

# VIRTUAL HEALTH REPOSITORY

## Output factsheet: Tools

Version 1

Project index number and acronym	CE69 INAIRO
Lead partner	National Public Health Institute
Output number and title	Output O.T2.1 - Virtual Health Repository
Responsible partner (PP name and number)	NIOM - PP3
Project website	<a href="http://www.interreg-central.eu/Content.Node/InAirQ/InAirQ.html">http://www.interreg-central.eu/Content.Node/InAirQ/InAirQ.html</a>
Delivery date	June 2018 (September 2017)

### Summary description of the key features of the tool (developed and/or implemented)

The Virtual Health Repository (VHR) is a tool which provides health relevant information on the indoor environment in primary school buildings in Central Europe. The VHR is an online platform consisting of (i) the methodology of Indoor Health Index developed in the InAirQ project; (ii) the categorization of the comfort parameters; (iii) a brief description of the main features of the school buildings investigated in the project and (iv) the Indoor Health Index and comfort categories calculated based on the indoor air quality (IAQ) data for each school building. Indices for the characterization of IAQ have been reviewed in the InAirQ project. Due to the complexity of this issue, a simple Indoor Health Index has been developed in the InAirQ project (i) to disseminate the results of the project among the public and stakeholders and (ii) to provide health relevant information about the IAQ. Moreover, the comfort parameters have been evaluated as well. Previous projects carried out on IAQ in Central Europe have been reviewed to check the compatibility of the data. We concluded that a harmonized monitoring campaign is needed since the data collected from other projects are not compatible. Moreover, data from several projects are not available for each school building. Thus, a detailed monitoring campaign has been carried out in total 64 primary school buildings in the project partner countries during the heating period in 2017/2018 (November 2017 - March 2018). The Indoor Health Index categories (healthy, moderate, unhealthy, very unhealthy and dangerous) for all investigated school buildings as well as the methodology are available on the VHR. The database consisting of all weekly mean values measured during the monitoring campaign is available for stakeholders upon request.

NUTS region(s) where the tool has been developed and/or implemented (relevant NUTS level)

Czech Republic  
NUTS 1 level: CZ0  
NUTS 2 level: CZ01, CZ02, CZ06,  
Hungary  
NUTS 1 level: HU1, HU2, HU3  
NUTS 2 level: HU10, HU21, HU31  
Italy  
NUTS 1 level: ITC  
NUTS 2 level: ITC1  
Poland  
NUTS 1 level: PL1  
NUTS 2 level: PL11  
Slovenia  
NUTS 1 level: SI0  
NUTS 2 level: SI01, SI02

### Expected impact and benefits of the tool for the concerned territories and target groups

Air pollution is one of the major determinants of public health in Central Europe. Indoor air quality (IAQ) can be characterized by physical parameters (e.g., temperature, relative humidity, air exchange rate), chemical air pollutants (e.g., carbon dioxide, nitrogen dioxide, particulate matter, ozone, benzene, etc.) and biological agents (e.g., pollen, fungi). Due to the complexity of this issue, a simple tool is needed to provide health relevant information on IAQ to stakeholders, school managers, etc. to be able to elaborate actions to improve the indoor environment. The Indoor Health Index developed in the InAirQ project provides very clear information on the presence of IAQ related problems.

### Sustainability of the tool and its transferability to other territories and stakeholders

The Virtual Health Repository (VHR) will be updated when new indoor air quality (IAQ) monitoring campaigns are carried out in primary school buildings. The aim of the tool is to act as a repository for IAQ related health relevant information. The school managers are encouraged to regularly collect and process IAQ data. Accordingly, any improvements in IAQ can be monitored or new IAQ related problems can be identified. The tool can be implemented in other territories as the methodology of the Indoor Health Index has been described in details. The VHR is an appropriate online tool to highlight the IAQ related problems in different regions in Central Europe and to provide evidence to stakeholders.

### Lessons learned from the development/implementation process of the tool and added value of transnational cooperation

The development of Virtual Health Repository (VHR) was the joint work of all project partners. During the implementation of the InAirQ project, the national vulnerability assessments, SWOT analyses as well as the results of the indoor air quality (IAQ) monitoring campaign revealed the similarities and differences regarding the IAQ related problems in the primary schools in the Central European countries participating in the project. The VHR is the main output of the most important health relevant information, namely the Indoor Health Index, for each school building. The most important lesson learnt from the development/implementation process of the VHR is that transnational cooperation is needed to develop joint methodologies, implement them and to analyze the results in the field of indoor air pollution.

