conservation: Hermetic homes</p> <p><i>Quality vs Quantity</i> <i>Ventilation</i></p>	 <p>Performance delivery: Construction Method statements Commissioning Value Engineering Not integrated supply chain</p> <p><i>Incentives for delivering performance?</i> <i>Improving construction skills?</i> <i>IPD?</i></p>	<p>Use of space: COVID19 Homes used as multipurpose spaces (living, workplace, school/playground, gym, etc) New uses: more indoor pollutants</p> <p>Maintenance of equipment: E.g. Change of filters</p> <p>Lack of knowledge and control:</p> <ul style="list-style-type: none"> • Windows: ventilation regime, trickle vents, fixed panes in tower blocks. • Cleaning products, cooking, etc. <p><i>Monitoring</i> <i>Educating users (O&M manual?, soft landings?, IAQPC?)</i></p>



IAQ improvement and overheating mitigation in new build residential

- Need to close the gap between research and practice.
- Need to create resilient houses and adapt designs to new occupant needs derived from Covid19 (more time spent at home, working from home, etc)
- The research involves working with major home builder partners to conduct trials to monitor and record indoor air quality in unoccupied and occupied dwellings across the UK, gathering user's feedback on thermal comfort and wellbeing and evaluating the data obtained to propose solutions than can cost effectively improve the IAQ and thermal comfort in new developments.
- Major home builders involved (Barratt Homes, Redrow, Taylor Wimpey), housing associations (e.g. Midland Heart) and industry advisors (e.g. Envirovent, AES Sustainability Consultants, Ibstock, Glen Dimplex).
- A key element of the Research is to gain a better understanding of occupants behaviour and home building process, including the things that influence how decisions are made, so we can deliver performance, without causing unintended consequences and in a cost-effective way.

Thanks for your attention

Dr Monica Mateo Garcia
Lecturer in Built Environment, BCU
monica.mateogarcia@bcu.ac.uk