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Indoor air quality and health – the K-HEALTHinAIR project

Submission date	**Recruitment status**	[X] Prospectively registered
05/09/2023	No longer recruiting	[_] Protocol
Registration date	**Overall study status**	[_] Statistical analysis plan
15/09/2023	Completed	[_] Results
Last Edited	**Condition category**	[_] Individual participant data
25/09/2026	Respiratory	[X] Record updated in last year

Plain English summary of protocol

Background and study aims

The negative impact of outdoor air pollution and indoor air quality on health is well-accepted. However, the current knowledge on the health effects of impaired indoor air quality shows numerous gaps (e.g. previous studies cover limited parameters, limited scenarios or are limited in time). Therefore the Knowledge for improving indoor AIR quality and HEALTH (K-HEALTHinAIR) project aims to address these gaps by studying determinants of the effect of indoor air quality on health covering multiple parameters in nine relevant scenarios in six European countries with a project duration of 3 years.

The overall K-HEALTHinAIR project objectives are:

1. Identifying the determinants of indoor air quality and health, and the association between indoor air quality and health, by monitoring indoor air quality and performing big data analyses
2. Confirming the identified determinants and search for their sources by monitoring indoor air quality, performing big data analysis and using supporting studies
3. Testing preventive interventions using continued monitoring of indoor air quality and using reference spaces and theoretical analysis to evaluate interventions.

This registration is for the K-HEALTHinAIR Rotterdam pilot study. The primary objective of the Rotterdam pilot is to study the determinants of indoor air quality and its associations with health and well-being among older adults.

Who can participate?

Older adults (aged 60+ years) living at home. The participants will be recruited in Erasmus Medical Centre (EMC) outpatient clinics (e.g. department of geriatrics, internal medicine, and pulmonary medicine) and in collaboration with senior housing cooperations.

What does the study involve?

Using self-report questionnaires older adults will report on their (general) health and wellbeing and indoor air quality related behavior at the start of the study and at 6 and 12 months of follow-up. A two-page questionnaire on health symptoms related to indoor air quality is completed every 2 months.

What are the possible benefits and risks of participating?

This is a non-invasive study and there are low risks associated with participation. The study

involves non-invasive measurements that do not affect the physical and/or psychological integrity of the participants. Participants can withdraw from participation at any time during the study without having to explain why to the research team.

Where is the study run from?
Erasmus Medical Center (Netherlands)

When is the study starting and how long is it expected to run for?
September 2022 to May 2026

Who is funding the study?
European Union - the European Health and Digital Executive Agency (HADEA) as part of HORIZON HEALTH 2021

Who is the main contact?
The main contact of the overall K-HEALTHinAIR project is josdom@cartif.es
The two contacts for the K-HEALTHinAIR Rotterdam pilot study are Amy van Grieken (a.vangrieken@erasmusmc.nl) and Simon de Leede (s.c.deleede@erasmusmc.nl)

Contact information

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Additional identifiers

Protocol serial number
101057693

Study information

Scientific Title
Knowledge for improving indoor air quality and health - Rotterdam study

Acronym
K-HEALTHinAIR-Rotterdam

Study objectives
The primary objective of the K-HEALTHinAIR Rotterdam pilot is to study the determinants of indoor air quality and its associations with health and well-being among older adults.

The Rotterdam study is part of the larger K-HEALTHinAIR project funded by grant nr. 101057693. The information below all refers to the Rotterdam pilot study as part of the larger K-HEALTHinAIR project.

Ethics approval required
Ethics approval required

Ethics approval(s)
1. Approved 17/05/2023, Non-WMO Review Committee (Niet WMO Toetsingscommissie) (Dr. Molewaterplein 40, Rotterdam, 3000CA, Netherlands; +31 (0)107033625; metc@erasmusmc.nl), ref: MEC-2023-0293

2. Approved 25/08/2025, Non-WMO Review Committee (Niet WMO Toetsingscommissie) (Dr. Molewaterplein 40, Rotterdam, 3000 CA, Netherlands; +31 (0)107033625; metc@erasmusmc.nl), ref: MEC-2025-0388

Primary study design
Observational

Study design
The Rotterdam pilot study uses mixed methods in a small size prospective cohort study, namely self-report questionnaires, a non-intrusive household indoor air quality monitoring device and an observational checklist.

