

**Indoor air quality at home**

**Consultation on draft guideline - Stakeholder comments table  
28/06/2019 to 09/08/2019**

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Action on Smoking and Health	Guideline	General	General	<p>ASH welcomes the inclusion of reference to smoking in section 1.4.10 and 1.5.7. The harms of second-hand smoke (SHS) are well established and will be highlighted throughout this response. SHS is a significant source of many established harmful pollutants of indoor air, including particulate matter, polycyclic aromatic hydrocarbons (PAHs) and volatile organic compounds. In households with a smoker, cigarette smoke is likely to be the largest source of these pollutants – for instance, more than 87% of PAHs in a smoker's home can be attributed to SHS.[i] Therefore, where household smoking is present, taking steps to reduce or eliminate it make the greatest contribution to the improvement of indoor air quality. As ASH's 2018 report, Smoking in the home: New solutions for a smokefree generation,[ii] identified, exposure to SHS in the home remains significant. A recent survey of over 10,000 adults conducted by YouGov for ASH found that 13% of all adults in England are exposed to SHS in their home most days.[iii] There are also stark inequalities in SHS exposure in the home. When broken down by</p>	<p>Thank you for your comment. While the scope states that evidence on environmental tobacco smoke (passive smoking) as an indoor air pollutant will not be reviewed as it is accepted that no level of environmental tobacco smoke is considered safe (Air quality guidelines for Europe World Health Organization), the committee recognised that environmental tobacco smoke is a major pollutant in the home and added people exposed to smoke in their homes to the list of people who are vulnerable to ill-health as a result of exposure to poor indoor air quality. The committee have, where appropriate, also cross-referred to, and adapted from, NICE guidelines on smoking as outlined in the scope.</p> <p>[i] Choi H, Harrison R, Komulainen H, Delgado Saborit J. Polycyclic aromatic hydrocarbons. In: WHO Guidelines for Indoor Air Quality: Selected Pollutants. Geneva: World Health Organization; 2010 This report has been referenced in recommendation 1,6.1</p> <p>[ii] Action on Smoking and Health (ASH). Smoking in the home: New solutions for a smokefree generation. November 2018. This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is an overview not a research paper.</p>

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				<p>social grade, 17% of C2DE adults reported being exposed to SHS in their home most days, compared to 10% of ABC1 adults.<sup>3</sup> More starkly, when comparing rates between types of housing tenure, 25% of those in social renting arrangements reporting being exposed to SHS most days, compared to 15% who rent privately and 9% who own their property outright.<sup>3</sup></p> <p>These inequalities are mirrored when assessing child exposure to SHS in the home. Whilst 8% of children (people aged under 18) in owner occupied housing are exposed to SHS most days, this increases to 13% in privately rented housing, and up to 21% in social housing.<sup>3</sup></p> <p>Ensuring the harms of SHS exposure and smoking in the home more generally<sup>2</sup> are communicated and that smokers are encouraged to quit and provided support in line with NICE guidance NG92<sup>[iv]</sup> and PH26<sup>[v]</sup> would be an extremely positive step in reducing the harm caused by smoking in the home. Furthermore, as the guidance references (page 31, line 12) local authorities have an obligation to improve health and reduce inequalities. What the patterns of SHS exposure explicated above demonstrate is that</p>	<p>[iii] Action on Smoking and Health (ASH). Smokefree GB Survey 2019. This report is not yet published, and we will pass your comment to the NICE surveillance team which monitors guidelines to ensure that they are up to date.</p> <p>[iv] NICE. NG92: Stop smoking interventions and service. March 2018. This guideline is referenced in recommendation 1.4.11</p> <p>[v] NICE. PH26: Smoking: Stopping in pregnancy and after childbirth. June 2010. This guideline is referenced in recommendations 1.4.11 and 1.5.7</p> <p>[vi] Marmot M. Fair Society Healthy Lives (The Marmot Review). February 2010. This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a policy report not primary research.</p>

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				any approach to this effect will also combat health inequalities, by better targeting population groups with higher smoking rates. Higher smoking rates are estimated to account for half the gap in life expectancy between the richest and poorest.[vi]	
Action on Smoking and Health	Guideline	4	2-3	<p>Given the recognition that “Smoking and passive smoking is always a health risk.” (page 25, line 14) and the repeated inclusion of recommendations to advise people not to smoke in the home (1.4.10 and 1.5.7), reference to smoking should be included in “Box 1 People who may be particularly vulnerable and factors that increase the risk of ill health due to exposure to indoor air quality”. Specifically, household smoking should be included under “Housing conditions that put people at increased risk of exposure to poor indoor air.”</p> <p>Furthermore, children who live in a home where one or more other people smoke in the home should be included under “People who may be particularly vulnerable to ill health as a result of exposure to poor indoor air quality” in Box 1.</p> <p>Exposure to SHS amongst children and young people poses particular risks due to their smaller, immature and developing organs.[vii]</p>	<p>Thank you for your comment. While the scope states that evidence on environmental tobacco smoke (passive smoking) as an indoor air pollutant will not be reviewed as it is accepted that no level of environmental tobacco smoke is considered safe (Air quality guidelines for Europe World Health Organization), the committee recognised that environmental tobacco smoke is a major pollutant in the home and added people exposed to smoke in their homes to the list of people who are vulnerable to ill-health as a result of exposure to poor indoor air quality. The committee have, where appropriate, also cross-referred to, and adapted from, NICE guidelines on smoking as outlined in the scope.</p> <p>[vii] Seddon C. Breaking the cycle of children’s exposure to tobacco smoke. British Medical Association. 2007. This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is an overview not a research paper</p> <p>[viii] Royal College of Physicians. Passive smoking and children: Parliamentary briefing. 2012. This study does not meet the inclusion criteria as specified in the review protocols</p>

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				<p>Evidence shows that SHS is a preventable cause of numerous health conditions including bronchitis, asthma, pneumonia, meningitis and sudden infant death syndrome.[viii] The Royal College of Physicians (RCP) estimates that household smoking increases the incidence of childhood asthma by as much as 50% and results in 20,000 cases of lower respiratory tract infection each year.[ix]                      Exposure to SHS in childhood can also lead to long term respiratory problems, including an increased risk of chronic respiratory illness and lung function deficits in later life.[x] Each year in the UK, children breathing in other people's cigarette smoke results in 300,000 GP visits,9 and children exposed to smoke are likely to have more days off school each year.[xi]                      When looking at annual dose to fine particulate pollution, evidence from detailed modelling of extensive UK data indicates that an 11 year old child will typically inhale over 5 times as much PM2.5 per day if they live in a smoking-permitted home compared to the same child in a smoke-free home.[xii]                      In addition to the physical harm caused by SHS, environmental tobacco smoke can exacerbate and cause behavioural issues and impair mental development. Research</p>	<p>(Appendix A of the evidence reviews) as it is a policy report not a research paper</p> <p>[ix] Royal College of Physicians. Passive smoking and children. 2010. This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a policy report not a research paper</p> <p>[x] American Thoracic Society. Children Exposed to Smoking Face Long-Term Respiratory Risks. ATS International Conference. California. 2012. This is a conference abstract only</p> <p>[xi] Levy, D. Winickoff, J. and Rigotti, N. School absenteeism among children living with smokers. Paediatrics 2011; 128: 650-656 This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a study concerned with the impact of exposure to environmental tobacco smoke on school attendance</p> <p>[xii] Semple S, Apsley A, Azmina Ibrahim T, Turner SW, Cherrie JW. Fine particulate matter concentrations in smoking households: just how much secondhand smoke do you breathe in if you live with a smoker who smokes indoors? Tob Control. 2015 Oct;24(e3):e205-11. This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is concerned with</p>

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				<p>suggests tobacco smoke could be neurotoxic at extremely low levels and exposure to SHS may impair mental development and lead to neurobehavioral disorders.[xiii],[xiv] One study found that children who were continuously or intermittently exposed to SHS were more likely to be physically aggressive and display anti-social behaviour.[xv] Furthermore, a recent study has found that environmental tobacco smoke exposure increases the risk of behavioural problems in school age children.[xvi]</p> <p>Recommendations Household smoking should be included under "Housing conditions that put people at increased risk of exposure to poor indoor air" in Box 1 Children who live in a home where one or more other people smoke in the home should be included under "People who may be particularly vulnerable to ill health as a result of exposure to poor indoor air quality" in Box 1</p>	<p>environmental non-smokers exposure to environment tobacco smoke in homes where a smoker lives.</p> <p>[xiii] Yolton, K et al. Exposure to environmental tobacco smoke and cognitive ability among US children. Environmental Health Perspectives 2005; 113: 98–103 This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a cross-sectional study</p> <p>[xiv] Kabir, Z. Connolly, G. Alpert, H. Secondhand smoke exposure and neurobehavioral disorders among children in the United States. Pediatrics 2011; 28, 263–270. This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a cross-sectional study.</p> <p>[xv] Pagani, L and Fitzpatrick, C. Prospective associations between early long-term household tobacco smoke exposure and antisocial behaviour in later childhood. Journal of Epidemiology and Community Health 2013; 67:552-557 This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is concerned with the association between environmental tobacco smoke and antisocial behaviour</p> <p>[xvi] Chastang J. et al. Postnatal Environmental Tobacco Smoke Exposure Related to Behavioural Problems in Children, PLoS One. 2015 Aug 5;10(8):e0133604 This study does not</p>

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					meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a cross-sectional study.
Action on Smoking and Health	Guideline	6	10	<p>In relation to “Raising awareness of poor indoor air quality in the home” and with regard to question 3 posed at the beginning of this comment form, regional mass media collaboration between local authorities provide an example of best practice for raising awareness of the impact smoking has on indoor air quality.</p> <p>Good examples of such mass media campaigns run by the North East tobacco control programme Fresh,[xvii] which is funded by 7 North East local authorities. Fresh campaigns have included the “Take 7 Steps Outside” mass media campaign (in collaboration with Healthier Futures in the North West), and the roll out of a Fresh training programme, called “Smokefree Families”, for front line staff (particularly those based within children’s services) to raise awareness of the impact of SHS in the home and to deliver evidence based brief interventions to parents and carers of children.</p> <p>More recently, Fresh delivered two phases of a mass media campaign titled “Secondhand Smoke is Poison” (utilising a Scottish</p>	<p>Thank you for your comment. The committee did not identify any evidence for regional campaigns of the health impact of poor indoor air quality and its sources including smoking.</p> <p>The committee recognised that smoke is a major pollutant in the home and added people exposed to smoke in their homes to the list of people who are vulnerable to ill-health as a result of exposure to poor indoor air quality. The committee have, where appropriate, also cross-referred to, and adapted from, NICE guidelines on smoking as outlined in the scope.</p> <p>Furthermore, the committee have emphasised the benefits of joint working with external organisations to improve air quality in people’s homes and have drafted recommendations to use existing communication strategies to raise awareness of cause of poor indoor air quality and the health impact of poor indoor air quality.</p> <p>[xvii] Fresh Smokefree North East. <a href="http://www.freshne.com/">http://www.freshne.com/</a> This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is not a research paper.</p>

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				<p>government TV advert), and they continue to promote an interactive website informing users of the danger of SHS in the home (www.smokefreefamilies.co.uk), and provide materials for localities.</p> <p>Recommendations Local authorities should collaborate at a regional level to fund mass media campaigns raising awareness of the impact smoking in the home has on indoor air quality, the associated health risks and the steps individuals can take to eliminate the harm</p>	
Action on Smoking and Health	Guideline	7	1 - 14	<p>In relation to recommendation 1.3.2, ASH agrees that home visits should be utilised to help improve indoor air quality. In particular, all professionals, such as housing officers, environmental health practitioners, midwives, social workers and care workers should be trained in Very Brief Advice, a NICE endorsed intervention delivered opportunistically to encourage smoking cessation,[xviii],4 to best improve smoking related indoor air pollution. Although this is already practiced in some cases,2 it is not routine.</p> <p>More extensive interventions should also be considered by housing professionals. An intervention designed to reduce SHS exposure to children whose primary caregiver feels</p>	<p>Thank you for your comment. Interventions for smoking cessation are outside the scope of this guideline but, as the committee recognised that smoke is a major pollutant in the home, it referred to other NICE guidance on smoking where appropriate.</p> <p>[xviii] National Centre for Smoking Cessation and Training. Very Brief Advice training module This advice is referred to in the NICE guideline on stop smoking interventions and services which is included in recommendation 1,4.11</p> <p>[xix] Ratschen E, Thorley R, Jones L, et al A randomised controlled trial of a complex intervention to reduce children's exposure to secondhand smoke in the home Tobacco Control 2018;27:155-162</p>

