



Public Health
England

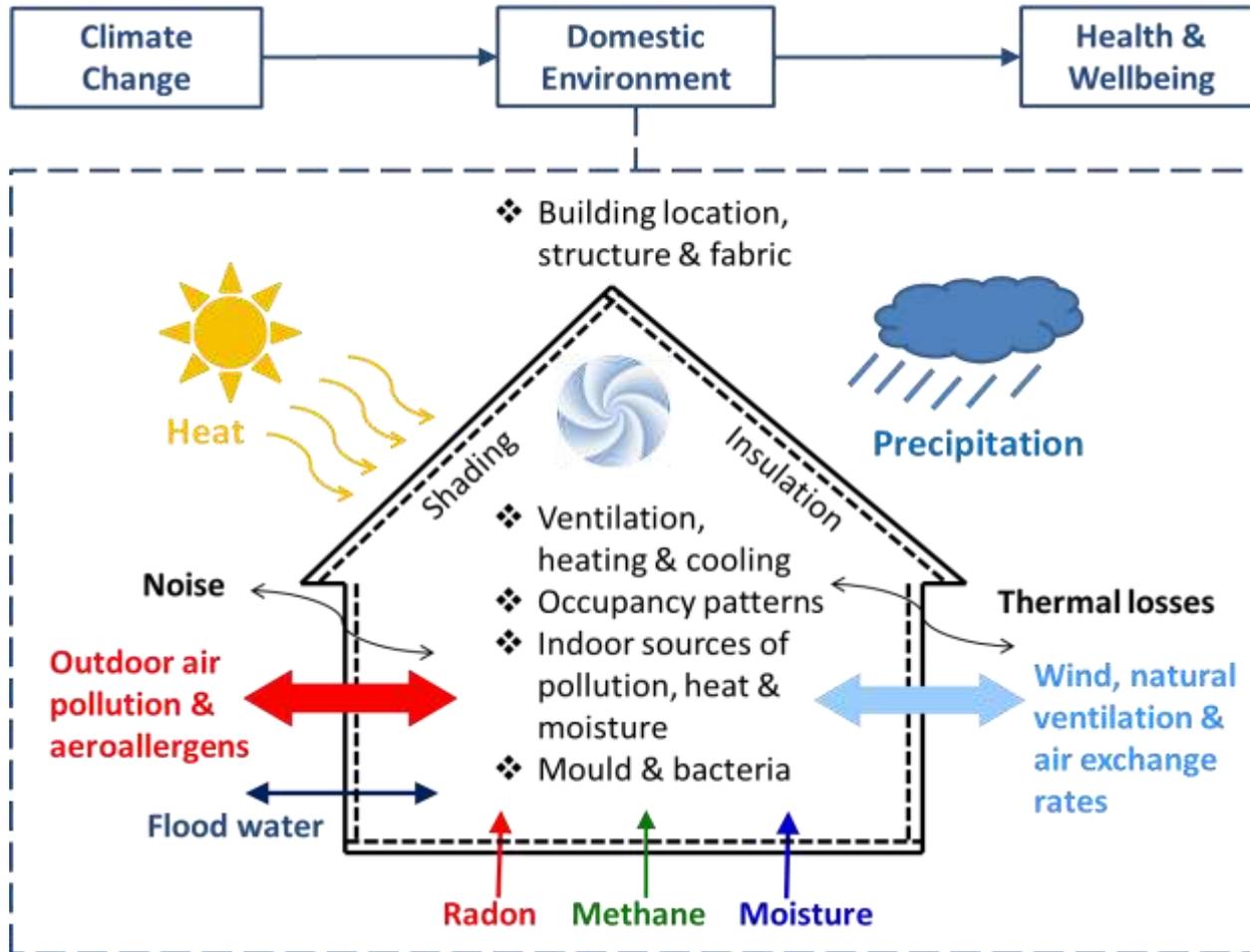
Indoor Air Quality: Recent / current activities

Dr Sani Dimitroulopoulou

Principal Environmental Public Health Scientist - Indoor Environments,
Air Quality and Public Health, Environmental Hazards and Emergencies Dept, Public Health England
Honorary Senior Lecturer, The Bartlett School, University College London
Vice Chair, UK Indoor Environments Group



