



## Research Article

# Gathering baseline data to assess household energy interventions' impact on indoor air quality, occupant health, and wellbeing: In2Air a non-randomized experiment

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## Plain language summary

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### Background

Everyday activities can release harmful substances into the indoor air we breathe. Breathing polluted air can cause or worsen respiratory problems like asthma and lung diseases. It can also lead to heart problems and even cancer. Homes need good ventilation to be healthy. Making homes more energy efficient is important for combating climate change. Energy efficiency of homes can be improved by insulation and better sealing of windows and doors; however, these measures also reduce natural ventilation, so additional ventilation (extractor fans and window air vents) may be necessary.

### Aim

To understand how making homes more energy efficient (so-called 'retrofitting') affects the indoor air quality, health and well-being of occupants, we began by measuring conditions before home modifications started (the baseline).

### Methods

We designed a study to measure the baseline data on 30 single story, one- and two- bedroomed homes and their occupants. We measured the indoor and outdoor air qualities, energy use and asked participants to complete a questionnaire about their home and their general health.

### Results

Other than three homes where smoking occurred indoors, no homes were above the current (2019) United Kingdom limits for the amount of fine particles in the air, but if we use the stricter World Health Organization (2021) limit, then 21 homes had poor indoor air quality. Typically, the highest concentration of particles was recorded during the daytime and usually around mealtimes such as breakfast, lunch and dinner.

### Conclusion

Our monitoring provided the necessary information on 30 homes and their occupants before the retrofit works began.

### Future work

We now need to monitor these same homes again once the retrofitting has been completed so that we can look at any changes. This future work will make recommendations to ensure that improving the energy efficiency of homes does not accidentally cause health problems for the people living in these homes.