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				<p>unable or unwilling to quit smoking further demonstrates the success such initiatives can have on improving indoor air quality. Following the intervention, which involved personalised feedback on home air quality, behavioural support and nicotine replacement therapy for temporary abstinence, levels of PM2.5 decreased significantly more (by 35.2%) in households which received the intervention compared with households where no intervention took place, as did the proportion of time PM2.5 exceeded WHO recommended levels of maximum exposure.[xix] Even where individuals are unable to quit, therefore, there are still significant gains to be achieved to child health through the reduction of SHS in the home.</p> <p>With regard to question 2 posed at the beginning of this consultation form, implementation of such initiatives would not have any significant cost implications, particularly when compared with measures required to facilitate better ventilation (which does not completely remove particulates). Costs are largely confined to training (VBA training is freely available)<sup>18</sup> and the joining up of services, for example by training staff to refer residents to local stop smoking support</p>	<p>This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is concerned with complex intervention including nicotine replacement therapy and support to reduce exposure to environmental tobacco smoke in the home</p>

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				<p>(an element of VBA) which can provide behavioural support and advice on pharmacotherapy. Recommendations All appropriate staff visiting residents' homes should be trained in Very Brief Advice on smoking cessation which can be utilised in home visits to advise residents not to smoke in the home and refer them to appropriate further support.</p>	
Action on Smoking and Health	Guideline	11	8	<p>Notably omitted from guidance for Architects and designers is any reference to smoke drift when considering building design. Smoke drift is where someone is exposed to tobacco smoke in their home from an external source. A population survey conducted by ASH found that 21% of people report SHS exposure in their home from someone smoking elsewhere (e.g. a neighbour).<sup>2</sup> Exposure to smoke drift is nearly twice as likely for people in social housing compared to people in owner occupied housing (35% vs 18%).<sup>2</sup> Building construction and design can have a significant impact on the prevalence of smoke drift and, consequently, exposure to SHS in the home and indoor air quality. A case study from ASH's recent report Smoking in the home: New solutions for a</p>	<p>Thank you for your comment. Outdoor air pollution is covered in the NICE guideline on outdoor air quality (Air pollution: outdoor air quality and health). However, the committee agreed that smoke is a major pollutant in the home and have added people exposed to smoke in their homes to the list of people who are vulnerable to ill-health as a result of exposure to poor indoor air quality.</p> <p>The committee also added physical infrastructure of the building (for example, building orientation and layout) to the list in Box 1 as a type of housing condition that may put people at risk of exposure to ingress of tobacco smoke from outside.</p>

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				<p>smokefree generation demonstrates this well: Case study: YP, London, Social tenant "The first place the smoke drifts in from is the drainage because the flats have shared drainage...so if anyone's smoking it just comes through the drainage, so even if you close all the windows...there's a lot [of smoke coming in] from there... Unlike with houses where they have space in between them, [people in] flats don't have a choice...my mum's on benefits and it's not like she can choose where she can stay...she's kind of stuck...Even if you close all the windows these buildings have brick ventilation [to prevent damp] – so [you have] the bricks with the holes and there's nothing you can do about that. You can't cover them up because that will increase damp, so you try to solve one issue, but it leads to other issues."2 ASH receives a large volume of calls from the general public regarding smoke drift – it can be extremely distressing, especially for those who report health conditions worsening as a result of exposure. Including reference to smoke drift in guidance for architects and designers to ensure smoke drift between properties and units within in a building is prevented would be an important recognition of this common issue</p>	

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				and would better guarantee good indoor air quality and reduce neighbourhood conflict <sup>2</sup> in new developments. Recommendations Architects and designers should aim to prevent the occurrence of smoke drift when designing and planning new housing developments	
Air Spectrum Environmental Limited	Guideline	5	15	We are concerned that specific pollutants are not listed where sensors measurements are mentioned. Sensor technology is broad, and certain pollutants are easier to measure than others, specific details regarding pollutants and their levels will be required to determine the "Best Technology" to be used when measurement is necessary.	Thank you for your comment. Based on stakeholders comments the committee have edited this sentence to replace sensors with monitoring.
Air Spectrum Environmental Limited	Guideline	19	3-6	We are concerned by the term "Low-Cost Sensors" this implies that these sensors are suitably accurate and repeatable, we have found that this is not the case in practice. The market is currently flooded with generic Indoor air quality sensors which have no certification or regular calibration. The data collected, at best will be indicative and provide little support to any indoor investigations.	Thank you for your comment. Based on stakeholders comments the committee have edited this sentence to replace sensors with monitoring.
Airtopia	Guideline	4	Box 1	Should specifically include babies and children as a specific vulnerable group category, not just those that may have increased exposure to poor air quality at home.	Thank you for your comment. The committee have considered this and concluded that they did not have the evidence to include all children in the list of people who may be particularly

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					vulnerable to ill health as a result of exposure to poor indoor air quality However, they did have evidence for pre-school children and have added this group as a separate bullet to this list.
Airtopia	Guideline	5 & 19	13-19	IAQ testing protocols should be standardised in terms of the primary pollutants to be covered and the methods used for their measurement.	Thank you for your comment. The committee agreed that each local authority would be best placed to decide how best to manage inspection protocols based on their local intelligence on sources of poor indoor air quality in homes. The committee have listed options including visual inspection, checklists and monitoring that can be used in inspection protocols.
Airtopia	Guideline	8 & 34		Landlords should be compelled to check the airflow rates of extractor fans as part of their routine maintenance to ensure they comply with building regulations.	Thank you for your comment. The committee have made suggested changes to the rationale and impact for section 1.9 for property managers and landlords to cover regular maintenance of ventilation systems, including the checking of air flow rates which is emphasised in the rationale and impact section.
Airtopia	Guideline	8 & 25	8:1.4.7, 1.4.8 25:3-8	Manufacturers of products that may have a direct impact on IAQ, (i.e. those containing VOCs, including building materials and consumer products such as household cleaners and air fresheners) should be encouraged to label their products as low, medium or high VOC emissions, so that consumers are in a better position to make an informed choice.	Thank for your comment. The committee agreed that this was important and have referred to the government plans for a voluntary labelling scheme in England as part of the Clean Air Strategy 2019 in the rationale and impact section for the recommendations for architects and designers.
Airtopia	Guideline	11		WHO guidelines on selected pollutants are somewhat limited as far as VOCs are concerned with only 5 compounds listed	Thank you for your comment. The WHO guidelines on selected pollutants (2010) and on dampness and mould (2009) and Public Health England's (2019) on selected VOCs are

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				(excluding PAHs) – consider expanding the scope of these.	referenced in recommendation 1.6.1 as examples that could be used to develop or update standards.
Airtopia	Guideline	12	1.7.5	Possible addition would be “intelligent ventilation systems” which take into account outdoor air pollution levels before allowing the introduction of outdoor air.	Thank you for your comment. The committee concluded that ‘intelligent ventilation systems’ are covered under mechanical ventilation systems with filtration that protect against outdoor pollutants.
Airtopia	Guideline	16	15	Damp & mould in the home, other recommendations for research, consider the use of “microbial” VOCs as an indicator of mould growth and therefore damp conditions.	Thank you for your comment. The committee have added more detail to the supporting information on this research recommendation in evidence review 4 to include detection of microbial VOC’s as an indicator of mould growth
Allergy UK	Guideline	General	General	Overall, there needs to be a stronger specific emphasis on the health impacts of mould and damp. Excessive exposure to mould is associated with increased likelihood of sensitisation, which may cause mould allergy to develop (Jacob et al. 2002). This risk is higher for those individuals living in rented or social housing, where control over their living environment is more limited because they are dependent upon landlords and housing associations to make renovations and house improvements. These actions may be delayed, all the while the occupant is being exposed to increased amounts of mould for a longer period of time. Current projections of climate change indicate risks of more frequent flooding, which may cause increased mould and damp. People with	Thank you for your comment. The committee concluded that the level of emphasis on the health impacts of mould and damp was appropriate, based on the strength of the available evidence. However, the committee have provided recommendations in section 1.4 on how to reduce damp and condensation and prevent mould and also stressed the health impacts of exposure to damp and mould in the rationale and impact section.  Thank you for the reference provided. Jacob et al 2002 was excluded as it is a case control study and we already had cohort studies on the same pollutant. Please see evidence review 1 for the review protocol and excluded studies table with reasons for exclusion.

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				<p>existing health conditions, such as asthma, chronic ill health conditions and those allergic to moulds are more vulnerable to the effects of flooding and damp. Jacob, B. et al. (2002). Indoor exposure to molds and allergic sensitization. Environmental Health Perspectives, 110(7), pp.647-653.</p>	
Allergy UK	Guideline	5	12	<p>We agree that joint working between stakeholders is essential in improving indoor air quality. In addition to those listed, we believe that the guidance should recommend joint working, involving relevant patient health charities and other organisations with an interest in air quality. This should also include healthcare professionals, care workers, psychiatric nurses and other care professionals who visit homes.</p>	<p>Thank you for your comment. We have added 'voluntary, community and social enterprise organisations and other organisations with an interest in indoor air quality' to the list.  The committee agreed and have added 'community health services' to this list as this covers the suggested professionals.</p>
Allergy UK	Guideline	5	19	<p>Health visitors and community psychiatric nurses need to be included in this list as they are uniquely placed to see the conditions in which people are living and understand the potential health impacts of poor living conditions, such as the presence of mould, and address these issues. Both these professionals visit vulnerable people, and they should be given tools and pathways to fast-track concerns to those most in a position to rectify problems, i.e. help with rehousing etc.</p>	<p>Thank you for your comment. The committee agreed and have added community health services as suggested to cover the suggested professionals.  The committee have recommended that local authorities develop a structured process so that these professionals can use existing referral pathways to help people request a housing assessment (recommendation 1.2.1).</p>

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Allergy UK	Guideline	7	General	<p>There is opportunity in "Advice and information for the general population" to mention that there are products available which have been independently and scientifically tested to be beneficial for improving indoor air quality. For example, Allergy UK has a globally recognised endorsement scheme to signpost people to products which have been independently and scientifically tested and proven to reduce or remove allergens from the indoor environment.</p> <p>Disclosure: Please note that this endorsement scheme generates income for Allergy UK.</p>	<p>Thank you for your comment. The committee considered the evidence for different products included in the evidence review but concluded that they could not recommend specific products as the context of each individual dwelling was key to what interventions would be effective. However, the committee referred to the use of allergen barriers as appropriate in recommendation 1.5.4 and cross referred to the NHS advice on allergen avoidance for more information.</p>
Allergy UK	Guideline	9	22	<p>We are pleased to see a dedicated section on indoor allergens. We recommend adding a section on mould allergen specifically as it can cause aggressive respiratory symptoms, as can animal allergy and house dustmite. However, strategies such as washing bedding at 60 degrees Celsius and anti-allergy bedding may reduce house dustmite load to be of benefit.</p> <p>In instances where the inhabitant is living in rented accommodation or social housing, they may rely on an external landlord or housing association to mitigate the effect of mould which can not only be hidden by furniture and</p>	<p>Thank you for your comment. The committee did agree that mould allergen is an important pollutant but did not agree with the need for a separate section as there was insufficient evidence to warrant this. However, we have cross referred to the NHS advice on allergen avoidance for more information and this includes advice on mould spores.</p> <p>The committee also provided recommendations in section 1.4 on how to reduce damp and condensation and prevent mould and stressed the health impacts of exposure to damp and mould in the rationale and impact section</p> <p>The committee agreed with your concerns and have drafted recommendations to residents and landlords of rental properties on actions to take in order to prevent or reduce damp in the home. The committee also drafted research</p>

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				fittings, but can thrive in damp walls etc. This may be subject to delays, causing increased exposure to the allergen.	recommendations on the identification of, management of and advice on damp and mould in the home.
Allergy UK	Guideline	22		We agree that raising awareness is vital in ensuring that people are aware of the risks of indoor air pollution. In addition to those already listed, care workers and health visitors should also be educated on this issue.	Thank you for your comment. The committee agreed and have added 'community health services' to this list as this covers the suggested professionals
Allergy UK	Guideline	22		Patient charities should be included as an information source with an important role of raising awareness among the general public, decision makers, healthcare professionals and those in the building industry. For example, during the year of 2019 Allergy UK has a focussed campaign on air quality. Allergy Awareness Week in October 2019 focuses, in particular on Indoor Air Quality. The charity's dedicated resources can be shared among members of the public, healthcare professionals, people in the building/planning sector, local authorities and other stakeholders to raise awareness.	Thank you for your comment. The committee have not specified the content of training for staff but have cross-referred to the NHS advice on allergens as a source of information for health care professionals. This does not preclude other sources of information being used.
Allergy UK	Appendix visual summary	N/A	N/A	We would suggest that mould should be included specifically as an allergen in the visual summary document, as it is a key trigger for allergic conditions, including asthma.	Thank you for your comment. The committee did not agree that we need to add mould allergen as this is a non-exhaustive list of allergens and mould is already covered in the visual summary.