The big picture





Public Health
England

Factors affecting IAQ

Ambient air

Urban planning



Building and Construction Materials, Furnishing and Consumer products

Ventilation

Design and maintenance Of buildings

Occupant activities



Sources of IA pollutants

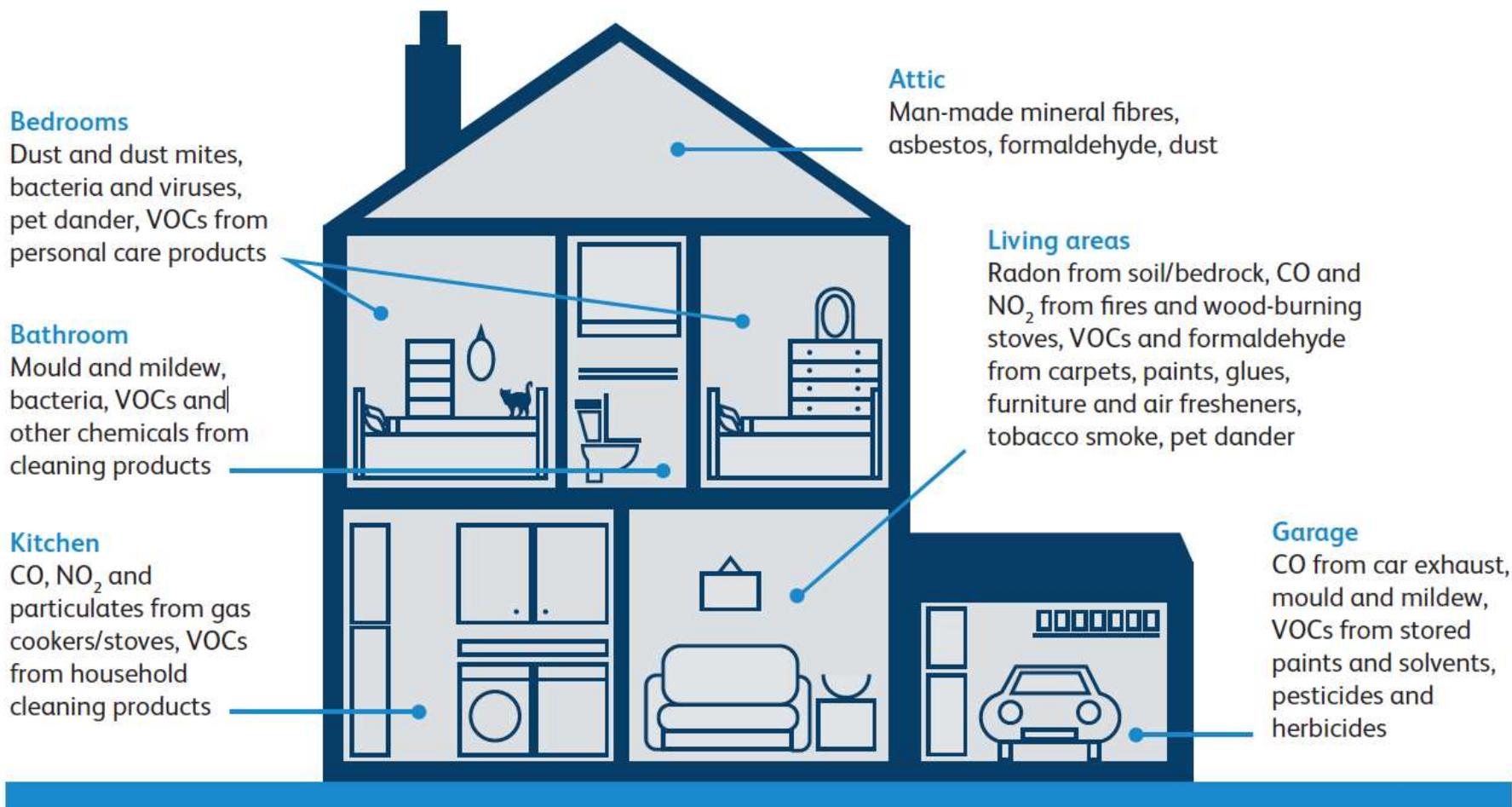
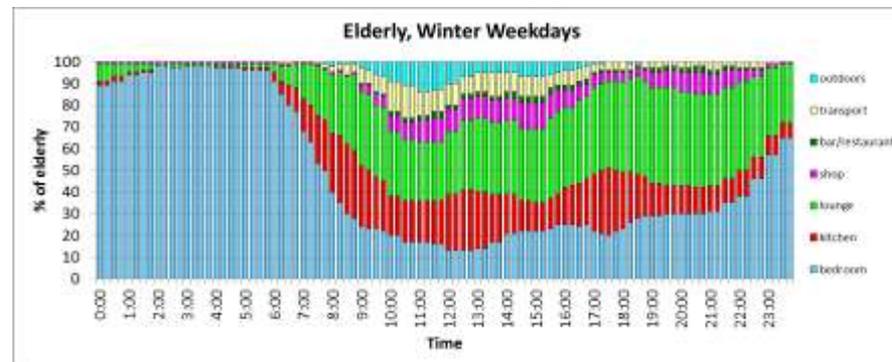
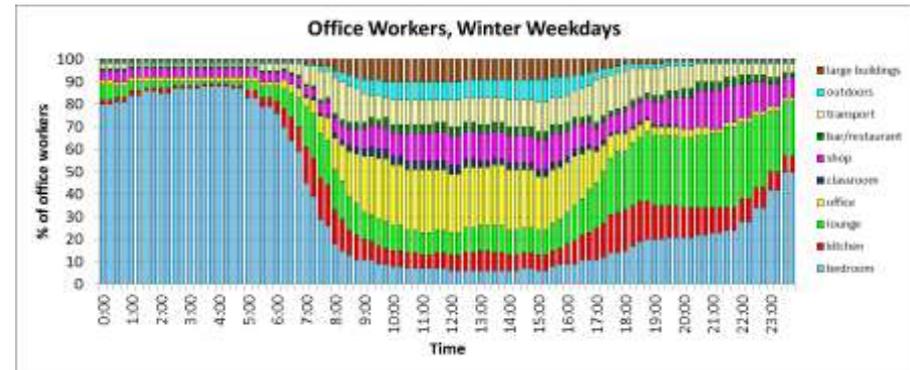
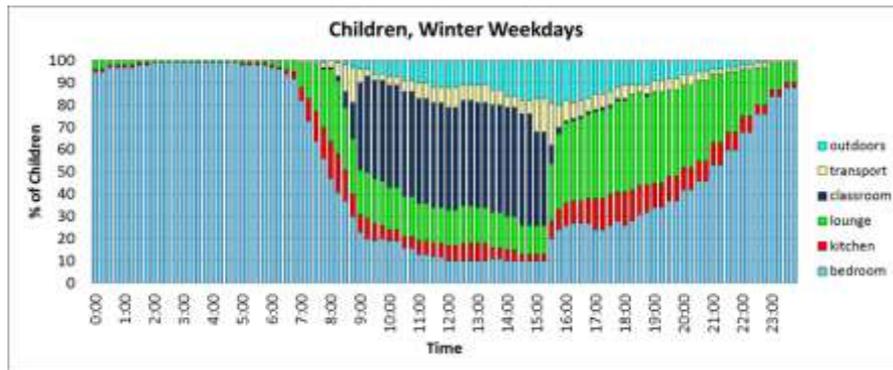


Fig 3. Sources and types of indoor pollution encountered in homes. VOCs = volatile organic compounds. Please note that these lists are not exhaustive and that the actual pollutants present, and their amounts, will vary from household to household.



Where do we spend our time during the day?



Dimitroulopoulou C, Ashmore MR, Terry A, Hill MTR. Use of Population Exposure Frequency Distributions to simulate effects on policy interventions on NO₂ exposure. *Atmospheric Environment*. 2017; 150: 1-14.



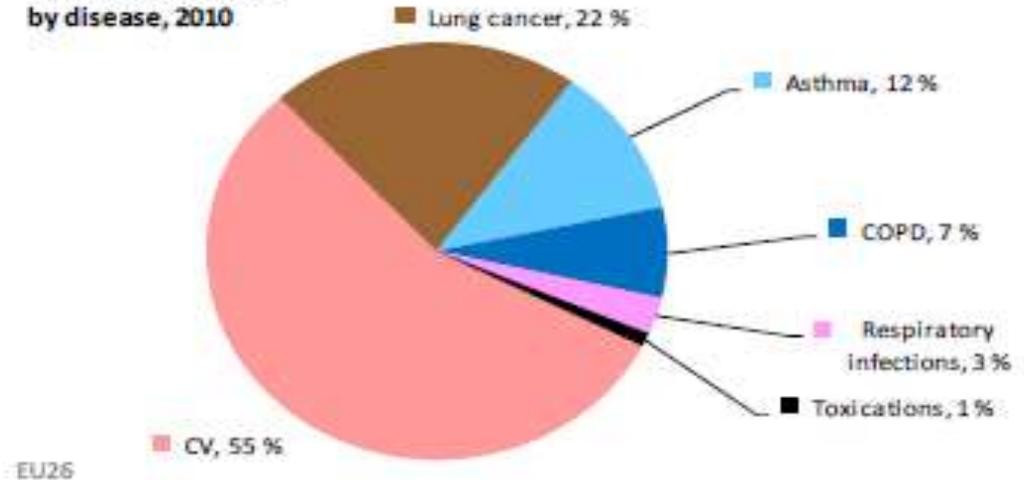
HEALTHVENT project

Otto Hänninen and Arja Asikainen (Eds.) (2013).

