INFORMATION SHEET

19.11.2026

Research study – Household air pollution measurements

You are invited to participate in a research study investigating wintertime household air pollution in homes that use solid fuels for heating. You have received this information because you expressed interest in participating in this study.

After reading this information sheet, you will have the opportunity to ask any questions you may have. You will be separately requested to provide written consent for participating in the study.

Purpose of the research

This study is a part of the ATMOPOLIS project (Air and Noise Pollution Mitigation Through Integrated, Society-Centred Actions). ATMOPOLIS aims to support the reduction of air pollution, noise pollution, and greenhouse gas emissions in European cities by developing decision-support tools for policymakers and increasing citizens' understanding of environmental pollution.

This specific study supports these goals by improving understanding of household solid fuel burning and its relationship with household air pollution in a Northern European context.

More information about the ATMOPOLIS project is available on the project website: https://atmopolis-project.eu/.

Description of the process

The study consists of a three-month measurement period of indoor and outdoor air pollution and environmental conditions at your home. In addition, you will be asked to complete a questionnaire about your home and air pollution-related activities and behaviours.

Participants will not receive financial compensation. However, after data collection and initial analysis have been completed, participants may receive a summary of the estimated air pollution levels measured in their household. The measurements consist of a required component involving all participants and a simultaneous optional component in which a small subset of participants takes part in additional air pollution measurements.

Required component: Household air quality measurements

The study will begin with a home visit from the researchers in December 2026 or early January 2027. During this visit (approximately 30-90 minutes), you will receive instructions for the study, and the researchers will install the monitoring equipment in and around your home. At the end of the three-month measurement period, the researchers will return for a second visit (approximately 30 minutes) to collect the equipment. You will also be asked to complete a study questionnaire in two parts: part one in the beginning of the measurements, and part two after the measurement period is over.

The monitoring equipment will operate automatically throughout the study period. The monitoring equipment requires a continuous power supply and will need to remain connected to an electrical outlet throughout the measurement period. Researchers will provide any extension cords required for the study and will remove them at the end of the measurement period. The monitoring equipment requires a Wi-Fi connection. If your home Wi-Fi cannot be used, the research team will provide a mobile Wi-Fi connection for the devices. In some cases, you may be asked to reconnect a monitor to Wi-Fi or unplug it in the event of a malfunction. The researchers will monitor the transmission of data remotely and contact you if any of the devices stop transmitting data for an extended period.

Optional component: Additional measurements

One to four additional air pollution measurement devices will be installed in and around your home. Depending on the instrument, the measurement period will range from two weeks to three months. During the measurement period, the researchers will make two additional visits (approximately 15 minutes) in January–February to ensure that the devices are functioning properly. These devices require a continuous power supply and will need to remain connected to an electrical outlet throughout the measurement period. All monitoring devices, including that used for the required component, will use a Wi-Fi connection to internet. Researchers will monitor data transmission remotely and contact you if any monitoring device stops transmitting data for an extended period. In some cases, you may be asked to reconnect a device to Wi-Fi, restart a device or turn off a device.

Please note: Some of the monitoring equipment in this component may produce a faint continuous noise or a faint high-pitched sound during operation. Although typically unobtrusive, the sound may be noticeable to some people, pets, or individuals sensitive to noise.

Procedures for collecting research data

Required component: Household air quality measurements

Air pollution and environmental parameters will be measured for three months inside and outside participating households. We will use small air pollution monitors that measure particulate matter (PM), total volatile organic compounds (TVOC), nitrogen oxides (NO_x), carbon dioxide (CO_2), temperature, and relative humidity. Additionally, a separate temperature sensor will be placed next to one indoor air pollution monitor.

Researchers will visit participants at the beginning of the study at a pre-arranged time to install monitors at selected locations around the home. One monitor will be placed in the living room or room with the fireplace, one monitor will be placed in a bedroom, and one will be placed outside the home. During the visit, monitor placement will be discussed with the participant to ensure minimal disruption to daily life.

The researchers will aim to place the indoor monitors at least 1 metre away from fireplaces and stoves at a height of approximately 1–2 metres, for example on top of furniture. The outdoor monitor will be installed at sheltered location, where possible, with access to an outdoor electricity outlet. When possible, the monitors will be secured to place in a non-surface-damaging way (e.g. a soft reusable zip tie, protective layer between the surface and a fastener).

The monitors collect measurement data every minute and automatically transfer the data via a Wi-Fi connection to secure Tampere University servers and accessible only to the research team. Data is private; however, measurements may indirectly indicate occupancy patterns and the presence or absence of people in the home at different times of the day.