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Asthma UK	Recommendations	4	3	<p>Box 1 lists people who may be particularly vulnerable and factors that increase the risk of ill health due to exposure to poor indoor air quality. We would suggest that asthma and cardiovascular conditions are listed separately as the effects of poor indoor quality manifest themselves differently in response to different factors in both these conditions; they should therefore, ideally, be listed separately, mentioning which of these conditions affect children:</p> <p>Adults and children with a pre-existing health condition such as:</p> <p>Asthma including allergic asthma (children affected as well as adults)</p> <p>Allergies (children affected as well as adults)</p> <p>COPD</p> <p>cardiovascular disease</p>	<p>Thank you for your comment. The committee have added more examples to the list of those vulnerable to ill-health as a result of exposure to poor indoor air quality and have also included COPD alongside asthma.</p>
Asthma UK	Guideline	5	1	<p>Says: Embed a plan for improving indoor air quality in an existing strategy or plan to improve people's health. This could be a general air quality strategy if one exists. Otherwise, for example, include it in a strategy on housing, health and wellbeing or inequalities.</p> <p>To add: As shown in Asthma UK's report, 'On the</p>	<p>Thank you for your comment. The committee agreed and have inserted text stating that local authorities that have been declared an 'air quality management area' must have an air quality action plan which should include indoor air quality in the home. Please see the rationale and impact section on 'prioritising indoor air quality in local strategy or plans'.</p> <p>Asthma UK On the edge: How inequality affects people with asthma 2018. This study does not meet the inclusion criteria as</p>

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				<p>edge: How inequality affects people with asthma', people from socially deprived groups are disproportionately exposed to the causes of asthma and triggers of asthma attacks, such as poor housing and air quality [1]. Preventing poor housing conditions which may cause or trigger asthma, is a policy challenge that is related to a root cause of housing inequality: low incomes/poverty. For example, mould can be a consequence of inadequately heated properties, which, in turn, may be a consequence of fuel poverty.</p>	<p>specified in the review protocols (Appendix A of the evidence reviews) as it is an overview not a research paper</p>
Asthma UK	Guideline	7	12	<p>Says: Use existing professional development opportunities to ensure local authority staff who visit people in their homes (such as housing, healthcare and social care professionals): can give general advice on how to avoid activities that increase the level of indoor air pollutants (see sections 1.4 and 1.5) To add: Where possible, local authority staff should have knowledge of different sources of indoor air pollution and how they affect different health conditions (in line with the details included in the section below for healthcare professionals).</p>	<p>Thank you for your comment. The committee agreed and have added an additional bullet point to the recommendation that reflects the suggested edit.</p>

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Asthma UK	Guideline	8	5	using candles, in particular oil-based, paraffin-wax candles and fragranced candles which can be harmful to health (natural wax candles using soy are the cleanest, producing less soot than paraffin candles)[2]	Thank you for your comment. This recommendation is about increasing ventilation when using any type of candle. There was a lack of evidence on the different types of candles.
Asthma UK	Guideline	9	9	The effects described below relate only to people with asthma. For people with cardiovascular conditions and other respiratory conditions such as COPD, the effects may well be different or not applicable. Indoor (and outdoor) air pollution is more of a risk for people with asthma because it can quickly irritate the airways, making them inflamed and swollen, bringing on their asthma symptoms (wheezing, chest tightness, breathlessness, coughing) or causing them to have a potentially life-threatening asthma attack. Air pollution can also make people with asthma sensitised and more likely to react to their usual asthma triggers. During an asthma attack, the lining of the airways swells, causing them to narrow, reducing the flow of air in and out of the lungs. In England and Wales, more than three people die every day as a result of having an asthma attack[3]; it is, therefore, very important that action is taken to reduce the prevalence in the indoor environment of the chemical and biological pollutants listed	Thank you for your comment and the information provided. This recommendation was based on research evidence which showed that people with pre-existing conditions, for example respiratory or cardiovascular conditions, are also affected by indoor air pollutants. The committee have cross-referenced to NICE's guidance on asthma for advice that healthcare professionals can give to patients.

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				<p>below, in order to improve air quality and asthma outcomes.</p> <p>The main substances that Asthma UK has identified as capable of triggering symptoms in people with asthma, based on peer-reviewed medical/scientific evidence, include:</p> <p>Tobacco/smoking (we think it is useful to also refer to this in the guidance on indoor air quality)</p> <p>Smoking can cause people to develop asthma and it increases the risk of them having more, potentially life-threatening, asthma attacks. It can also reduce lung function and lessens the effectiveness of some asthma medication.</p> <p>Indoor air quality is badly affected by passive second-hand smoke, which can trigger symptoms in people with asthma. Second hand cigarette smoke is the most harmful indoor asthma trigger and smoke from cigars, pipes, hand-rolled cigarettes and shisha can also trigger asthma symptoms. Fifty-three per cent of people with asthma have told Asthma UK that tobacco smoke triggers their asthma[4]. Babies and small children are most at risk because they take more smoke into their lungs than adults.</p> <p>E-cigarettes</p> <p>Little research has been done so far looking at</p>	<p>While the scope states that evidence on tobacco smoke as an indoor air pollutant will not be reviewed as it is accepted that no level of environmental tobacco smoke (passive smoking) is considered safe (Air quality guidelines for Europe World Health Organization), the committee recognised that tobacco smoke is a major pollutant in the home and added people exposed to smoke in their homes to the list of people who are vulnerable to ill-health as a result of exposure to poor indoor air quality.</p> <p>E-cigarettes are outside the scope of this guideline</p>

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				<p>nitrogen dioxide (NO<sub>2</sub>). Being exposed to these pollutants can make asthma symptoms worse. It can also increase sensitivity to other allergens and to colds [8].                      Burning coal indoors gives off sulphur dioxide (SO<sub>2</sub>) in the home which can trigger asthma symptoms or bronchitis [9].</p> <p>Indoor heating                      Central heating is a safer, cleaner option for people with asthma than open fires, wood burning stoves or gas or paraffin heaters without flues, all of which give out particulates which can trigger asthma. It also helps to avoid sudden temperature changes when people go from a warm room to a cold one. However, pollutants are given off if people have an old boiler or one which has not been serviced regularly. Research suggests that asthma symptoms are easier to control for people who have central heating at home as it gives out a dry heat and asthma is worse in homes that are damp [10].</p> <p>Perfumes, hairsprays and deodorants – personal care products                      Around 48% of people with asthma have told Asthma UK that their asthma is triggered by perfumes and aerosols, such as body sprays,</p>	<p>We have included evidence on personal products in evidence reviews 1 and 2.</p> <p>We have included evidence on household cleaning products in evidence reviews 1 and 2.</p>

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				<p>perfumes and hairstyling products [11]. People who find these products are triggers should choose their personal care products carefully, going for non-aerosol, low fragrance products and those containing low levels of volatile organic compounds (VoCs). Household cleaning products A lot of everyday cleaning products such as furniture polish, air fresheners, carpet cleaners and oven cleaners, also contain VOCs that can give off gases which trigger asthma. Often these are products with strong smells and perfumes. Studies have shown that professional cleaners and others who use a lot of cleaning products are more likely to develop asthma[12]. Sprays can be more likely to trigger asthma than solid or liquid cleaning products as the chemicals are more likely to be inhaled. Some people have also told Asthma UK that even the smell of cleaning products and air fresheners can trigger their asthma, even without them being directly exposed to the spray. Paints and other DIY products VOCs from cavity wall insulation and other DIY products such as paints, glues and varnishes can inflame the airways and trigger asthma</p>	<p>We have included evidence on paints and other DIY products in evidence reviews 1 and 2.</p> <p>We have included evidence on flooring and furniture in evidence reviews 1 and 2.</p>

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				<p>symptoms [13].                      New carpets and furniture                      VOCs are also emitted from some carpets, furniture, shelving (including plywood and particle board) and laminate flooring. The most common VoC is formaldehyde, a colourless gas with an acrid (sharp and bitter) smell which can irritate the airways, making them more sensitive to other triggers. Some people report that the smell from new furniture or flooring triggers their asthma symptoms because the VOCs in the products become gaseous at room temperature, giving off unpleasant fumes [14].                      The BMJ Journal of Epidemiology and Community Health has reported that bare floors trap fewer contaminants than carpeted floors and carpeted floors have been implicated in worsening asthma symptoms; however, children living in homes with phthalate-containing vinyl floors, an alternative to carpet flooring, have worse asthma symptoms than children in homes without vinyl floors[15].                      Dust from building work can also be a problem for people with asthma.                      Dust and dust mites                      In Asthma UK's Annual Asthma Survey 2017,</p>	<p>We have included evidence on dust and house dust mites in evidence reviews 1 and 2.</p> <p>We have included evidence on pets and pests in evidence reviews 1 and 2.</p>

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				<p>64% of respondents told us that dust triggered their asthma symptoms (sneezing, itchy, runny or blocked nose, itchy eyes, wheezing, tight chest, shortness of breath cough) [16]; it is actually the microscopic dust mites that build up around the home in carpets, soft toys, bedding, cushions and furniture, that are the problem. The number of dust mites increases during the winter when the heating is turned up indoors. Little can be done to avoid the effects of dust mites in people with asthma who are sensitive to them, apart from people taking their preventer medication regularly[17].</p> <p>Pets and pests</p> <p>If pets are an asthma trigger, this is usually caused by an allergic reaction to proteins found in the animal's flakes of skin (dander), saliva, urine or even fine particles from bird feathers known as 'feather dust'. For people sensitive to these proteins, touching or inhaling them causes the person's immune system to overreact and release histamine, leading to an allergic reaction [18]. Again, people with such asthma need to use their preventer medication regularly.</p> <p>Cockroaches are thankfully less common indoors in the UK, but studies in the US suggest that in poor housing in urban areas,</p>	<p>We have included evidence on mould and fungi in evidence reviews 1 and 2.</p>

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				<p>the waste from cockroaches is a risk factor for people with asthma who are allergic to them [19].</p> <p>Mould and fungi</p> <p>For people with asthma who are sensitive to mould spores, mould and fungi can act as a trigger and cause asthma symptoms to get worse. When someone with an allergy to mould breathes in mould or fungi spores, their immune system over-reacts with coughing, sneezing or watery eyes.</p> <p>Around 42% of people with asthma have told Asthma UK that mould and fungi can trigger their asthma [20]. People with asthma who are more likely to have their asthma triggered by fungal and mould spores include:</p> <ul style="list-style-type: none"> <li>babies and children</li> <li>elderly people</li> <li>people with existing skin problems, such as eczema</li> <li>people with a weakened immune system</li> <li>people with severe asthma.</li> </ul> <p>Babies and children are particularly vulnerable to having their asthma triggered by fungal and mould spores; evidence also suggests that exposure to mould as a child is associated with an increased risk of developing childhood asthma[21].</p>	<p>We looked for evidence on candles in evidence reviews 1 and 2 but no studies met our inclusion criteria.</p> <p>Pollen / outdoor air pollution were outside the scope of this guideline.</p>

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				<p>Mould grows in damp or musty conditions, so it is common on wallpaper, flooring, behind wall tiles and on window frames. Spore numbers increase when there is a sudden rise in temperature in a moist environment, such as when central heating is turned on in a damp house, or when wet clothes are dried next to a radiator (although people with asthma do need good heating in their homes).</p> <p>Candles/scented candles</p> <p>Burning candles can be a potential asthma trigger [22]. Burning petroleum-based candles (paraffin-wax) releases pollutants such as benzene, styrene, toluene, acetone and particulate matter into the air. Candle smoke contains many of the same compounds given off when burning diesel fuel [23] which are harmful to health.</p> <p>Scented candles, combining artificial fragrances with essential oils, also give off odours that often aggravate asthma symptoms [24].</p> <p>Scented oil burners and incense may also pose problems for people with asthma.</p> <p>NOTE: Candles made with soy wax are a healthier alternative to oil-based candles.</p> <p>Pollen/Outdoor air pollution</p> <p>When there is a high pollen count outside,</p>	<p>There was limited evidence on the development of asthma in children as a result of poor indoor air quality, but the committee agreed on a research recommendation focussing on people without pre-existing conditions to develop the evidence base in this area.</p>