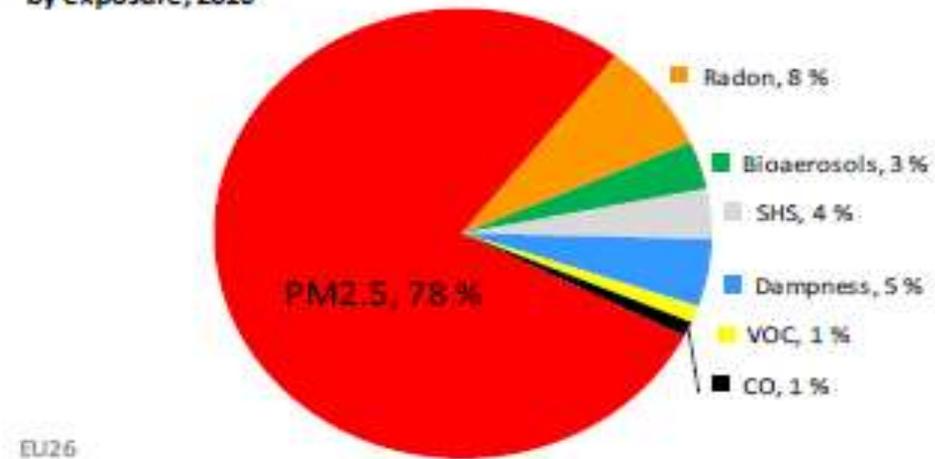
Efficient reduction of indoor exposures - Health benefits from optimizing ventilation, filtration and indoor source controls.

ISBN 978-952-245-821-6
(printed) ISBN 978-952-245-822-3 (online publication)

BOD from poor IAQ by disease, 2010



BOD from poor IAQ by exposure, 2010





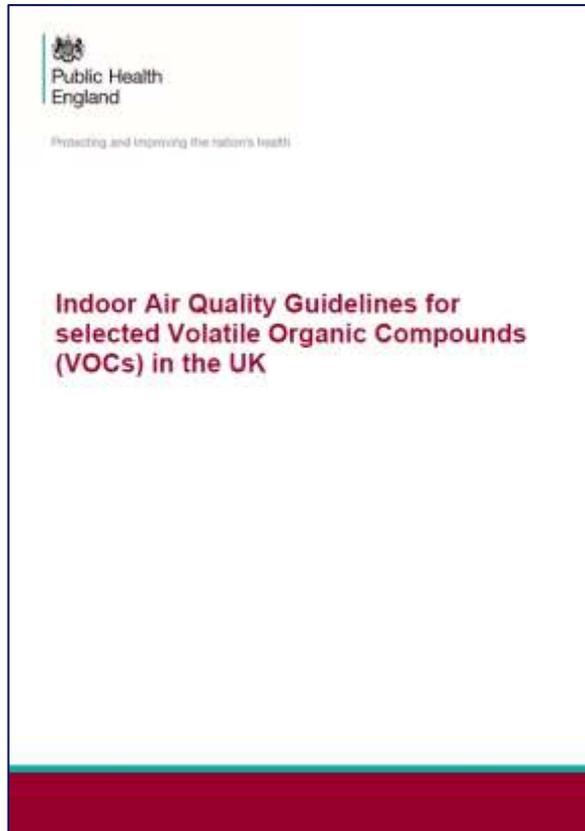
Public Health
England

PHE Activities



Public Health
England

PHE indoor air quality guidelines for selected VOCs



<https://www.gov.uk/government/publications/air-quality-uk-guidelines-for-volatile-organic-compounds-in-indoor-spaces>



Building and Environment, 2019,
<https://doi.org/10.1016/j.buildenv.2019.106382>



PHE indoor air quality guidelines for selected VOCs

VOCs	Limit Values in $\mu\text{g.m}^{-3}$		Source Document	Reasoning for choice	Potential Health impacts
	Short Term	Long Term			
Acetaldehyde (75-07-0)	1,420 (1h)	280 (1day)	Health Canada (2018) ²	Most recent appraisal of evidence	Irritation of the eyes, skin, and respiratory tract following acute exposure. ³ Long-term animal studies have reported carcinogenicity and inflammation and injury to tissues of the upper respiratory tract (Health Canada, 2018)
α -Pinene (80-56-8)	45,000 (30min)	4500 (1 day)	EPHECT (Trantallidi et al., 2015)	Critical Exposure limit (CEL) inhalation exposure to key and emerging indoor air pollutants emitted during household use of selected consumer products	<u>With the exception of its irritative (skin, eyes) and sensitizing properties, it is a chemical with fairly low acute toxicity.</u> ⁴ Ozone initiated reactions with terpenes produce gaseous and aerosol phase products, causing sensory irritation of upper airways and airflow limitation.
Benzene (71-43-2)	No safe level of exposure can be recommended. The unit risk of leukaemia per $1\mu\text{g.m}^{-3}$ air concentration is 6×10^{-6} . The concentrations of airborne benzene associated with an excess lifetime cancer risk of 1/10 000, 1/100 000 and 1/1 000 000 are 17, 1.7 and $0.17\mu\text{g.m}^{-3}$, respectively.		World Health Organisation (2010)	The risk estimates are based on human health risk. However, it is noted that the current Defra national air quality objectives for benzene for England and Wales is an annual mean of $5\mu\text{g.m}^{-3}$, based on the European (EU) ambient air quality directive 2008/50/EC (EU, 2008), (Defra, 2010).	The International Agency for Research on Cancer has classified benzene as carcinogenic to humans (Group 1). Benzene causes acute myeloid leukaemia in adults. Positive associations have been observed for non-Hodgkin lymphoma, chronic lymphoid leukaemia, multiple myeloma, chronic myeloid leukaemia, acute myeloid leukaemia in children and cancer of the lung. (IARC, 2018a).
D-Limonene (5989-27-5)	90,000 (30min)	9000 (1 day)	EPHECT (Trantallidi et al., 2015)	Critical Exposure limit (CEL) inhalation exposure to key and emerging indoor air pollutants emitted during household use of selected consumer products	As for α -Pinene above
Formaldehyde (50-00-0)	100 (30min)	10 (1yr)	World Health Organisation (2010). ATSDR MRL (1999)	World Health Organisation guidelines valid for short term exposure. ATSDR value of $10\mu\text{g}/\text{m}^3$ suggested as the long-term health-based guideline value which accounts for the potential for child susceptibility.	Sensory irritation of the eyes, nose and throat, together with exposure-dependent discomfort, lachrymation, sneezing, coughing, nausea and dyspnoea. Human carcinogen -long-term exposure linked to nasal cancer. ¹
Naphthalene (91-20-3)	-	3.0* (1yr)	Agency for Toxic Substances & disease Registry (2005), USA	Value also selected by the Flemish Government (2018) There is no proposed guideline for short term exposure due to the lack of scientific evidence.	Haemolytic anaemia in humans at high doses. Respiratory tract lesions including carcinogenicity reported in long-term animal studies. ^{1,3}