## References to relevant deliverables and web-links If applicable, pictures or images to be provided as annex

The Virtual Health Repository (VHR) is available at: <https://www.oki.hu/vhr/>  
The VHR is operated and updated by the National Public Health Institute, Budapest, Hungary.

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### Virtual Health Repository - general overview

Indoor air quality (IAQ) can be characterised by physical parameters (e.g., temperature, relative humidity, air exchange rate), chemical air pollutants (e.g., carbon dioxide, nitrogen dioxide, particulate matter, ozone, benzene, etc.) and biological agents (e.g., pollen, fungi). During the monitoring campaign 64 primary school buildings were investigated in Central Europe (Czech Republic, Hungary, Italy, Poland and Slovenia) where the concentration of the most important air pollutants as well as the physical parameters were monitored. Due to the complexity of this issue, a simple Indoor Health Index has been developed (i) to disseminate the results of the project among the public and stakeholders and (ii) to provide health relevant information about the IAQ.

The calculation of the Indoor Health Index is based different threshold values determined by the health effects of the air pollutants/physical parameters (recommendations of the WHO and/or EC and/or scientific papers).

We applied a five scale categorization of the most important and frequent chemical air pollutants using for the cut off points.

Table 1. The calculation of Indoor Health Index.

Category	benzene ( $\mu\text{g}/\text{m}^3$ )	formaldehyde ( $\mu\text{g}/\text{m}^3$ )	PM <sub>2.5</sub> ( $\mu\text{g}/\text{m}^3$ )
healthy	<1.7	<10	<10
moderate	1.7-4.99	10-24.9	20-39.9
unhealthy	5-7.5	20-50	25-49.9
very unhealthy	7.51-10	51-100	50-75
dangerous	>10	>100	>75

When applying the index in practice we characterize the actual air quality according to the worst category, indicating the pollutant.

The database in which the Indoor Health Index has been calculated is available upon request.

To characterize the thermal comfort, different cut-off points for two physical parameters, temperature and relative humidity, as well as for the concentration of carbon dioxide have been set (Table 2).

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### VHR - Italy

Number of school buildings investigated: 12

- IT01** is located in the southern suburbs of Turin city. The building, consisting of 3 floors above ground, was built in 1966 and is made of concrete. It also has lead pipes, very harmful to health, but no component in asbestos. The school is located along a street with moderate traffic, and with moderate traffic and urban-type driving speed (speed limit 50 km / h or less). It is, however, close to high traffic and high traffic arterial roads: the south ring road of Turin and the Orbassano course. As a result, the school building, despite being immersed in a relatively green neighbourhood, thanks to its proximity to an urban park, is exposed to the air pollution generated by heavy traffic that develops nearby. Consequently, the main indoor air pollutant was benzene originated by vehicular traffic, and the IAQ is in the very unhealthy category based on the indoor health index.
- IT02** is located in the southern suburbs of Turin city. The building, consisting of 3 floors, is made of concrete, with no asbestos or lead components. It is heated by central heating (district heating with cast iron radiators). The school is located in a mainly residential area, with a moderate traffic and urban-type driving speed (speed limit 50 km / h or less). It is, however, not far from high-speed and high-traffic arterial roads: Corso Traiano and Corso Unione Sovietica, i.e. the main routes to take the southern ring road of Turin. As a result, the school building is exposed to the air pollution generated by heavy traffic flowing nearby and the IAQ is strongly influenced by outdoor pollution, particularly for what concerns the benzene levels, so high that they put the school IAQ in the dangerous category based on the indoor health index.
- IT03** is located in a residential area of Turin. The building consists of 4 floors above ground and a basement: it is mainly made of bricks with no lead or asbestos components. Recently (in 2011-2012) it has undergone renovations that have mainly affected the fixtures. The building is heated by central heating (district heating with cast iron radiators). The school is located in a mainly residential area, with a moderate traffic and urban-type driving speed (speed limit 50 km / h or less). It is located, however, near high traffic and high traffic arterial roads such as Corso Cosenza, Corso Unione Sovietica and Corso Giovanni Agnelli. As a result, the school building is exposed to the air pollution generated by the urban traffic that develops nearby. The indoor health index reflects this situation: the general index is very unhealthy, thanks to the very unhealthy levels of benzene.