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				<p>closing windows is a sensible option to avoid exposure to those whose asthma symptoms are triggered by it. People should also be aware that pollen can stick to clothes, hair etc if they have been outside and return to the home environment.</p> <p>Keeping windows closed is advisable when there are high levels of air pollution outside.</p> <p>Specific consideration for children and young people</p> <p>Poor indoor air quality can not only trigger asthma symptoms, but it can also be a driver of the development of asthma in children. There is longstanding evidence that links childhood exposure to inhaled chemicals and mould with an increased risk of developing asthma[25].</p> <p>Asthma UK's Annual Asthma Survey found that poor indoor air quality can trigger asthma in children and young people: in the under 18 age group, 51% of respondents told us that dust triggered their asthma; 46% of respondents told us that air pollution (indoor and outdoor) triggered their symptoms; 33% told us that their asthma was triggered by perfumes and aerosols; 30% by moulds and fungi and 22% by paint fumes [26].</p> <p>As shown in Asthma UK's recent report on</p>	

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				<p>health inequalities in asthma, damp and mould disproportionately affects infants, children and young people from more socio-economically deprived groups, who are more likely to grow up in poor housing conditions. It has been established that children growing up in homes with mould are between one and a half and three times more prone to develop asthma and other respiratory conditions, including symptoms such as coughing and wheezing, than children living in dry homes [27].</p> <p>General Advice In general, it might be useful to provide more structured and detailed information for health professionals to help them and the people with asthma they care for to better understand their triggers in the indoor environment as the triggers can be varied and complex (some of which can be avoided relatively easily). It might be useful to link to Asthma UK's Indoor Asthma Triggers page on Asthma UK's website.</p>	
Asthma UK	Guideline	9	16	<p>Avoidance and using preventer inhaler as prescribed Tell a person with asthma to avoid the above triggers wherever possible, but to take their preventer medication as prescribed to reduce the risk of unavoidable triggers causing</p>	<p>Thank you for your comment. Advice on the use of asthma preventer inhalers is outside the scope of this guideline. However, we have added a cross-reference to the NICE guideline on Asthma: diagnosis, monitoring and chronic asthma management (NG80) for advice that healthcare</p>

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				<p>worsening symptoms or an asthma attack. An asthma preventer inhaler, used correctly, prevents inflammation and swelling in the airways, meaning people with asthma are less likely to react to their normal asthma triggers.</p> <p>Opening windows and good ventilation is also important.</p>	<p>professionals can give to patients.</p> <p>The committee have emphasised the need for adequate ventilation throughout the guideline, for example in recommendation 1.9.5, especially the use of purge ventilation (for example, opening windows) when needed.</p>
Asthma UK	Guideline	9	22	<p>People with a dust mite allergy are allergic to a substance in the dust mite droppings. In Asthma UK's Annual Asthma Survey, 64% told us that dust triggered their asthma symptoms [28]. The dust mites live in the dust that builds up around the home, in carpets, soft toys, bedding, cushions and furniture.</p> <p>For people with asthma triggered by dust mites, the best way to reduce their symptoms is to look after their asthma and make sure it is well managed, as this reduces the likelihood of them reacting to the dust mite droppings when they come into contact with them, as they are almost impossible to avoid. Having a Personal Asthma Action Plan, also helps people to manage their asthma well. There is currently little evidence to say cleaning more than normal can make a significant difference to the number of dust mites in the home for people with asthma[29].</p>	<p>Thank you for your comment. The committee referred to the use of allergen barriers as appropriate in recommendation 1.5.4 and cross referred to the NHS advice on allergen avoidance for more information.</p> <p>Thank you for the sources provided, however after checking, these studies do not meet the inclusion criteria of the evidence reviews. Please see evidence reviews 1, 2 and 3.1 for the review protocols and excluded studies lists with reasons for exclusion.</p>

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				A review of all the trials done to see if mite-proof covers for bedding can make a difference showed no evidence of long-term beneficial effects for people with asthma[30].	
Asthma UK	Guideline	10	11	All the advice in Comment 1 should be provided for pregnant mothers with asthma. Babies in the womb exposed to outdoor air pollution are at a higher risk of developing asthma in childhood; for example, a 2018 Canadian study found that second-trimester exposure to NO2 and PM2.5 was associated with an increased risk of children developing asthma up to 6 years of age [31]. This is likely to apply to babies in the womb exposed to high concentrations of the same pollutants indoors, in the home environment, in particular NO2 and particulate matter from heating and cooking appliances (especially gas cookers); particulate matter from open fires; wood burners (especially without a flue) and candles. See all the relevant sources/triggers listed above under Comment 1.	Thank you for your comment. The committee agreed that pregnant women were a vulnerable group and the advice for people with asthma applies to pregnant women with asthma  The committee have edited the list of vulnerable groups to include "pregnant women and their unborn babies"
Asthma UK	Guideline	10	20	Women who smoke while they are pregnant are more likely to have babies with breathing problems, including asthma [32].	Thank you for your comment. While the scope states that evidence on tobacco smoke as an indoor air pollutant will not be reviewed, as it is accepted that no level of environmental tobacco smoke (passive smoking) is considered safe (Air quality guidelines for Europe World Health Organization), the committee recognised that tobacco smoke is a major pollutant

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**Indoor air quality at home**

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					<p>in the home and have added people exposed to smoke in their homes to the list of those vulnerable to ill-health as a result of exposure to poor indoor air quality.</p> <p>The committee also added “pregnant women and their unborn babies” to the edited list of vulnerable groups in Box 1, cross-referred to the NICE guideline on stopping smoking in pregnancy and after childbirth where appropriate and have adapted text on smoking at home from recommendation 7 in that guideline and included as recommendation 1.4.11 in this guideline.</p>
Asthma UK	Guideline	15	10	<p>What are the health risks associated with exposure to sources of particulate matter in the home?</p> <p>It would be useful to include further research into the health effects of other domestic pollutants, such as nitrogen dioxide (NO<sub>2</sub>), volatile organic compounds (VoCs) and compounds emitted from the burning of paraffin and/or scented candles (synthetic fragrances), looking at the effects on the airways and lungs. Real-time monitoring of the impact of different indoor air pollutants on health (respiratory and cardiac) using indoor air quality sensors could also be useful. There ideally needs to be a full evidence-based evaluation of the impact of common household chemicals on asthma and other</p>	<p>Thank you for your comment. The committee recognised the importance of developing the evidence base on the health effects of different pollutants, alone or in combination, and have edited this research recommendation to cover all ‘air pollutants in the home’.</p>

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				respiratory conditions, leading to much clearer product labelling.	
BEAMA	Guideline	6	15-18	BEAMA believe that if local authorities are going to be encouraged to raise awareness of the risks of poor indoor air quality, the opportunity should not be missed to also raise awareness of what can be done to prevent or mitigate the issue – as this is what will help improve health outcomes. BEAMA suggest including an additional point to the bullet point list such as “behavioural changes and buildings interventions that can be made to improve indoor air quality”.	Thank you for your comment. The committee agreed and have added an additional point to recommendation 1.3.1 on preventing or reducing poor indoor air quality.
BEAMA	Guideline	7	21	BEAMA wish to highlight that opening windows should not be advised as a strategy for improving indoor air quality. Opening windows is not considered an effective ventilation strategy under current building regulations and so should not be recommended in NICE guidelines either. Opening windows may cost the occupant significantly in lost energy (in contradiction with the Government's energy policy) and increase the risks of fuel poverty and therefore the associated health risks of cold homes. More importantly an occupant may open a window (which could be adjacent to an area of poor outdoor air pollution) and significantly worsen their indoor air quality	Thank you for your comment. The committee recommended opening windows when and where safe as a temporary solution to rapidly dilute the build-up of indoor air pollutants.  The committee also provided recommendation 1.1.3 for local authorities on the need for a balanced approach to ventilation, insulation and heating for good indoor air quality especially for people who live in poverty and cross referred to NICE's guideline (on winter deaths and illness and cold homes) on improving the health and wellbeing of people vulnerable to cold and reducing unnecessary fuel consumption.

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				without knowing. Opening windows may also increase noise pollution (which has associated health costs) as well as increasing security risks. Effective ventilation also needs to be continuous and opening windows is not a viable solution as a continuous ventilation strategy.	
BEAMA	Guideline	8	2	BEAMA wish to highlight that opening windows should not be advised as a strategy for improving indoor air quality. Opening windows is not considered an effective ventilation strategy under current building regulations and so should not be recommended in NICE guidelines either. Opening windows may cost the occupant significantly in lost energy (in contradiction with the Government's energy policy) and increase the risks of fuel poverty and therefore the associated health risks of cold homes. More importantly an occupant may open a window (which could be adjacent to an area of poor outdoor air pollution) and significantly worsen their indoor air quality without knowing. Opening windows may also increase noise pollution (which has associated health costs) as well as increasing security risks. Effective ventilation also needs to be continuous and opening windows is not a	Thank you for your comment. The committee recommended opening windows when and where safe as a temporary solution to rapidly dilute the build-up of indoor air pollutants.  The committee also provided recommendation 1.1.3 for local authorities on the need for a balanced approach to ventilation, insulation and heating for good indoor air quality especially for people who live in in poverty and cross referred to NICE's guideline (on winter deaths and illness and cold homes) on improving the health and wellbeing of people vulnerable to the cold and reducing unnecessary fuel consumption.

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				viable solution as a continuous ventilation strategy.	
BEAMA	Guideline	9	20-21	BEAMA recommend pointing HCPs (healthcare professionals) directly to the section for recommendations about ventilation and controlling sources of pollution, for ease of use of the guideline.	Thank you for your comment. The committee agreed and have now cross referred healthcare professionals to the section with recommendations on ventilation and controlling sources of indoor pollutants.
BEAMA	Guideline	9-10	(23-24 and 1-3 respectively )	BEAMA recommend adding in a line about effective and continuous ventilation to reduce moisture levels which is proven to reduce levels of house dust mite by reducing reproduction rates.	Thank you for your comment. The committee agreed that effective and continuous ventilation is important in reducing house dust mite reproduction rates by reducing moisture levels. This is covered by recommendation 1.4.1 on advice to reduce damp and condensation. The committee have also hyperlinked to the NHS advice on allergens which also provides advice on ventilation.
BEAMA	Guideline	11	23	BEAMA wish to highlight that opening windows should not be advised as a strategy for improving indoor air quality. Opening windows is not considered an effective ventilation strategy under current building regulations and so should not be recommended in NICE guidelines either. Opening windows may cost the occupant significantly in lost energy (in contradiction with the Government's energy policy) and increase the risks of fuel poverty and therefore the associated health risks of cold homes. More importantly an occupant may open a window (which could be adjacent to an area of poor outdoor air pollution) and	Thank you for your comment. The committee recommended opening windows when and where safe as a temporary solution to rapidly dilute the build-up of indoor air pollutants.  The committee also provided recommendation 1.1.3 on the need for a balanced approach to ventilation, insulation and heating for good indoor air quality and have cross referred to NICE's guideline (on winter deaths and illness and cold homes) on improving the health and wellbeing of people vulnerable to the cold and reducing unnecessary fuel consumption.

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				significantly worsen their indoor air quality without knowing. Opening windows may also increase noise pollution (which has associated health costs) as well as increasing security risks. Effective ventilation also needs to be continuous and opening windows is not a viable solution as a continuous ventilation strategy.	
BEAMA	Guideline	12	18-20	<p>BEAMA recommend adding onto the end of the sentence 'once installed in situ' so that the system actual performs as it is supposed to in practical.</p> <p>BEAMA also recommend adding in a line that systems are installed by an installer who is a member of a MHCLG (Ministry of Housing, Communities and Local Government) recognised competent persons scheme, so as to avoid issues of poor quality installation which are proven to reduce the effectiveness of HVAC (Heating, Ventilation and Air Conditioning) systems.</p>	Thank you for your comment. The committee noted that this addition was not needed as the recommendation already states 'Ensure all heating and ventilation is installed and commissioned in accordance with the manufacturer's instructions and meets building regulation requirements. The committee have also added that systems should be installed by a recognised competent professional to avoid poor quality installation in the rationale and impact section.
BEAMA	Guideline	13	19-23	<p>BEAMA recommend adding in a separate point reading 'mechanical ventilation systems, in order to achieve building regulation compliant air exchange rates'.</p> <p>BEAMA recommend removing the point</p>	Thank you for your comment. The committee agree and have added mechanical ventilation systems as suggested. The committee recommended opening windows when and where safe as a temporary solution to rapidly dilute the build-up of indoor air pollutants.