PHE indoor air quality guidelines for selected VOCs

VOCs	Limit Values in $\mu\text{g}\cdot\text{m}^{-3}$		Source Document	Reasoning for choice	Potential Health impacts
	Short Term	Long Term			
Styrene (100-42-5)	-	850 (1y) [^]	Health Canada (2018)	Most recent appraisal of evidence	Sensory irritation of the eyes, nose and throat. High concentrations- headache, nausea, vomiting, weakness, tiredness, dizziness, mild irritation to skin. Long-term exposure has been reported to cause neurological effects in humans including changes in hearing, balance, colour vision and psychological performance.
Tetrachloroethylene (127-18-4)	-	40 (1day)	US EPA (2012) and Health Canada (2018)	Most recent appraisals of evidence	Effects in the kidney indicative of early renal disease and neurotoxicity (visual and autonomic disturbances) ^{1,3} Evidence of carcinogenicity in animals. Limited evidence for carcinogenicity in humans (positive associations have been observed for bladder cancer)
Toluene (108-88-3)	15,000 (8h)	2,300 (1 day average)	Health Canada (2018)	Most recent appraisal of evidence, specifically the dose response relationship.	Eye, nose and throat irritation, headaches, dizziness and feelings of intoxication following short-term exposure. Neurological effects including reduced scores in tests of short-term memory, attention and concentration following long-term exposure ²
Trichloroethylene (71-01-06)	-	0.2* (1yr)	US EPA (2011)	This value is based on human data for kidney cancer, which has also been adjusted for other cancers.	The International Agency for Research on Cancer has classified trichloroethylene as carcinogenic to humans (Group 1). Trichloroethylene causes cancer of the kidney. A positive association observed for non-Hodgkin lymphoma and liver cancer. It is assumed that trichloroethylene is genotoxic (IARC, 2018b)
Xylenes-mixture (1330-20-7)	-	100 (1y) [^]	Health Canada (2018)	Most recently derived and most precautionary value.	Irritation to the nose, throat and lungs. Severe inhalation exposure can cause dizziness, headache, confusion, heart problems, liver and kidney damage and coma ²

*No safe level of exposure can be recommended. The concentrations shown are associated with an excess lifetime risk of 1/1,000,000 and are applicable to both long and short-term exposures.

[^]We are aware of new data that indicates that effects may occur at lower doses; however, this new data has not yet been evaluated by an authoritative body.

[^] Health Canada uses screening values for some species - Indoor Air Reference Levels (IARL). These are used to assess possible risk. They are associated with acceptable levels of risk after long-term exposure (over several months or years) for each specific VOC. Due to uncertainties in derivation; these have simply been labelled as annual. In these cases, no separate short-term exposure limit has been stated.

Main References

¹World Health Organisation. WHO Guidelines for selected pollutants.

²Public Health England. Chemical hazards compendium.

³United States Environment Protection Agency. Iris Assessments.

⁴Sarigiannis et al., 2011

PHE Statement (2019): Indoor Air quality guidelines for selected VOCs in the UK, <https://www.gov.uk/government/publications/air-quality-uk-guidelines-for-volatile-organic-compounds-in-indoor-spaces>

Shrubsole C, Dimitroulopoulou S, Foxall AK, Gadeberg B, Doutsis A (2019). IAQ guidelines for selected volatile organic compounds (VOCs) in the UK. Building and Environment, Vol 165, <https://doi.org/10.1016/j.buildenv.2019.106382>



Portable air purification: review of impacts on indoor air quality and health

Cheek E, Guercio, Shrubsole C, Dimitroulopoulou S (2020)

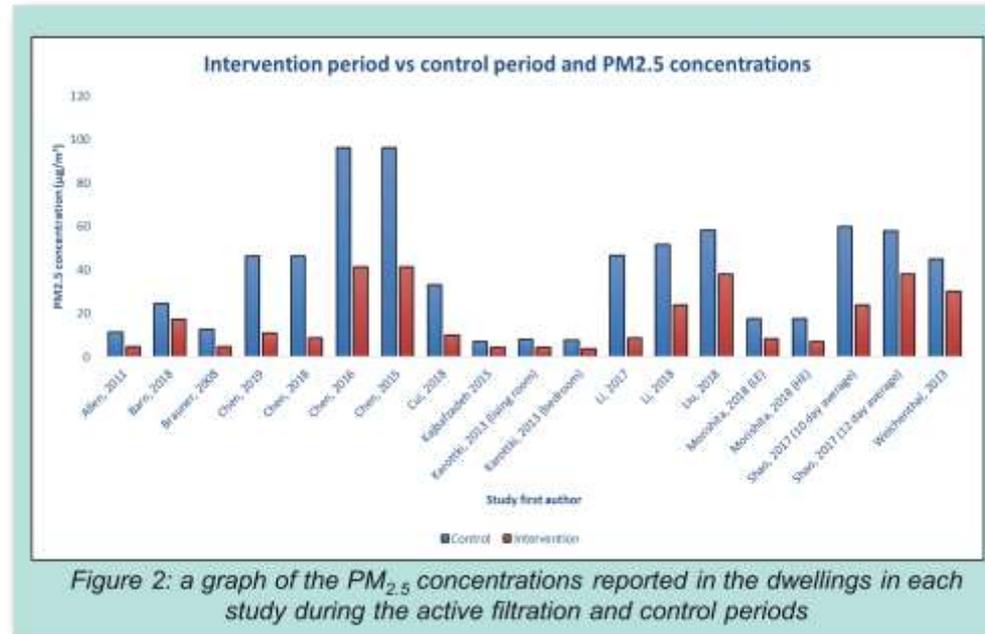


Figure 2: a graph of the PM_{2.5} concentrations reported in the dwellings in each study during the active filtration and control periods

- ❑ This review shows that portable air purifiers can improve indoor air quality significantly by reducing particulate air pollution.
- ❑ There is currently not enough evidence to confirm health benefits because there are so few properly designed studies. But given that there is strong evidence that the exposure to particulate pollutants is harmful to health, there are likely to be positive impacts.