Information on household characteristics and air pollution-related behaviours will be collected through researcher observations during the first home visit and through a questionnaire completed by participants after the measurement period. The researchers will record details about monitor placement and relevant household characteristics such as whether the kitchen and living room are connected.

Optional component: Additional particulate matter measurements

Air pollution will be measured for a period ranging from two weeks to three months inside and outside participating households. We will use air pollution measurement instruments that measure ultrafine particles (UFP), lung deposited surface area of particles (LDSA), and black carbon (BC).

Researchers will install the instruments during the first study visit. One to two instruments will be placed in the living room nearby the monitor from the required component of the study. Similar devices will be placed outside in a protective case on one volunteering household for the duration of the study. The case containing the outdoor device will be secured to place in a non-surface-damaging way. One to two additional visits will take place during January and February for the purpose of checking that the instruments are working properly. The devices collect data every minute.

Participants of the additional particle measurements will be asked to track their solid fuel burning and major cooking activities for one week during the measurement period. The tracking can be done with either buttons provided by the researchers, with participants pressing the provided buttons at the beginning and end of the activities or digital/physical written diary. Cooking activity that you will be instructed to log is the use of stove, oven, air fryer or comparable appliance for food preparation.

Potential risks and benefits of participation

You will not receive any direct benefit from participating in the study. However, you will have an opportunity to gain insights about the air pollution levels and environmental conditions within your home after the measurement period. Please note that due to the type of monitoring instruments used the measurements provide estimates and are most useful for identifying trends rather than determining exact pollutant concentrations.

The results of this study will be used to further understanding on how solid fuel heating affects household air pollution levels in Europe.

The procedures and methods used during this study are not expected to involve significant health risks, social risks, financial risks or risks related to personal data breaches. Some of the monitoring instruments may produce a faint sound, which may be noticeable or bothersome to sensitive participants. However, participants are free to withdraw from the study at any given time and may turn off the instruments according to the instructions provided.

The monitoring equipment consumes a small amount of energy (a few watts of energy per device), corresponding to a few to approximately ten euros over the study period. This cost will not be reimbursed.

Data confidentiality, processing and storage

All personal data collected during the study will be processed in compliance with the EU's General Data Protection Regulation (GDPR) and the data protection laws of Finland. All data collected during the study will be stored at Tampere University: digital data at secure university servers, and physical records in locked cabinets with restricted access.

Measurement data and questionnaire responses will be pseudonymised for analysis and stored separately from participants' names and contact information. Personal data will only be processed by authorised researchers at Tampere University involved in the project. Data about individual participants will not be disclosed to external parties.

An anonymised version of the dataset may be shared with other ATMOPOLIS project partners during the project.

The research materials and raw data including identifiable information collected during the study will be retained by Tampere University for three years after the end of the ATMOPOLIS project, after which they will be securely destroyed (i.e. at the end of 2032). A processed and anonymised research dataset (e.g. without names, addresses, and other information that could reasonably identify participants) will be made publicly available in a research data repository (Zenodo) to support open science and enable verification and reuse of research findings.

Further information on the processing of personal data is provided in the accompanying **Privacy Notice**.

Protecting the privacy of participants in research papers/publications

Research findings will be reported in a manner that does not reasonably permit the identification of individual participants or households. Precise location information that could be used to identify individual households will not be published.

Prior to publication of the anonymised dataset in the repository, the temporal resolution of the measurement data will be reduced to 15-minute averages or coarser. Direct identifiers will be removed, and no information that could reasonably be used to identify individual participants or households will be included. Information on house characteristics and wood-burning behaviour will be published only in categorised form.

Funding sources

The project is funded by the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement No. 101238690.

Voluntary participation

Participation in this study is entirely voluntary, and you have the right to withdraw from the study at any time either permanently or for a temporary period. Refusal to participate or discontinuing participation at any time will not affect you in any way.

The data collected about the you up to the point of withdrawal will remain in the study database and may not be removed.

Insurance coverage and compensation

Tampere University has liability insurance (policy number 312-1164504-X), which covers personal injury and property damage for which the University is legally liable during the course of this study.

Privacy protection in the context of research papers and communicating about the study

The results of this study may be reported in scientific publications, presentations, reports and other research outputs. No information that could be reasonably used to directly identify participants will be included in these outputs.

Use of data for non-research/later research purposes

After completion of this study, an anonymised research dataset will be archived and made openly available for future use. The data may be used in future research projects, teaching, and other purposes permitted by the licence under which the dataset is shared. As the dataset will be anonymised and openly available, it is not possible to identify all future users in advance.

Contact details

General questions about the project or this study can be sent to the project email address (atmopolis@tuni.fi), and a relevant member of the research team will respond.

Please direct inquiries about the air pollution and environmental measurements described in this information sheet to:

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