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				<p>regarding opening windows as opening windows should not be advised as a strategy for improving indoor air quality. Opening windows is not considered an effective ventilation strategy under current building regulations and so should not be recommended in NICE guidelines either. Opening windows may cost the occupant significantly in lost energy (in contradiction with the Government's energy policy) and increase the risks of fuel poverty and therefore the associated health risks of cold homes. More importantly an occupant may open a window (which could be adjacent to an area of poor outdoor air pollution) and significantly worsen their indoor air quality without knowing. Opening windows may also increase noise pollution (which has associated health costs) as well as increasing security risks. Effective ventilation also needs to be continuous and opening windows is not a viable solution as a continuous ventilation strategy.</p>	<p>The committee also provided recommendation 1.1.3 for local authorities on the need for a balanced approach to ventilation, insulation and heating for good indoor air quality and cross referred to NICE's guideline (on winter deaths and illness and cold homes) on improving the health and wellbeing of people vulnerable to the cold and reducing unnecessary fuel consumption.</p>
British Coatings Federation Ltd				<p>We are not opposed to creating a standardised labelling scheme to communicate VOC emissions to users, such as those schemes that are already mandatory in France and Germany. However, we do believe that any approach should be harmonised across</p>	<p>Thank you for your comment. The committee were aware of national labelling schemes in Europe but also noted that the government has set out plans for a voluntary labelling scheme as part of the Clean Air Strategy 2019.</p>

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				Europe, we do not support having separate requirements in each member state.	
British Coatings Federation Ltd	Guideline	8	1	We agree with the requirement for suitable ventilation to be considered to help with indoor air emissions.	Thank you for your comment.
British Coatings Federation Ltd	Guideline	8	21	We agree with the statement of advising people to follow the manufacturers product instructions.	Thank you for your comment.
British Coatings Federation Ltd	Guideline	11	10	It is important to point out that there is a distinct difference between the VOC content of a product and its VOC emissions, as defined by the following standards respectively BS EN 11890-2:2013 and BS EN 16402:2019, the latter standard is fully aligned with the construction sector's horizontal standard BS EN 16516:2017. These standards should be taken into consideration when producing any guidance for users in relation to the choice of products. There is already a mandatory labelling scheme in place for paints under 'The Volatile Organic Compounds in Paints, Varnishes and Vehicle Refinishing Products Regulations 2012' as well as a voluntary scheme to use the 'VOC Globe', but no such requirement for VOC emissions from products within the UK.	Thank you for your comment. The committee emphasised that emission from VOC containing products was of concern and have retained the wording as is. The second part of this recommendation refers to using existing labelling schemes which could include national emission labelling schemes in other European countries.  These technical standards (BS N11890-2: 2013, BS EN 16402:2019 and BS EN 16516:2017) were not included in the evidence reviews as the committee prioritised studies that reported health related outcomes over exposure levels. The scope and review protocols (Appendix A of the evidence reviews) set out what will and won't be covered in the guidance  We will pass your comment to the NICE surveillance team which monitors guidelines to ensure that they are up to date so this prioritisation can be revisited when the guideline is updated.

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				Under BS EN 16402:2019 emissions are tested over a 28-day period taking into account differences in the rate of emission for VOCs and semi-volatile organic compounds (SVOC), typical room size, typical application amount, as well as climate and ventilation effects. Informing users to look for low VOC products without a detailed explanatory note of the difference between content and emissions may lead to consumers purchasing paints with a lower VOC content detailed on the label, which would not give a true indication of the emissions of the product to indoor air. For example, water-borne products may contain very low levels of VOCs (if any) compared to solvent-borne. However, the latter will evaporate quickly and be gone in a few days and not affect longer-term indoor air quality whereas those in some water-borne products may be SVOCs and may evaporate more slowly.	
British Coatings Federation Ltd	Evidence Review 2	16	33	The data for the study evaluating the relationship between the levels of formaldehyde when using paint or fibre-cloth wallcoverings has been taken from 2003-2006. This is no longer representative of the formaldehyde levels within these products today, due to the reclassification of	Thank you for your comment. The committee had agreed to consider the evidence base in its entirety rather than limit the searches by date. The committee noted in the committee discussion section of evidence review 1 that not all associations reported in the literature led to recommendations. The recommendations on the use of paints relate to following

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				formaldehyde as a 1B carcinogen, meaning that it is not permitted for use as a biocide for products to be used by the general public as stipulated by the Biocidal Products Regulation. In the past the primary use for formaldehyde and formaldehyde releasers in paint was as a biocide.	the manufacturer's instructions and emphasised the need for adequate ventilation which is still valid for new paints. We have highlighted in the rationale and impact section that while newer paints have lower VOC content this information can be found as there is a UK labelling schemes for paints with this information.
British Coatings Federation Ltd	Evidence Review 2	38	27	Data collected in 2001 and 2003 is not representative of the VOC levels in paint today. 'Directive 2004/42/CE on the limitation of emissions of volatile organic compounds due to the use of organic solvents in certain paints and varnishes and vehicle refinishing products and amending Directive 1999/13/EC' set out targets to reduce the maximum VOC content allowed in paints. The first phase limit of VOCs was reached in 2007 and the second phase in 2010 which has led to a significant reduction of VOCs in paints.	<p>Thank you for your comment. The committee have agreed to consider the evidence base in its entirety rather than limit the searches by date. The committee note that not all associations reported in the literature led to recommendations. The recommendations on the use of paints related to following the manufacturer's instructions and emphasised the need for adequate ventilation.</p> <p>We have highlighted in the rationale and impact section that while newer paints have lower VOC content this information can be found as there is a UK labelling schemes for paints with this information.</p> <p>These technical standards (Directive 2004/42/CE and Directive 1999/13/EC) were not included in the evidence reviews as the committee prioritised studies that reported health related outcomes over exposure levels. The scope and review protocols (Appendix A of the evidence reviews) set out what will and won't be covered in the guidance, within the time and resources available.</p>

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					We will pass your comment to the NICE surveillance team which monitors guidelines to ensure that they are up to date so this prioritisation can be revisited when the guideline is updated.
British Coatings Federation Ltd				Final comment: We are generally in agreement with the document and the interventions that have been proposed but feel it is important to consider the above points when producing guidance documents and for future decision-making regarding indoor air.	Thank you for your comment.
British Lung Foundation	Guideline	4	Box	<p>This box should list more lung conditions than asthma, perhaps to include COPD, and bronchiectasis. We welcome that this section recognises that disabled people may spend more time indoors but feel that more could be done to outline why this is the case particularly for people with lung conditions and people who have limited mobility but may not be medically recognised as 'disabled'.</p> <p>This box should recognise the outsized impact on children, who are particularly vulnerable to poor indoor air quality as their lungs are still developing. We feel it is important to note that their airways are smaller, so inflammation caused by pollution can cause them to narrow more easily than in older people.</p>	<p>Thank you for comment. The committee agreed and have added COPD as suggested as an example of a pre-existing condition in the list of people who may be particularly vulnerable to ill health as a result of exposure to poor indoor air quality. The committee intended that this list should highlight examples of people who may be vulnerable rather than provide a detailed account of all vulnerable groups and their circumstances.</p> <p>The committee have considered this and concluded that they did not have the evidence to include all children to the list of people who may be particularly vulnerable to ill health as a result of exposure to poor indoor air quality. However, they did have evidence for pre-school children and have added this group as a separate bullet to this list.</p>

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British Lung Foundation	Guideline	5	7	We welcome the fact that this recognises the impact on people vulnerable to ill health. However, as per the previous comment it may be good to recognise the disproportionate impact to children.	Thank you for your comment. The committee have considered this and concluded that they did not have the evidence to include all children to the list of people may be particularly vulnerable to ill health as a result of exposure to poor indoor air quality. However, they did have evidence for pre-school children and have added this group as a separate bullet to this list.
British Lung Foundation	Guideline	5	24	We would welcome the availability of grants to combat poor indoor air quality. These should be targeted at those who need them most.	Thank you for your comment. However, the committee recommended that local authorities work with external organisation to identify grants (recommendation 1.1.7) to help with home improvements to combat poor indoor air quality. These grants are generally targeted at the more vulnerable.
British Lung Foundation	Guideline	7	15	This recommendation on advice and information for the general population is targeted at local authorities. We would recommend that central government is also recommended to fund and lead a public health campaign on all types of air pollution, with clear health advice to empower people to protect their own health.	Thank you for your comment. NICE produces evidence-based guidance and advice for health, public health and social care practitioners. ( <a href="https://www.nice.org.uk/about/what-we-do">https://www.nice.org.uk/about/what-we-do</a> ), so recommendations for central government are outside of the remit of NICE
British Lung Foundation	Guideline	10	11	We feel that this could be expanded to include children, not just babies under 12 months old.	Thank you for your comment. The committee considered this and concluded that they did not have the evidence to include all children in the list of people who may be particularly vulnerable to ill health as a result of exposure to poor indoor air quality. However, they did have evidence for pre-school children and have added this group as a separate bullet to this list.

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British Lung Foundation		General	General	<p>We are concerned that this paper does not assess the role of outdoor/ambient air pollution on the indoor environment. Whilst we understand that the scope of this paper is limited to indoor air quality in residential buildings, outdoor pollution does have an important contribution which should be addressed and recognised here. The guideline should signpost to outdoor air pollution guidelines.</p> <p>We recommend informing people to remember that outdoor air pollution can also travel inside, and that they check their local outdoor air pollution levels regularly and consider avoiding opening windows at times when the Daily Air Quality Index is high or very high. (<a href="https://www.blf.org.uk/support-for-you/indoor-air-pollution/improving-air-quality">https://www.blf.org.uk/support-for-you/indoor-air-pollution/improving-air-quality</a>)</p> <p>In line with the lack of discussion around outdoor air pollution, we are concerned that asking people to open windows in areas with high levels of outdoor air pollution may have the unwanted effect of decreasing indoor air pollution. This paper should address sources of outdoor air pollution, including from transport and residential burning. We would recommend sign posting to external organisations' health advice, for example the</p>	<p>Thank you for your comment. Outdoor air pollution is covered in the NICE guideline on outdoor air quality (Air pollution: outdoor air quality and health) and we cross referred to this guideline in the 'context' section. The committee recommended designing ventilation systems to reduce or avoid exposure to outdoor air pollution (recommendation 1.7.5).</p> <p>The committee recommended opening windows when and where safe as a temporary solution to rapidly dilute the build-up of indoor air pollutants. And have elaborated on sources of outdoor air pollution to include busy roads, open fires, bonfire and firework events, agricultural sources, industrial sources or railway lines in the rationale and impact section.</p>

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				British Lung Foundation's pages on this topic: <a href="https://www.blf.org.uk/support-for-you/air-pollution/tips">https://www.blf.org.uk/support-for-you/air-pollution/tips</a> .	
British Lung Foundation		General	General	We very much support all measures to keep homes smoke free, and welcome references to the comprehensive guidelines on smoking.	Thank you for your comment.
British Thoracic Society	Guideline	General	General	It would be very helpful for respiratory healthcare professionals if NICE produced simple guidance of what to advise patients to do if they suspect there is an illness such as asthma or HP that is being caused by a structural problem at home that has resulted in damp/mould etc.	Thank you for your comment. The committee agreed that healthcare professionals can help patients request a housing assessment if they suspect repeated or worsening respiratory or cardiovascular conditions from damp and mould or other pollutants in recommendation 1.5.2. NICE has produced a visual summary document with information on pollutants and sources of pollution that healthcare professionals can refer to. The committee also recommended that local authorities set up a structured process to enable professionals to access existing referral pathways for a housing assessment in section 1.2.
British Thoracic Society	Guideline Recommendations and section 1.5	4	3	We recommend adding COPD as a specific named vulnerability factor. Asthma and cardiovascular disease are named; the COPD population are almost certainly at higher risk than those with cardiovascular disease, whilst compared to those with asthma they are much more likely to be house bound and to require hospitalisation for an exacerbation.	Thank you for your comment. The committee agreed and have now added COPD to the list of pre-existing conditions.