Exposure to air pollution from indoor solid fuel combustion and respiratory outcomes in children in developed countries

Guercio V, Pojum I, Leonardi G, Shrubsole C, Gowers A, Dimitroulopoulou S, Exley K (2020)

*There is currently **little evidence** linking exposure to indoor coal or wood burning with **asthma or other respiratory diseases in children.***

This does not mean that exposure to these sources of air pollution is not having health effects, but rather that there is currently no strong scientific evidence showing this. Further research would be needed to establish whether there is a link.

*The epidemiological evidence on the association between indoor wood, coal and all solid fuel use and **lung cancer risk** is **still limited**, as only a few studies evaluate such an association.*

[doi:10.1016/j.scitotenv.2020.142187](https://doi.org/10.1016/j.scitotenv.2020.142187)

Science of the Total Environment 751 (2021) 142187

Contents lists available at ScienceDirect

Science of the Total Environment

journal homepage: www.elsevier.com/locate/scitotenv

Review

Exposure to indoor and outdoor air pollution from solid fuel combustion and respiratory outcomes in children in developed countries: a systematic review and meta-analysis

Valentina Guercio ^{a,*}, Iuliana C. Pojum, Giovanni S. Leonardi, Clive Shrubsole, Alison M. Gowers, Sani Dimitroulopoulou, Karen S. Exley

^a Centre for Statistics, Chemical and Environmental Health, Public Health England, Centre for Statistics, 61 Colindale Avenue, London NW9 5EQ, United Kingdom

HIGHLIGHTS

- Exposure to indoor wood burning is not associated with an increased risk of adverse respiratory outcomes.
- Exposure to indoor wood burning is highly associated with an increased risk of respiratory infections.
- The relationship between exposure to indoor coal burning and outdoor solid fuel and respiratory outcomes is limited.

GRAPHICAL ABSTRACT

ARTICLE INFO

Webb Page: <https://www.sciencedirect.com/science/article/pii/S1631300220371871>

Received 3 July 2020

Revised 19 August 2020

Accepted 2 September 2020

Available online 22 September 2020

Editor: Luke Shumway

Keywords:

Indoor air pollution

Wood burning

Coal burning

Respiratory diseases

Children's health

Environment of epidemiology

* Corresponding author.
E-mail address: valentina.guercio@phe.gov.uk (V. Guercio).

<https://doi.org/10.1016/j.scitotenv.2020.142187>

0167-6369/© 2020 Elsevier B.V. All rights reserved.



Public Health
England

PHE research

➤ PhD projects (co-funded PHE and UCL LoLo CDT)

PhD project 1 (2017-2021): *“Quantifying the benefits of measures to reduce exposure of deprived communities to indoor and outdoor sources of air pollutants”*.

Student: **Lauren Ferguson**

PHE Supervisor: Sani Dimitroulopoulou



PhD project 2 (2018-2022): *“Ventilation practices in new homes in relation to air quality, noise and overheating risk, and their impact on health”*

Student: **Cairan van Rooyen**

PHE Supervisors: Sani Dimitroulopoulou (IAQ),

Ben Fenech (noise) and Ross Thompson (building overheating)





Recent PHE publications

PHE (2019) Statement: *PHE Statement: Indoor Air quality guidelines for selected VOCs in the UK*,
<https://www.gov.uk/government/publications/air-quality-uk-guidelines-for-volatile-organic-compounds-in-indoor-spaces>

Shrubsole C, Dimitroulopoulou S, Foxall AK, Gadeberg B, Doutsis A (2019). *IAQ guidelines for selected volatile organic compounds (VOCs) in the UK*. Building and Environment, Vol 165,
<https://doi.org/10.1016/j.buildenv.2019.106382>

O'Leary C, Jones B, Dimitroulopoulou S, Hall IP (2019) *Setting the standard: The acceptability of kitchen ventilation for the English housing stock*. Building and Environment, 166
<https://doi.org/10.1016/j.buildenv.2019.106417>

Ferguson L, Taylor J, Davies M, Shrubsole C, Phil Symonds, Dimitroulopoulou S (2020) *Exposure to indoor air pollution across socio-economic groups in high-income countries: A review of the literature and a modelling methodology*. Environment International; 143:105748.

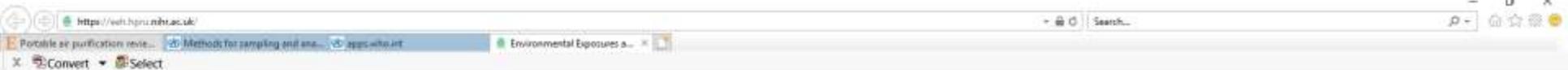
Guercio V, Pojum I, Leonardi G, Shrubole C, Gowers A, Dimitroulopoulou S, Exley K (2020) *Exposure to indoor and outdoor air pollution from solid fuel combustion and respiratory outcomes in children in developed countries: a systematic review and meta-analysis*. Science of the Total Environment,
[doi:10.1016/j.scitotenv.2020.142187](https://doi.org/10.1016/j.scitotenv.2020.142187).

Cheek E, Guercio V, Shrubsole C, Dimitroulopoulou C (2020). *Portable air purification: a systematic literature review of impacts on indoor air quality and health*, Science of the Total Environment,
<https://doi.org/10.1016/j.scitotenv.2020.142585>



Public Health
England

PHE research



NIHR | Health Protection Research Unit in
Environmental Exposures and Health
at Imperial College London

[Home](#) [Our Team](#) [PhD Studentships](#) [Covid-19 Projects](#) [Contact](#)

THEME I: ASSESSMENT OF POPULATION EXPOSURES

Welcome

Welcome to the National Institute for Health Research Health Protection Research Unit (NIHR HPRU) in Environmental Exposures and Health.