Study type(s)
Prevention, Quality of life

Health condition(s) or problem(s) studied

General health and well-being in older adults (aged 60+ years) and older adults with pulmonary complaints

Interventions

Observational methodology and assessments:
1. Indoor air quality (e.g. particle matter, volatile organic compounds) continuously monitored with air quality sensors
2. Health and well-being (e.g. health complaints, mental health, quality of life, falls) assessed by self-report questionnaire
3. Indoor environment (e.g. cooking type, windows present etc) assessed by observational checklist
4. Indoor air quality related behavior (e.g. opening windows) assessed by self-report questionnaire

For the first year, the observations are as follows:
Month 0: installation of MICA device, administering of observational checklist and larger questionnaire
Month 2: diary questions, 5 days in a row
Month 4: diary questions, 5 days in a row
Month 6: larger questionnaire
Month 8: diary questions, 5 days in a row
Month 10: diary questions, 5 days in a row
Month 12: larger questionnaire

Added 25/11/2025:
For the follow-up study of 6 months, the observations are as follows:
Month 0: baseline questionnaire, 7-day diary
Month 1,5: 2-week intervention
Month 2: interviews with select sample, 7-day diary
Month 2,5: 2-week intervention
Month 3: interview with select sample, first follow-up questionnaire, 7-day diary
Month 6: interview with select sample, second follow-up questionnaire, 7-day diary

Within the 6-month follow-up study, a select sample of n = 10 participants will use a portable air quality monitoring tool for 7 days in a row. Before and after using the portable tool interviews will take place to evaluate expectations and experiences.

Intervention Type

Mixed

Primary outcome(s)

First-year study:
1. Quality of life measured using EQ-5D-5L at baseline, 6-month and 12-month follow-up.
2. Mental health measured using PHQ-9 at baseline, 6-month and 12-month follow-up.
3. Indoor air quality (IAQ)-related health symptoms measured using a diary at months 2, 4, 8 and 10
After the 12-month follow-up, the researchers will assess which measurements will be administered and at what frequency for years 2 and 3 of the study. They will update the registration once they have this information

Added 25/11/2025:
Follow-up study:
1. Quality of life measured using EQ-5D-5L at baseline, 3- and 6-month follow-up.
2. Mental health measured using PHQ-8 at baseline, 3- and 6-month follow-up.
3. Indoor air quality (IAQ)-related health symptoms measured using a diary at baseline, month 2, 3 and 6

Key secondary outcome(s)
1. Indoor air quality measured with MICA devices that measure IAQ continuously for 36 months
2. Indoor air quality related behavior (e.g. opening windows) assessed using a questionnaire every 6 months
3. Measured using International Consortium for Health Outcomes Measurement (ICHOM) adult and older set (combination) at baseline, 6-month and 12-month follow-up:
3.1. Medication and care use
3.2. Falls
3.3. Lifestyle
4. Living situation (perceived IAQ and outdoor air quality [OAQ], window opening, time spent in scenario) measured at baseline, 6-month and 12-month follow-up
5. Time spent at home measured using a diary at months 2, 4, 8 and 10
After the 12-month follow-up, the researchers will assess which measurements will be administered and at what frequency for years 2 and 3 of the study. They will update the registration once they have this information

Added 25/11/2025:
Follow-up study:
1. Indoor air quality measured with MICA devices that measure IAQ continuously for 6 months
2. Indoor air quality related behavior (e.g. opening windows) assessed using a questionnaire at baseline, 3 and 6 months
3. Living situation (perceived IAQ and outdoor air quality [OAQ], window opening) measured at baseline, 3- and 6-month follow-up, and the diaries
4. Time spent at home measured using diaries at baseline, month 2, 3 and 6

Completion date
20/05/2026

Eligibility

Key inclusion criteria
1. 60+ years old
2. Cognitively capable of providing informed consent
3. Understand the Dutch language

Participant type(s)
Healthy volunteer

Healthy volunteers allowed
Yes

Age group
Mixed

Lower age limit
60 Years

Upper age limit
110 Years

Sex
All

Total final enrolment
109

Key exclusion criteria
1. Not able to comprehend the information provided in Dutch
2. Unable or unwilling to give informed consent
3. Unable to cognitively evaluate the risks and benefits of participation

Date of first enrolment
07/01/2024

Date of final enrolment
30/11/2025

Locations

Countries of recruitment
Netherlands

Study participating centre
Erasmus MC
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Sponsor information

Organisation
Cartif

ROR
https://ror.org/036krsg33

Organisation
Erasmus MC

ROR
https://ror.org/018906e22

Funder(s)

Funder type
Other

Funder Name
European Health and Digital Executive Agency

Alternative Name(s)
Health and Digital Executive Agency, Agencia Ejecutiva Europea en el Ámbito Sanitario y Digital, Europäische Exekutivagentur für Gesundheit und Digitales, Agence exécutive européenne pour la santé et le numérique, Agenzia esecutiva europea per la salute e il digitale, HaDEA

Funding Body Type
Government organisation

Funding Body Subtype
National government

Location

Results and Publications

Individual participant data (IPD) sharing plan

IPD sharing plan summary
Data sharing statement to be made available at a later date

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Study website	Study website	11/11/2025	11/11/2025	No	Yes