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British Thoracic Society	Guideline	8	4	Consider a stronger statement on avoiding the use of open solid-fuel fires, particularly by those with vulnerability factors such as COPD. Down draughts from chimneys can quickly overwhelm ventilation meeting regulations. Biomass fires contribute to the development and progression of COPD, and may trigger exacerbations. Solid-fuel fires are also an uneconomical means of heating.	Thank you for your comment. The committee concluded that it was not appropriate to recommend that people avoid using open solid-fuel fires as some homes may use this as their main or only source of heating.
British Thoracic Society	Guideline	9	22	<p>The recommendation that those with HDM allergy should be given allergen avoidance advice is sensible, but in practice efforts are often inadequate and clinically ineffective, in part because of difficulties achieving eradication. The eradication advice given in the document is limited; nothing about the need for the temperature and frequency required for washing bedding (or use of a freezer), HEPA filters on vacuums, avoidance of fitted carpets in particular or carpets in general etc.</p> <p>Confirmation of HDM allergy may perhaps be beyond the remit of this document, but clear evidence of symptoms from HDM should be sought by healthcare professionals (not just positive RAST or skin tests) - specifically itchy eyes/runny nose/wheeze when making the</p>	<p>Thank you for your comment. There was insufficient evidence to support these interventions and so the committee cross referred to NHS advice on allergen avoidance.</p> <p>As you have suggested, confirmation of HDM allergy is outside the scope of this guideline.</p>

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				bed. Such symptoms should prompt discussion of trial of HDM avoidance, but with an informed approach explaining the difficulties achieving clinically noticeable benefits.	
British Thoracic Society	Guideline	4	Box 1	There are 2 key areas that seem to have been overlooked here. Firstly, poor indoor air quality can cause hypersensitivity pneumonitis – an allergic lung disease that can result in permanent lung scarring and reduced life expectancy. Well-known causes include household damp/mould and pet birds/feather duvets. The disease is driven by ongoing exposure, and these patients should be seen as the most “vulnerable” as their prognosis is linked to the exposure being remediated. It would be useful to signpost the ELF/ERS factsheet entitled “Mould, damp and the lungs”. This condition needs specifically mentioning as a special circumstance and is not adequately covered by “allergies” in Box 1 or “other respiratory conditions” on page 9 Secondly, an increasing number of individuals work from home for all or part of their employment, and this should be a factor that increases risk.	<p><b>Thank you for your comment. The committee agreed with the comment but noted that this is covered in the bullet point with 'people with pre-existing health conditions'. They also highlighted that the examples listed in the box are not exhaustive and does not exclude hypersensitivity pneumonitis.</b></p> <p>The list of people who may be particularly vulnerable to ill health as a result of exposure to poor indoor air quality has been refined based on committee discussion of the stakeholder consultation and the bullet referring to people who have increased exposure because they spend long periods at home has now been removed.</p>
British Thoracic Society	Guideline	26	17	The document makes several references to “respiratory conditions such as cough,	Thank you for your comment. We have made corrections as suggested.

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				wheezing or asthma..." – cough and wheeze are symptoms, not respiratory conditions	
Camfil Ltd		general		Should the title not read - Clean Indoor Air Quality at Home?	Thank you for your comment. We consider that the title is appropriate.
Camfil Ltd		general		<p>Firstly - The need for air that is clean and suitable to be inhaled by people at no risk to health does not change.</p> <p>It does not change if you are in your home or at your place of work. It does not change if you are outside or inside a building. It does not change if you are young or old. It does not change if you are male or female.</p> <p>Clean air is indeed a need that does not change and should be considered a human right.</p> <p>If you are alive with lungs you need to breathe clean air to be healthy, productive and for your well-being. Nobody can opt out of this situation.</p>	Thank you for your comment. The committee agree that everyone needs clean air and as such this guideline is for everyone.
Camfil Ltd		general		The title of the consultation and document titles above suggests its preoccupation is with the rising public awareness of the increased health damage and premature mortality when people are exposed to air pollution.	Thank you for your comment. This is correct as the committee were aware that awareness of the health effects of poor indoor air quality is limited.
Camfil Ltd		general		Air pollution comes in different forms, airborne particles and gaseous emissions. Both come from different sources. Outdoor sources such as traffic in cities have gained attention. Fine	Thank you for your comment. Outdoor air pollution is covered in the NICE guideline on outdoor air quality (Air pollution: outdoor air quality and health) and we have cross referred to this guideline in the 'context' section.

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				combustion particles (PM1 PM2.5 PM10) gases (NO2) principally from traffic and other combustion processes have reached hazardous concentration in nearly all UK cities.	
Camfil Ltd		general		<p>The health effects have been documented and detailed over many years by the WHO and the RCOP report in 2016. 'Every breathe we take'. Recent studies have shown PM1 particles can penetrate directly into the brain causing damage to cognitive capability, personality change, early onset dementia and other chronic vital organ damage. Life is shortened and degraded.</p> <p>The focus of government organisations should on removal to PM1 size particles from the air coming into buildings. Even more than PM2.5 and PM10 the PM1 size particles can penetrate into the human bloodstream via the lungs or via the nerves connecting the nose to the brain. Some of these particles found in brains (Magnetite mainly from diesel traffic) have been linked to early onset of dementia. They have also been shown to resonate with radiation from mobile phones. A useful way of remembering the importance of PM1 is People Matter 1st.</p>	Thank you for your comment. Outdoor air pollution is outside the scope of this guideline, but it's covered in the NICE guideline on outdoor air quality (Air pollution: outdoor air quality and health) and we cross referred to this guideline in the 'context' section.
Camfil Ltd		general		Comment on Design and use of ventilation Buildings in city centres are usually located in	Thank you for your comment and for the references to national and international standards. These technical standards (BS EN

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				<p>areas of high concentrations of air pollution. These buildings are often heavily occupied and rely on mechanical ventilation systems to supply outside air to displace carbon dioxide and maintain oxygen levels.</p> <p>The strategy of promoting buildings as Havens to protect occupants in cities against outdoor sourced air pollution is sensible. This is where the immediate threat to health is most apparent.</p> <p>To meet the needs of modern building designers and specifiers there have been new technical standards developed by BSI CEN and ISO the British European and World bodies responsible for standards development. These latest current standards have been developed to answer the needs of modern building design be it residential or commercial such as offices.</p> <p>Current Technical Standards - Prefixes BS British EN European ISO World Standard BS EN ISO 16890:2016 Particulate air filters for general ventilation. Classification and determination of filter performance (Replaces BS EN 779:2012 which was withdrawn by BSI in June 2018) BS EN 1822-1:2019 High efficiency particulate</p>	<p>ISO 16890:2016, BS EN 1822-1:2019, BS EN ISO 29463-2:2018, BS EN ISO 29463-3:2018, BS EN ISO 29463-4:2018, BS EN ISO 29463-5:2018, BS EN ISO 10121-2:2013, BS EN 15805:2009, BS EN 15780:2011, BS EN 1886:2007, BS EN 16798-3:2017) were not included in the evidence reviews as the committee prioritised studies that reported health related outcomes over exposure levels. The scope and review protocols set out what will and won't be covered in the guidance (within the time and resources available). However, we will pass your comment to the NICE surveillance team which monitors guidelines to ensure that they are up to date so this prioritisation can be revisited when the guideline is updated.</p>

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				air filters (EPA. HEPA, ULPA) Part 1. Classification, performance testing, marking. (To be used in conjunction with BS EN ISO 29463 parts 2 to 5 as below) BS EN ISO 29463-2:2018 High efficiency air filters (EPA. HEPA, ULPA) Part 2. Aerosol production, measuring equipment, particle counting statistic BS EN ISO 29463-3:2018 High efficiency air filters (EPA. HEPA, ULPA) Part 3. Testing flat sheet filter media BS EN ISO 29463-4:2018 High efficiency air filters (EPA. HEPA, ULPA) Part 4. Determining leakage of filter elements BS EN ISO 29463-5:2018 High efficiency air filters (EPA. HEPA, ULPA) Part 5. Determining the efficiency of filter elements (BS EN ISO 29463 parts replace BS EN 1822 parts 2 to 5 :2009 which have now been withdrawn by BSI) BS EN ISO 10121-2:2013 Gas phase air filters for general ventilation. Determination of performance BS EN 15805:2009 Particulate air filters for general ventilation. Standardised dimensions BS EN 14779:2007 Air filters for general air cleaning. Terminology	

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				These current technical standards have important guidance referring to air filtration: BS EN 15780:2011 Ventilation for buildings. Ductwork. Cleanliness of ventilation systems BS EN 1886:2007 Ventilation for buildings Air Handling Units BS EN 16798-3:2017 Energy performance - Ventilation for buildings (Replaces BS EN 13779:2007 which has been withdrawn by BSI)	
Camfil Ltd		general		For air pollution in city centre locations natural or passive ventilation design solutions will not clean the outside air that is necessary for supply ventilation. Supply air filtration is the only practical solution that can protect building occupants in the short term situation.	Thank you for your comment. Outdoor air pollution is covered in the NICE guideline on outdoor air quality (Air pollution: outdoor air quality and health). However, the committee agree and have noted that mechanical systems should be fitted with filtration to protect against outdoor pollutants.
Camfil Ltd		general		It is important air purifiers and ventilation systems are fitted with air filters tested to the latest standards as listed. There have been many 'lifestyle gadget' air cleaners put on the market by certain opportunistic manufacturers. They frequently have inadequate filters with untested performance and as air purifiers and are often not fit for purpose, being sold mainly on looks.	Thank you for your comment. The committee looked at evidence on air filtering systems and air purifiers but agreed not to make specific recommendations on air filters and testing as there are variations in building and testing standards. However, the committee did agree and noted that mechanical systems should be fitted with filtration to protect against outdoor pollutants.
Camfil Ltd		general		Air pollution is highly variable in character. Measured concentrations can vary by as much as 2 orders of magnitude at the same city	Thank you for your comment. Outdoor air pollution is covered in the NICE guideline on outdoor air quality (Air pollution:

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				location from one day to the next. Single snap readings are limited in value as a long term estimate of the pollution problem. That is why the annual mean value given by the World Health Organization (WHO) for PM2.5 and NO2 carries the most weight when assessing the level of air filtration efficiency for a project building ventilation system. Effective high efficiency filtration can remove these air pollutants.	outdoor air quality and health) and we cross referred to this guideline in the 'context' section. However, the committee agreed and have noted that mechanical systems should be fitted with filtration to protect against outdoor pollutants.
Camfil Ltd		general		In general terms for UK city locations a filter efficiency of 80% to 90% is required to meet the needs of ODA down to SUP1 and SUP2 as defined by BS EN 16798-3:2017 and Eurovent 4/23 guideline published October 2018. To reduce air filter running costs greater use of Life Cycle Costing analysis must be used as given in BSI PD CEN/TR16798-4:2017 and Eurovent 4/21 2018. Energy reductions for an A+ rated filter can reach 60% as shown in the table.	Thank you for your comment. Outdoor air pollution is covered in the NICE guideline on outdoor air quality (Air pollution: outdoor air quality and health) and we cross referred to this guideline in the 'context' section. However, the committee agree and have noted that mechanical systems should be fitted with filtration to protect against outdoor pollutants. These technical standards (BS EN 16798-3:2017, Eurovent 4/23, BSI PD CEN/TR16798-4:2017 and Eurovent 4/21 2018) were not included in the evidence reviews as the committee prioritised studies that reported health related outcomes over exposure levels. The scope and review protocols set out what will and won't be covered in the guidance, within the time and resources available. However, we will pass your comment to the NICE surveillance team which monitors guidelines to ensure that they are up to date so this prioritisation can be revisited when the guideline is updated

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Camfil Ltd		general		Greater use of demand led building ventilation which also respond to changes in outdoor ambient air pollution and temperature levels are needed.	Thank you for your comment. The committee agreed and have noted that mechanical systems should be fitted with filtration to protect against outdoor pollutants.
Camfil Ltd		general		Low cost monitoring and control technology is now becoming available and should be employed.	Thank you for your comment. The committee agreed and have noted that mechanical systems should be fitted with filtration to protect against outdoor pollutants.
Camfil Ltd		general		The onset of global warming and extreme weather events means we will need better and lower cost, but effective clean air ventilation systems in buildings. This can only be achieved by harnessing the latest performance tested air filtration technology.	Thank you for your comment. The committee agreed and have noted that mechanical systems should be fitted with filtration to protect against outdoor pollutants.
Cancer Prevention Society	Evidence Review 2 – exposure to pollution	General	General	We did not find mention of flame retardants (FRs) in this document even though they partition to air, surfaces and dust depending on their molecular weight. The UK has some of the highest usage of FRs in the world. Please refer to our recent submission to the RCPCH for their indoor air quality inquiry or contact us to see it. Some flame retardants are carcinogenic and endocrine disrupting. Some are reported to have neurological and developmental effects.	Thank you for your comment. No evidence on flame retardants met the inclusion criteria for evidence review 1 (association between building characteristics and exposure levels) or evidence review 2 (association between exposure levels and health outcomes).
Chartered Institution	Guideline	1	General	We support the production of this guideline, which is much needed. We agree with the emphasis on source control, ventilation,	Thank you for your comment. Acute exposure to carbon monoxide is outside the scope of this guideline. NICE has a

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of Building Services Engineers				maintenance, and awareness of occupants. Due to the complex mixture of pollutants that occupants are exposed to in homes, there is a need to prioritize, and we agree with the current emphasis on PM and formaldehyde (as well as consideration of VOCs more generally). We have highlighted in our comments where we think there should be more focus on carbon monoxide. At the next iteration, there could be a review on the need to include other pollutants (e.g. NOx), depending on evidence of exposure and on technological developments (e.g. this may not be needed if transport measures have reduced exposure; on the other hand, gas filters may have become more widely available). We have included possible references in comment #39 which cover research and guidance on prioritization.	guideline on 'unintentional injuries in the home: interventions for under 15s' which includes carbon monoxide alarms.  We will pass your comment to the NICE surveillance team which monitors guidelines to ensure that they are up to date.
Chartered Institution of Building Services Engineers	Guideline	4	2 - 3	We wonder whether the provision of gas heating systems and appliances (e.g. cookers) should be added to the list of key risk factors, as this increases risks of carbon monoxide as well as combustion pollutants. This would seem more consistent with the emphasis on it in the rest of the guideline. See also possible additional references for the evidence review in comment #39	Thank you for your comment. The committee sought to highlight examples of people who may be vulnerable to ill health as a result of exposure to poor indoor air quality rather than provide a detailed account of all vulnerable groups and their circumstances and so have not added gas heating systems and appliances to this list.