This HPRU is led by Imperial College London in partnership with Public Health England, King's College London and the MRC Toxicology Unit, Cambridge.

We have strong links with the [Chemical and Radiation Threats and Hazards HPRU](#) and the [MRC Centre for Environment and Health](#) and to ensure we operate as a highly collaborative matrix, analogous to PHE's multi-functional, single-agency model, we have created a Joint Steering Committee, Training Programme Committee, Public and Community Involvement, Engagement and Participation Committee and Public and Community Oversight Group.

PHE leads the indoor air project on the development of VOC/SVOC exposure models (2020 – 2023).

£3 million awarded to help tackle air pollution

22/07/2020

The funding will support six multidisciplinary research networks that will address future air quality challenges at the indoor-outdoor interface.

Networks awarded funding

Indoor/outdoor Bioaerosols Interface and Relationships Network – BioAirNet

Frederic Coupin - Cranfield University

The aim of BioAirNet is to act as the leading voice for the UK BioPM science community by taking a transdisciplinary approach to understand the complexity and connectivity among people, BioPM exposure and the indoor-outdoor continuum.

Air Pollution Solutions for Vulnerable Groups (CleanAir4V)

Christian Pfang - University of Birmingham

The aim of CleanAir4V is to develop innovative and cost-effective behaviour and technology interventions to reduce further air pollution exposure and improve health of vulnerable groups and implement these interventions through policy advice, planning and business innovation.

Breathing City: Future Urban Ventilation Network

Catherine Noakes - University of Leeds

The aim of Breathing City is to define a new integrated health evidenced approach to urban building design and technology innovation for vulnerable groups, by understanding how airflows transport pollutants in indoor and urban environments.

Tackling Air Pollution at School

Paul Linden - University of Cambridge

The aim of Tackling Air Pollution at School is to bring together interdisciplinary expertise to develop the research base to design and operate healthy schools in the environment of the future.

The health and equity impacts of climate change mitigation measures on indoor and outdoor air pollution exposure (HEICCAM)

Ruth Doherty - University of Edinburgh

The aim of HEICCAM is to strengthen evidence to optimise the health and equity impacts of changes in air pollution at the indoor/outdoor interface as we transition to a low carbon future.

Optimising air quality and health benefits associated with a low-emission transport and mobility revolution in the UK

Suzanne Bartington - University of Birmingham

The aim of the TRANSITION network is to identify, prioritise and tackle indoor and outdoor air quality challenges linked to the UK low emission mobility revolution, bringing together academics, researchers, policymakers, business, civil society and the wider general public.

Please sign up to our weekly newsletter to keep up to date:

Share:





Public Health
England

PHE Contribution to IAQ related activities of:

- Organisations &
- Government Depts



Public Health
England

PHE contribution to IAQ activities

Organisations

- CIBSE TM40: Health Issues in Building Services
- NICE guidelines / standard on indoor air quality at home (PHE Topic Advisor) (2019)
- RCP and RCPCH Systematic Review: “Effects of Indoor Air Quality on Children and Young People’s Health” (2020)
- WHO Experts Group on IAQ and children’s health
- BSI – PAS3003 Development of new standard Non-domestic buildings – Health and wellbeing performance

Government

- Cross Government Group On Gas Safety And Carbon Monoxide Awareness
- Department for Education – BB101 Guidance on ventilation, thermal comfort and indoor air quality in schools (2018)
- MHCLG Revision of Building Regulations (Part L and Part F)
- Government Review into CO Alarm Requirements (England)



NICE Guidelines: Indoor air quality at home

Evidence Reviews

- Studies that examined the association between **individuals** and **building characteristics** and **health outcomes**
- Studies that examined the association between
 - **sources of pollutants** and **health outcomes**
 - **exposure levels** and **health outcomes**

Interpreting the evidence

“Nitrogen dioxide (NO₂), volatile organic compounds (VOCs), particulate matter (PM), polycyclic aromatic hydrocarbons (PAHs, naphthalene and benzo[a]pyrene) and biological agents (mould and pet dander)

are sometimes associated with **respiratory**, **cardiovascular** and **neurological systems**”



NICE Guidelines: Indoor air quality at home

The screenshot shows the NICE website interface. At the top, there is a search bar and a 'Sign in' button. Below the navigation menu, a yellow banner reads 'Read about our approach to COVID-19'. The breadcrumb trail is 'Home > NICE Guidance > Health protection > Environment'. The main heading is 'Indoor air quality at home' with the NICE guideline number [NG149] and a published date of 08 January 2020. A navigation menu includes 'Guidance', 'Tools and resources', 'Information for the public', 'Evidence', and 'History'. The 'Guidance' section is active, showing an 'Overview' tab selected. A 'Download guidance (PDF)' link is visible. The main content area features a 'Guidance' section with a 'NICE Interactive flowchart - Air pollution' icon. A 'Next >' button is present. A text block states: 'This guideline covers indoor air quality in residential buildings. It aims to raise awareness of the importance of good air quality in people's homes and how to achieve this.' Below this is a thumbnail image of a 2-page visual summary and a link: 'See a 2-page visual summary on actions to improve indoor air quality.' At the bottom, it mentions 'NICE has also produced a guideline on outdoor air pollution.'



Public Health
England

NICE Pathways

The screenshot displays the NICE Pathways website interface. At the top, the NICE logo and navigation menu are visible. The main content area features a yellow banner for COVID-19 and a title for the 'Indoor air quality at home' pathway. A flowchart diagram is shown, detailing interventions to improve indoor air quality, such as local strategies, advice to the public, standards, and rental property regulations. A sidebar on the right provides a table of contents for the pathway, with 'Indoor air quality at home' highlighted as the current page.

Indoor air quality at home

Read about our [approach to COVID-19](#)

Interventions to improve indoor air quality

- Local strategies and plans
 - Raising awareness
- Giving advice and information to the general population and people at higher risk
 - Itineraries for housing assessments
- Standards and regulations
 - Building design and materials
- Rental properties: regulation and advice

Air pollution - everything NICE says in an interactive flowchart

About	Resources	Information for the public	Quality standards
▼	▼	▼	▼
▲	▲	▲	▲

- Air pollution overview
- Indoor air quality at home**
- Road-traffic-related air pollution

Your responsibility when using NICE advice

© NICE 2020. All rights reserved. Subject to Notice of rights.

<http://pathways.nice.org.uk/pathways/air-pollution>

Actions for local authorities

Checking people's homes and giving advice

Use inspections and home visits to identify poor indoor air quality.

