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Using behavioral nudges to help households reduce indoor air pollution

Submission date 16/04/2026	**Recruitment status** No longer recruiting	[_] Prospectively registered [X] Protocol [_] Statistical analysis plan [_] Results [_] Individual participant data [X] Record updated in last year
Registration date 17/04/2026	**Overall study status** Completed	
Last Edited 16/04/2026	**Condition category** Other	

Plain English summary of protocol

Background and study aims
Indoor air pollution is a common problem in many homes. It can come from everyday activities such as cooking and heating. Breathing polluted indoor air can affect health over time. This study aims to see whether simple messages and prompts, called behavioural nudges, can help people change daily habits and lower indoor air pollution levels in their homes. The main focus is on very small particles in the air called PM2.5.

Who can participate?
Adults aged 18 years to 90 years who live in selected communities in China can take part. Participants need to live in a household where activities like cooking may cause indoor air pollution. They must be willing to give informed consent, answer short surveys, and allow air quality monitoring in their home.

What does the study involve?
Participants will be placed at random into different groups. Some households will receive information about indoor air quality and health, including clear guidance on PM2.5 levels. Others will receive standard information for comparison. Some homes may receive simple prompts to encourage actions such as improving ventilation. An air quality monitor will be placed in the home to measure pollution levels over time. Participants may also be asked to complete short surveys about household activities.

What are the possible benefits and risks of participating?
There may be no direct benefit for individuals taking part. However, participants may become more aware of indoor air pollution and how to reduce it. The main risk is minor inconvenience, such as having monitoring equipment in the home or spending time on surveys. The study does not involve medical treatment.

Where is the study run from?
The study is run from Harbin Institute of Technology, with involvement from Nanjing Tech University and the University of Birmingham. The study takes place in selected communities in China.

When is the study starting and how long is it expected to run for?
April 2026 to October 2026.

Who is funding the study?
National Natural Science Foundation of China.

Who is the main contact?
Dr Jing Liang, j.liang@hit.edu.cn

Contact information

Type(s)
Scientific, Public, Principal investigator

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Study information

Scientific Title
Reducing indoor air pollution through behavioral nudges

Study objectives
This study aims to estimate the causal effects of behavioral interventions on PM2.5 exposure in rural households and to assess their impacts on exposure levels and related behaviors.

Ethics approval required
Ethics approval required

Ethics approval(s)
Submitted 02/04/2026, IRB board at School of Management at Harbin Institute of Technology (School of Management, Harbin Institute of Technology, Harbin, 150010, China; +86 13269666930; som@hit.edu.cn), ref: No.2026-04

Primary study design
Interventional

Allocation
Randomized controlled trial

Masking
Blinded (masking used)

Control
Placebo

Assignment
Sequential

Purpose
Basic science

Study type(s)

Health condition(s) or problem(s) studied
Indoor air pollution exposure in households and associated health risks related to household energy use and cooking practices.

Interventions
The study consists of two arms: a treatment group and a control group.

Participants in the treatment group received a real-time indoor air quality intervention. This included the installation of a PM2.5 sensor with continuous display of air quality levels. The device provided immediate visual feedback and triggered a red alarm when air pollution exceeded a predefined threshold. In addition, participants were provided with an information leaflet explaining the health risks of air pollution and practical actions to reduce indoor air pollution exposure.

Participants in the control group did not receive access to real-time air quality information or the informational leaflet during the study period.

The total study duration was two months. This included a two-week baseline (pre-intervention) period during which no participants received the intervention, followed by six weeks of active treatment for the treatment group. Outcome measures were collected throughout both the baseline and treatment periods for all study arms.

Participants were randomly assigned to the two groups using a pure computer-based randomisation process. Randomisation was conducted using an online tool without manual interference, ensuring allocation concealment and reproducibility.

Intervention Type
Behavioural

Primary outcome(s)
1. PM2.5 concentration measured using real-time air quality sensors installed in participant households at continuously throughout the study period, with pre-intervention baseline and post-intervention follow-up periods defined for analysis

Key secondary outcome(s)

Completion date

31/10/2026

Eligibility

Key inclusion criteria
1. Adults aged 18 years or older residing in the selected study communities or villages
2. Individuals living in households where cooking or other activities may generate indoor air pollution exposure
3. Individuals willing to participate in the study and provide informed consent
4. Households willing to participate in surveys and allow indoor air quality monitoring during the study period

Healthy volunteers allowed
Yes

Age group
Mixed

Lower age limit
18 Years

Upper age limit
90 Years

Sex
All

Total final enrolment
0

Key exclusion criteria
1. Adult residents living in the selected study communities or villages
2. Individuals who regularly cook or spend time in the household where indoor air pollution exposure occurs
3. Individuals willing to participate in the study and provide informed consent
4. Households willing to allow installation or use of indoor air quality monitoring devices during the study period

Date of first enrolment
01/04/2026

Date of final enrolment
31/08/2026

Locations

Countries of recruitment
China

Study participating centre
Harbin Institute of Technology
China

Study participating centre
Nanjing Tech University
China

Sponsor information

Organisation
Harbin Institute of Technology

ROR
https://ror.org/01yqg2h08

Organisation
University of Birmingham

ROR
https://ror.org/03angcq70

Organisation
Nanjing Tech University

ROR
https://ror.org/03sd35x91

Funder(s)

Funder type

Funder Name
National Natural Science Foundation of China

Alternative Name(s)

Chinese National Science Foundation, Natural Science Foundation of China, National Science Foundation of China, NNSF of China, NSF of China, National Nature Science Foundation of China, Guójiā Zìrán Kēxué Jījīn Wěiyuánhuì, , NSFC, NNSF, NNSFC

Funding Body Type
Government organisation

Funding Body Subtype
National government

Location
China

Results and Publications

Individual participant data (IPD) sharing plan

IPD sharing plan summary
Not expected to be made available

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Protocol file			16/04/2026	No	No