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Chartered Institution of Building Services Engineers	Guideline	5	General	We agree with the recommendations on this page as local authorities have a significant role to play to improve indoor air quality, through various levers (environmental health, planning, links with health departments and other local organisations etc). However, these guidelines will only be effectively implemented with appropriate training and resources to local authorities. We recommend explicitly adding a recommendation to central government for training and resources to be provided. See also comment #11	Thank you for your comment. The committee were mindful of the information and training that staff may need and have highlighted that professional development opportunities could be used to provide this. NICE produces evidence-based guidance and advice for health, public health and social care practitioners ( <a href="https://www.nice.org.uk/about/what-we-do">https://www.nice.org.uk/about/what-we-do</a> ) so recommendations for central government are outside of the remit of NICE.
Chartered Institution of Building Services Engineers	Guideline	5	9 - 11	We agree with this. It may be useful also to make the link with overheating: overheating risk will often be increased by similar factors as poor indoor air quality i.e. location near busy / noisy roads which increase noise and outdoor air pollution, and inadequate ventilation, and is likely to have a greater adverse impact on those with respiratory problems, so the connection between overheating and indoor air quality will exacerbate the impact of the two phenomena.	Thank you for your comment. The committee have cross-referred the reader to the NICE guideline on excess winter deaths which also emphasizes the need for a balanced approach to heating and ventilation.
Chartered Institution of Building	Guideline	5	12 - 14	We agree with this. It may be useful to list examples of departments that should be involved in this joint working, as individuals may not be aware of their potential to contribute e.g. environmental health, building	Thank you for your comment. The committee noted that there are different types of local government in England which have different responsibilities and considered that joint working would be dependent on local circumstances and responsibilities.

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Services Engineers				control, planning, housing (if any council housing), transport, trees & green spaces. Joint working is also relevant in the context of the post Grenfell discussions about a new Building Safety Regulator. Whilst there is a considerable focus on fire safety, current research and evidence suggest that air quality and overheating will pose a serious health risk in homes, and this needs to be on the agenda for the Building Safety Regulator from the earliest stages.	
Chartered Institution of Building Services Engineers	Guideline	5	15-18	We agree with this, and think it would benefit from adding guidance and references on local inspection protocols e.g. reference documents, examples of good practice, case studies. see also possible references in comment #39	Thank you for your comment. The committee were mindful that there are different types of local authority in England and that local circumstances will dictate what should be included in inspection protocols locally.
Chartered Institution of Building Services Engineers	Guideline	5	19-22	Yes, we support this	Thank you for your comment.

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Chartered Institution of Building Services Engineers	Guideline	5	23-24	We agree with this. It may be useful to list examples of external organisations that could be approached for joint working, to ensure the advice is adequate and not biased by commercial interests. Professional institutions are a good place to start, and CIBSE would be happy to be listed. We would also recommend CIEH (which environmental health officers will often already have good links to), the RIBA and CIAT for architectural issues including ventilation and materials selection, and the RTPPI for planning issues.	Thank you for your comment. The committee agreed and have listed these organisations in the rationale and impact section as sources of information.
Chartered Institution of Building Services Engineers	Guideline	5	25-27	We agree with this and support the use of audit data. In addition to audits to identify properties most at risk, we think that in order to monitor progress against the goals of the strategy, the recommendation should include monitoring the effect of interventions i.e. post-intervention audits. It is essential that the evidence and lessons learned are shared among local authorities and with the wider industry.	Thank you for your comment. The committee have edited the rationale and impact section on collecting data and monitoring progress to capture your concerns.
Chartered Institution of Building Services	Guideline	6	15-18	We agree with this. It would be useful to add a bullet point that would explicitly include awareness on how to avoid and remediate poor indoor air quality	Thank you for your comment. The committee agree and have added an additional bullet point to the recommendation (1.3.1) on preventing and reducing poor indoor air quality.

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Engineers					
Chartered Institution of Building Services Engineers	Guideline	7	1	The paths to professional development may be the existing ones, but resources should be increased and new opportunities created; CIBSE would be happy to discuss how they could support training programmes. See also comment #1	Thank you for your comment and offer of information. Your comments will be considered by NICE where relevant support activity is being planned.
Chartered Institution of Building Services Engineers	Guideline	7	18-25	We would add to the list of measures: fabric repairs and improvements to insulation levels to reduce cold surfaces, with care to avoid thermal bridging. CIBSE are recommending that the guidance in the Approved Documents which support Parts L (energy efficiency) and F (ventilation) of the Building Regulations, currently under review, should be revised to emphasise the importance of these aspects of renovation in relation to indoor air quality; there may be scope here for NICE to make similar recommendations.	Thank you for your comment. The committee concluded that fabric repairs and improvements to insulation levels in the home to reduce cold surfaces is covered by the recommendation on a balanced approach to heating, insulation and ventilation.
Chartered Institution of Building Services	Guideline	7	26	We would recommend the following rewording: "advise people <u>on what trickle vents are for and look like, and</u> to keep them open and unblocked". As per comment #12, this would be a useful area for NICE to be engaged in the	Thank you for your comment. The committee agreed and have edited this recommendation.

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Engineers				discussions around the review of Parts L and F.	
Chartered Institution of Building Services Engineers	Guideline	8	10 - 13	We would recommend the following addition to the existing wording: “fans in the kitchen or bathroom are not working <u>or if excessive noise levels from the fans discourage operation</u> ”. This is a known common cause for occupants switching off or even disabling extract fans (see for example several studies by Mawditt I., Gupta R. & Sharpe T.)	Thank you for your comment. The committee agreed and have edited recommendation 1.4.4 to include excessive noise.
Chartered Institution of Building Services Engineers	Guideline	8	14-15	We would recommend the following addition to the existing wording: “repairs are needed, including <u>fabric repairs and improvements to heating, insulation levels</u> or ...”	Thank you for your comment. The committee concluded that fabric repairs and improvements to insulation levels in the home to reduce cold surfaces is covered by the recommendation on a balanced approach to heating, insulation and ventilation.
Chartered Institution of Building Services Engineers	Guideline	8	23-25	It may be useful to give more guidance on what is meant by “low emission materials”, for example a list of possible labels. The current proliferation of labels may be confusing to consumers	Thank you for your comment. The committee concluded that, at the moment, there are no labelling schemes for these products, but they were aware of government plans to set up a voluntary labelling scheme as outlined in the Clean Air Strategy 2019 which will help standardise labelling in the future.
Chartered Institution of Building Services Engineers	Guideline	8	26-27	We would recommend adding any new combustion appliance to this section, including	Thank you for your comment. The committee discussed your comment and concluded that new combustion appliances,

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Institution of Building Services Engineers				indoor fires, and recommend closed fires rather than open ones	including indoor fires are covered in recommendation 1.7.2 on designing or specifying heating systems that minimise indoor exposure
Chartered Institution of Building Services Engineers	Guideline	9	general	As part of the guidance to home occupiers, it may be useful to include more general points that affect indoor air quality and which are related to lifestyles and behaviours, for example the effect of pets, removing shoes when indoors, vacuum cleaning etc.	Thank you for your comment. The committee considered a range of measures are required to address indoor pollution - occupant behaviour is just one of many including product emissions, building materials, building design, safe and affordable heating, ventilation – and many of these are beyond the occupants / tenants' control. The committee have provided examples of simple actions that can be taken to reduce exposure to indoor pollutants (section 1.4) and have referred to this section in Box 1, which lists people who may be particularly vulnerable and factors that increase the risk of ill health due to exposure to indoor air quality.
Chartered Institution of Building Services Engineers	Guideline	10	25-26	<u>This is a significant recommendation, which we very much support – see for example our 2018 briefing on Part F (<a href="https://www.cibse.org/getmedia/4a601f5c-a866-41a2-8cf7-1bab17f4f57e/Position-Paper-on-Building-Regulations-Part-L-F.pdf.aspx">https://www.cibse.org/getmedia/4a601f5c-a866-41a2-8cf7-1bab17f4f57e/Position-Paper-on-Building-Regulations-Part-L-F.pdf.aspx</a> ) .</u> <u>As this section is aimed at regulators and building control teams, we assume that “standards” includes building regulations – if so</u>	Thank you for your comment. The committee agreed and have edited this recommendation.

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				<u>(we would support this), this should be made explicit.</u>	
Chartered Institution of Building Services Engineers	Guideline	11	43497	<u>We support the reference to WHO 2006 (pollutants) and 2009 (mould); this is the basis of our recommended indoor air guidelines in the upcoming revised CIBSE TM40 Health and Wellbeing in Building Services (<a href="https://www.cibse.org/Knowledge/CIBSE-TM/TM40-2019-Health-Issues-and-Wellbeing-in-Building-Services">https://www.cibse.org/Knowledge/CIBSE-TM/TM40-2019-Health-Issues-and-Wellbeing-in-Building-Services</a> )</u>	Thank you for your comment.
Chartered Institution of Building Services Engineers	Guideline	11	3-7	We agree with the recommendation, but note that building regulations currently do not comprehensively deal with indoor air quality. This may change with the update to Part F as part of the Building Regulations 2019/20 review. This is another reason for NICE to consider participating in that review and approaching MHCLG to that end. We are aware of poor enforcement of the requirements of Part F and its guidance; we would recommend being more explicit about the essential provisions recommended in Part F and its Approved Document, including the guideline levels of pollutants, and commissioning of ventilation systems. Evidence from our members is overwhelming that such provisions are rarely queried by Building Control Bodies. In line with this, we	Thank you for your comment. We will pass your comment to the NICE surveillance team which monitors guidelines to ensure that they are up to date. The committee have considered enforcement in terms of including indoor air quality standards as part of enforcement activities (recommendations 1.6.1 and 1.6.2). The committee have also recommended in 1.8.5 that any variations to heating or ventilation should comply with building regulations and in recommendation 1.9.1 the committee have hyperlinked to the Ministry of Housing, Communities and Local Government's advice on ventilation and Housing health and safety rating system operating guidance, as part of using regulatory powers. The committee noted that timelines are important and have included this in recommendation 1.6.2 where they have linked to Building Regulations 2010 and Housing health and safety rating system operating guidance, and the Planning Portal's Failure to comply with the building regulations.