Staff who visit people's homes should:

- know about sources of indoor air pollutants and their effects on health
- give advice on avoiding activities that increase pollutants and improving ventilation (see below)
- know who can provide help with repairs and necessary improvements
- give advice on requesting a housing assessment if poor indoor air quality is suspected.

Advise private and social tenants to contact their landlord if:

- ventilation is inadequate
- repairs are needed to prevent water from entering the home
- improvements are needed to heating or insulation to prevent condensation.

Advise tenants to contact their local authority if no action is taken to improve ventilation or carry out repairs.

Advice on reducing damp and condensation

- Use background ventilation (trickle vents or whole-house mechanical ventilation)
- Use extractor fans and open windows (if possible and safe)
- Avoid moisture-producing activities (such as air-drying clothes) or, if unavoidable, improve ventilation
- Repair sources of water damage and remove residual moisture

Advice on increasing ventilation

- Use extractor fans in bathrooms and kitchens, or open windows (if possible and safe) when:
- using cookers, especially gas cookers
 - using open solid-fuel fires or free-standing gas heaters
 - using candles
 - using cleaning products, household sprays or aerosols and paints
 - having a bath or shower
 - air-drying clothes

Other advice

- Do not use unflued paraffin heaters
- Follow product instructions if using, for example, paint, glue and solvents
- Choose low-emission materials if replacing furniture or flooring
- Ensure adequate ventilation when installing a new cooker, especially for gas cookers
- Do not use gas cookers to heat a room
- Avoid smoking in the home

Actions for healthcare professionals

Advice for people with breathing or heart problems

- Explain that indoor air pollutants can trigger or exacerbate asthma, other respiratory conditions and cardiovascular conditions
- If repeated or worsening cough or wheezing, ask about housing conditions and help request a housing assessment if concerned
- If household sprays or aerosols trigger asthma, advise avoiding them or using non-spray products

Advice for people allergic to house dust mites

- Advise on how to reduce exposure to house dust mites, including:
- avoiding second-hand mattresses if possible
 - using allergen barriers such as mattress and pillow covers
 - washing bedding regularly

Advice for pregnant women and babies under 12 months

- Advise on the increased risks from poor indoor air quality
- Explain the risks of tobacco smoke
- Ask about housing conditions and help request a housing assessment if concerned
- Advise on reducing use of household sprays and aerosols
- Advise on avoiding or reducing use of open solid-fuel fires or candles
- Advise on avoiding smoking in the home or around the woman and baby

Actions for architects, designers, builders and developers

These recommendations apply both to building new homes and renovating or refurbishing existing homes.

Building materials and products

- Architects and designers should consider specifying materials and products that emit low levels of formaldehyde and volatile organic compounds (VOCs)
- Builders and developers should use materials as specified or substitute with products of the same or lower emission levels
- Builders and developers should ensure materials and products comply with building regulations, design specifications and the manufacturer's guidance

Designing heating and ventilation systems

- Adopt a whole-building approach to heating and ventilation, balancing indoor air quality with standards for energy use
- Use heating systems that minimise exposure to particulate matter
- Ensure there is permanent, effective ventilation
- Include provision for removing indoor air pollutants in designs, for example, windows that open and extractor fans that extract to outside
- Design ventilation to reduce exposure to outdoor air pollution, for example, with windows that face away from busy roads

Installing heating and ventilation systems

- Ensure heating and ventilation is installed and commissioned in accordance with the manufacturer's instructions and meets building regulation requirements
- When installing heating and ventilation systems, ensure they are easily accessible for regular maintenance
- Ensure any variations to the heating and ventilation specification comply with design specifications and building regulations

This is a summary of the recommendations on advice and information for the general population, healthcare professionals, architects and designers, and builders, contractors and developers in NICE's guideline on indoor air quality at home. See the original guidance at www.nice.org.uk/guidance/NG149



Public Health
England

RCPCH and RCP

Effects of indoor air quality on children and young people's health

Research project

Produced an evidence-
based report on the
impact of indoor air
pollution

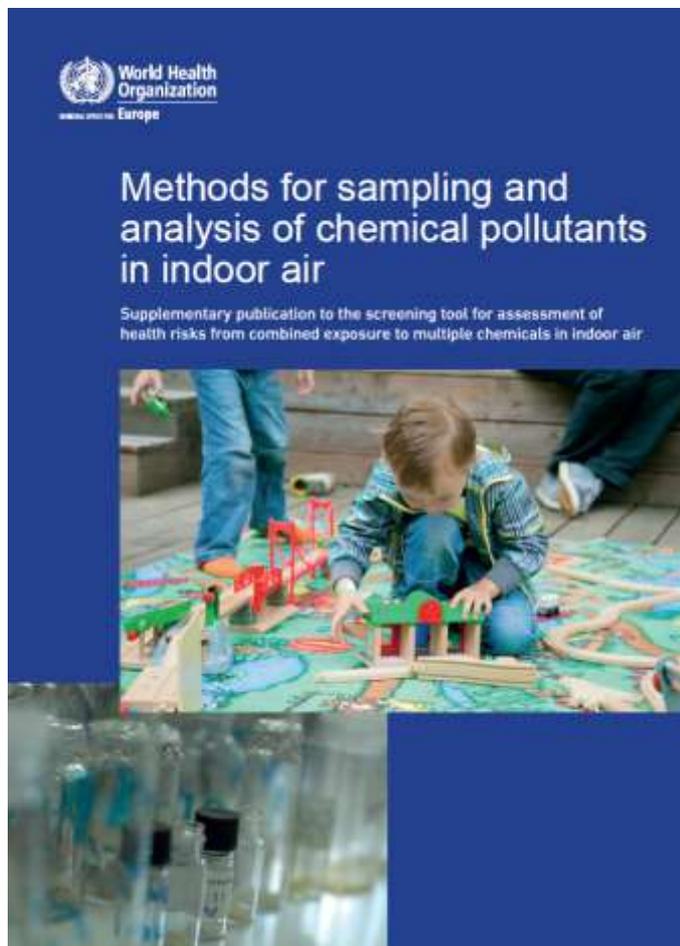
	Birth and infancy <ul style="list-style-type: none">• Respiratory problems - wheeze, rhinitis, atopic asthma, respiratory infections• Low birthweight and pre-term birth
	Pre-school <ul style="list-style-type: none">• Respiratory problems - wheeze, allergies, asthma, risk of respiratory diseases and pneumonia• Eczema and atopic dermatitis• Greater hyperactivity, impulsivity and inattention
	School age <ul style="list-style-type: none">• Respiratory problems - wheeze, rhinitis, asthma, throat irritation, nasal congestion, dry cough• Eczema, dermatitis, conjunctivitis, skin and eye irritation• Reduced cognitive performance, difficulty sleeping



Public Health
England

World Health Organisation (WHO)

Development of a tool to assess the cumulative risks from indoor air pollutants in public settings for children - *on-going project*



More publications are planned
Project end: December 2020

<https://apps.who.int/iris/handle/10665/334389>



MHCLG - Ministry of Housing Communities and Local Government

Building Regulations, Energy Efficiency and Sustainability Review 2020

- Revision of the Building Regulations - Part F: ventilation and Part L: airtightness)
- ADF - Performance criteria:

WHO indoor air quality guidelines (2010), together with the PHE IAQ guidelines for selected VOCs (2019).





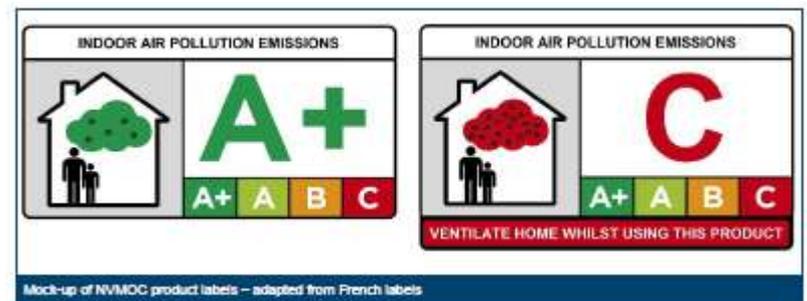
DEFRA Clean Air Strategy 2019

6. Action to reduce emissions at home

Currently, with the exception of the Paints Regulations, there are few provisions limiting the VOC content of products used in the home.

“We will work with industry to identify an appropriate test standard for new solid fuels entering the market.”

“We will explore a range of options including the development of a *voluntary labelling scheme for NMVOC containing products*, and assess its potential effectiveness.”





BB 101: Ventilation, thermal com... x

www.gov.uk/government/publications/building-bulletin-101-ventilation-for-school-buildings

GOV.UK

Search

Departments Worldwide How government works Get involved
Consultations Statistics News and communications

➔ **Coronavirus (COVID-19)** | Guidance and support

[Home](#) > [Education, training and skills](#) > [Running and managing a school](#) > [School buildings and land](#)
> [School buildings and land guidelines](#)

Guidance

BB 101: Ventilation, thermal comfort and indoor air quality 2018

This Building Bulletin provides guidance on ventilation, thermal comfort and indoor air quality in schools

Published 11 March 2014
Last updated 23 August 2018 — [see all updates](#)
From: [Education and Skills Funding Agency](#)

Documents

Related content

Windows taskbar: 13:24 11/10/2020



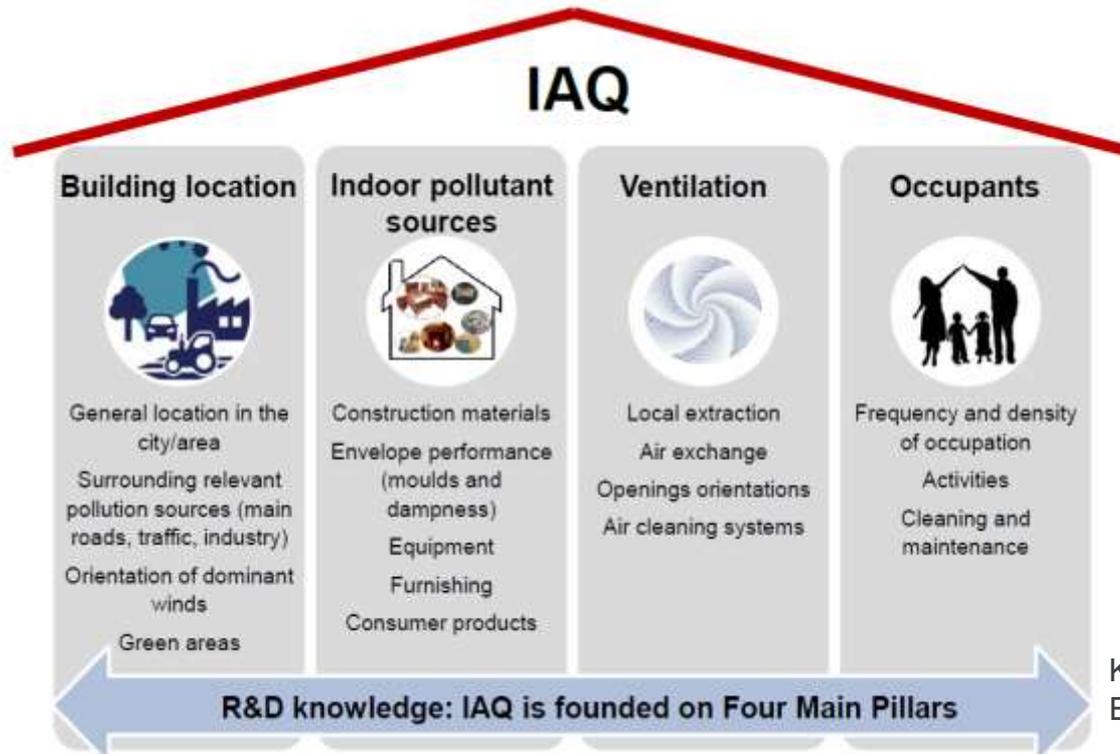
6.1 Indoor and outdoor air quality guidelines and UK air quality standards

For the first time in the UK policy, BB101 recommends:

- WHO (2010) guidelines for selected indoor air pollutants
- WHO (2009) guidelines for dampness and mould.
- Distinguish between indoor and ambient air:
 - UK National Air Quality Objectives (DETR, 2007) for ambient air pollutants.
- Refer to HSE EH40: Pollutant levels in *Science, Design and Technology and Art* should always be kept below the levels given in EH40.



Strategy on IAQ



Kindly provided by Prof
E. De Oliveira Fernandes

MHCLG
(Town planning)
Defra
DfE
LAs

Defra
MHCLG
(building Regs)
HSE
BEIS

MHCLG
(Building Regs)

DHSC
PHE
LAs



Public Health
England

Let's work together



to reduce our exposure to indoor air pollution

Thank you!

www.gov.uk/phe

Sani.Dimitroulopoulou@phe.gov.uk