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				<p>would recommend the following addition to the current text: "ensure enforcement takes place within the specified timelines and according to the recommended standards".</p> <p>The guidance should then be updated, ideally with training provided, following the expected 2019/20 update to Part F. Whilst there is now a post Grenfell focus on better enforcement, there is a natural tendency to focus on obvious and immediate safety matters – fire and structure – at the expense of longer term risks such as air quality and overheating. This will only change when Building Control are firmly guided to address the longer term hazards more seriously. This also requires NICE to engage with the proposed Building Safety Regulator to ensure that Building Safety is seen in this much wider framework, and not as a synonym for fire safety.</p>	
Chartered Institution of Building Services Engineers	Guideline	11	3-7	<p>"Existing building regulation enforcement activities": due to changes proposed under the Building Safety reforms we anticipate changes that would build better links to the operational stage of buildings. As this is a new and significant change, we think it could be beneficial to make reference to it here, as some local authorities bodies will not yet be</p>	<p>Thank you for your comment. We cannot refer to articles not yet published but will pass your comment to the NICE surveillance team which monitors guidelines to ensure that they are up to date so that evidence published after the guideline search dates can be considered as part of this process.</p>

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				familiar with the changes and the obligations and opportunities they will bring.	
Chartered Institution of Building Services Engineers	Guideline	11	42248	<p>A very important part of avoiding sources of pollutants is the location of sensitive uses (e.g. dwellings, care homes etc), rooms (e.g. bedrooms) and air inlets in relation to external sources of pollution. Single-aspect dwellings should also be avoided as much as possible (except for the small ones where it cannot reasonably be expected), to allow cross-ventilation.</p> <p>We strongly recommend that this should be added to this section, as one of the key measures that designers can take at an early stage through site configuration, building layout, and ventilation design. This could also have other benefits for health and wellbeing, such as reducing noise and overheating risk (by reducing nuisance through open windows, and therefore increasing the likelihood that occupants will open them). CIBSE publications, including the upcoming revised TM40, provide guidance on this if a reference is needed.</p>	<p>Thank you for your comment. The committee agree that layout of the building is important and is covered by location and physical infrastructure bullets in the list of housing conditions put people at increased risk of exposure to poor indoor air quality. The committee recommended that a whole-building approach to heating and ventilation should be adopted to ensure indoor air quality is maintained while achieving standards for energy use. The committee also agreed that designs should include provision for removing indoor air pollutants and minimising exposure to particulate matter (section 1.7).</p>
Chartered Institution of	Guideline	11	10-13	<p>"Consider specifying building materials and products that only emit a low level of formaldehyde and VOCs" : we would recommend strengthening this, at least for the</p>	<p>Thank you for your comment. The committee agreed to retain the wording as the strength of the recommendation is based on the quality of evidence identified in the reviews and, in this</p>

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Building Services Engineers				main building materials and finishes as low-emission options are already reasonably widely available for these. We would also clarify what is meant by "low emissions", for example by listing preferred and reliable labels. It may also be useful to refer to guideline levels in Approved Document F, as awareness of such guidelines is not widespread among industry and may raise the importance of the issue.	case, there was insufficient evidence to support strengthening this recommendation. The committee were aware that there is no labelling scheme for products other than paints. The committee were aware of government plans for a voluntary labelling scheme in England as part of the Clean Air Strategy 2019 which will help with standardising labels.  The committee noted that they have referenced the Approved Document F in recommendation 1.9.1.
Chartered Institution of Building Services Engineers	Guideline	11	14-15	This statement refers to minimising exposure to particulate matters; as these guidelines cover indoor air quality, we assume this refers to internal exposure, and therefore heating systems such as indoor fires which could increase indoor exposure? It may be worth clarifying this. We would also recommend adding a more general recommendation for low-emission heating systems, to reduce external pollution, in terms of particulate matters but also NOx (as this will in turn help improve indoor quality).	Thank you for your comment. The committee agreed and have edited this recommendation to clarify that it is indoor exposure to particulate matter. This complements government plans to phase out oil and coal heating as outlined in the clean air strategy 2019. Outdoor air pollution is outside of the scope of this guideline but covered in NICE's guideline on outdoor air quality (Air pollution: outdoor air quality and health) and we cross referred to this guideline in the 'context' section.
Chartered Institution of Building Services	Guideline		22	We would recommend the following addition to the existing wording: "specifying kitchen extractor or cooker hoods that extract to the outside <u>and which are easily accessible for cleaning or maintenance, with simple instructions for occupants</u> ". This is important	Thank you for your comment. The committee agreed and have edited this recommendation.

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Engineers				to avoid increasing the risk of fire, and avoid excessive noise which could prevent occupants from using the hood.	
Chartered Institution of Building Services Engineers	Guideline		23	We would recommend modifying the current wording ("specifying that windows must open where possible and safe to do so") to the following: "specifying that windows or openings in every room must at the very least meet the provisions of Part F purge requirements, and that all habitable rooms should be provided with windows that are openable in a safe and secure manner". The current wording could be read as if providing rooms without openable windows is acceptable in dwellings; we would strongly discourage this. This would also help reduce the risk of overheating, with associated health and wellbeing benefits.	Thank you for your comment. The committee agreed and have edited this recommendation.
Chartered Institution of Building Services Engineers	Guideline	12	3 - 4	We would recommend merging this point with broader considerations of site layout, building layout and air inlets (not only "windows that open"), as per comment #23	Thank you for your comment. The committee agreed to leave this bullet as a stand-alone to give greater emphasis.
Chartered	Guideline	12	5	We think it would be useful to explain what "filtration" is intended; filters against particulate	Thank you for your comment. The committee have clarified that filtration is to protect against outdoor pollutants.

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Institution of Building Services Engineers				<p>matters are commonly available for residential systems, with a well established system of standards to gauge their performance. Gaseous filters which could tackle NOx, however, are expensive and still expensive and uncommon. In any case, would recommend adding that, where mechanical ventilation systems are provided, there should be sample operation and maintenance guidance to occupants, including on filter replacement if filters are provided. The units should be easily accessible (e.g. if at all possible, not in a loft accessible by hatch, as the inconvenience will be a strong deterrent to regular maintenance). There is ample evidence and guidance on this, for example from the Good Homes Alliance (<a href="https://goodhomes.org.uk/wp-content/uploads/2017/08/VIAQ-final-120220.pdf">https://goodhomes.org.uk/wp-content/uploads/2017/08/VIAQ-final-120220.pdf</a>), Zero Carbon Hub (<a href="http://www.zerocarbonhub.org/resources/reports/ventilation-new-homes">http://www.zerocarbonhub.org/resources/reports/ventilation-new-homes</a>), Passivhaus Trust (<a href="http://www.passivhaustrust.org.uk/UserFiles/File/Technical%20Papers/2018%20MVHR%20Good%20Practice%20Guide%20rev%201.1.pdf">http://www.passivhaustrust.org.uk/UserFiles/File/Technical%20Papers/2018%20MVHR%20Good%20Practice%20Guide%20rev%201.1.pdf</a>) and CIBSE TM60 Good Practice in the Design of Homes.</p>	<p>The committee also made a recommendation that all ventilation systems should be accessible for regular maintenance.</p> <p>The reports provided (from Good Homes Alliance, Zero carbon Hub, Passivhaus Trust and CIBSE TM60) do not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as the committee prioritised studies that reported health related outcomes over exposure levels. The scope and review protocols set out what will and won't be covered in the guidance, within the time and resources available.</p> <p>However, we will pass your comment to the NICE surveillance team which monitors guidelines to ensure that they are up to date so this prioritisation can be revisited when the guideline is updated.</p>

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Chartered Institution of Building Services Engineers	Guideline	12	7-8	<p><u>"to improve heating efficiency": this could be read as relating to heating systems only, while we assume the intent of this sentence could include insulation and airtightness improvements, during which ventilation provision must be considered. The wording is ambiguous and we would recommend amending.</u></p> <p><u>A useful reference in the context of refurbishment would be the recently released BSI guidance PAS 2035 &amp; 2030:2019 (<a href="https://shop.bsigroup.com/ProductDetail/?pid=00000000030390699">https://shop.bsigroup.com/ProductDetail/?pid=00000000030390699</a>), which promotes a whole-house approach including consideration of inter-relations between energy efficiency, ventilation, indoor air quality and overheating</u></p>	<p>Thank you for your comment. The committee agreed and have edited this recommendation.</p> <p>The committee have signposted to BSI guidance PAS 2035 &amp; 2030 in the Rationale section for Architects and Designers as a useful source of information for architects and designers.</p>
Chartered Institution of Building Services Engineers	Guideline	12	9-23	<p>We are unsure that this section should be separate from the one addressed to designers: many homes are built by housebuilders which act as designers, builders, and developers; furthermore, under many contracts designers will be responsible to checking installation, departure from specifications etc. We think it may be better to merge this section with the previous one, allowing some of the paragraphs to be removed and others to be merged and expanded: for example, the point on materials specifications (p11, lines 10-13) could be</p>	<p>Thank you for your comment. The committee agreed to keep these sections separate as architects and designers (including homeowners) may be unfamiliar with labelling schemes or the emission profiles of building material and products.</p>

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				merged with that requiring follow-through during construction and attention to product substitutions (p12, lines 15-17).	
Chartered Institution of Building Services Engineers	Guideline	12	18-20	We would add a point on the requirement for flues to be accessible for maintenance, and carbon monoxide alarms to be installed. These are legal requirements in many situations and this should be emphasised. Shared flues should also be required in contract documents to be tested under witnessed conditions to demonstrate that they do not leak and that they do not allow flow of combustion products from one apartment to another under any circumstances.	Thank you for your comment. we have added a recommendation on heating and ventilation systems being accessible for regular maintenance. Acute exposure to carbon monoxide is outside the scope of this guideline. Please see the NICE guideline on 'unintentional injuries in the home: interventions for under 15s' which includes carbon monoxide alarms.  Contract documents are also outside the scope of the guideline.
Chartered Institution of Building Services Engineers	Guideline	13-14	general	This section is addressed to local authorities (line 2), as they will be in charge of enforcing regulations on rental properties. We think it would be useful to re-word and expand it so it is also addressed to landlords, to highlight their obligations. Enforcement and awareness-raising by local authorities can complement this. For example, sections 1.9.2, 1.9.3 and 1.9.5 could be presented as requirements and guidance for landlords AND points that need to be raised by local authorities if their application is poor.  In the recommendations to landlords, we	Thank you for your comments. This section recommends advice for local authorities to give to landlords including advice on their responsibilities, regarding maintenance.  NICE produces evidence-based guidance and advice for health, public health and social care practitioners ( <a href="https://www.nice.org.uk/about/what-we-do">https://www.nice.org.uk/about/what-we-do</a> ) so recommendations for private sector organisations are outside of the remit of NICE.

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				would also add the opportunity for works that improve air quality to be carried out as part of other works such as those to bring properties to the minimum Energy Performance Certificate (EPC) ratings (or better) required under Minimum Energy Efficiency Standards (MEES). MHCLG are currently reviewing and revising the national housing safety rating scheme, and should be consulted about strengthening the aspects that relate to this topic.	
Chartered Institution of Building Services Engineers	Guideline	13	14-18	We would add an explicit point stating that heating systems should be maintained as appropriate, and emphasising that annual safety inspections are required for gas appliances in rented properties. Under the current legislation for landlords to end tenancies under section 21 of the Housing Act, such a notice to terminate CANNOT legally be served if the gas safety certificates are not up to date. This should be a powerful incentive to landlords to keep them up to date, and it is worth advertising this to landlords.	Thank you for your comment.  Acute exposure to carbon monoxide is outside the scope of this guideline. Please see the NICE guideline on 'unintentional injuries in the home: interventions for under 15s' which includes carbon monoxide alarms. The committee agreed with your point about maintenance and have recommended regular maintenance of ventilation systems in recommendation 1.8.4. They also recommended that rented housing should have heating appliances that are correctly installed and tested (this may include annual safety checks) and comply with design and performance standards in recommendation 1.9.2 and in 1.9.3 the committee has recommended that property managers and landlords develop and undertake maintenance programmes for heating systems.

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Chartered Institution of Building Services Engineers	Guideline	13	13-26	We would add a point referring to legal obligations for carbon monoxide alarms to be installed, and list those in the items to be inspected and maintained	Thank you for your comment. Acute exposure to carbon monoxide is outside the scope of this guideline. Please see the NICE guideline on 'unintentional injuries in the home: interventions for under 15s' which includes carbon monoxide alarms.
Chartered Institution of Building Services Engineers	Guideline	15	25-27	We support the identification of air exchange rates as a priority for research, particularly in the context of the UK's carbon reduction targets. One option to explore could be to do this for different categories of buildings, as in the approach of BS EN 16798-1:2019 (i.e. buildings with low / medium / high internal emissions) and potentially adding consideration of external pollution to assess the best compromise point.	Thank you for your comment. The committee agreed and have added more detail to the text on this research recommendation in the evidence review 3.3.  This technical standard (BS EN 16798-1:2019) was not included in the evidence reviews as the committee prioritised studies that reported health related outcomes over exposure levels. The scope and review protocols set out what will and won't be covered in the guidance, within the time and resources available. However, we will pass your comment to the NICE surveillance team which monitors guidelines to ensure that they are up to date so this prioritisation can be revisited when the guideline is updated.
Chartered Institution of Building Services	Guideline	16	14-18	As a recommendation for research, we would add "how is occurrence avoided", particularly in the case of retrofit. While knowledge is growing on this (including thanks to the work of the Centre for Moisture in Buildings), it needs to grow further and be widely disseminated to practitioners. This is crucial as retrofit works	Thank you for your comment. The committee agreed and have added more detail to the text on this research recommendation in the evidence review 3.1.

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Engineers				are expected to increase significantly to meet the UK's carbon targets; this will lead to fabric interventions and the application of insulation and airtightness improvements to a very varied building stock, including traditional buildings which require different approaches to moisture management.	
Chartered Institution of Building Services Engineers	Guideline	16	13	<p>Under "other recommendations for research", we would add research into the effects of combined exposure to multiple stressors (e.g. to heat and air pollution, to noise and air pollution), as is very common in practice. This could help better assess priorities for regulation and interventions.</p> <p>We would also recommend reviewing research on semi-volatile organic compounds (SVOCs) and whether they should be the subject of more guidelines. Below is further information provided by a member of our indoor air quality group and of UK-IEG.</p> <p>SVOCs: People are exposed to SVOCs via multiple routes. They inhale air containing gaseous SVOCs or SVOCs adsorbed on airborne particles, they touch SVOC coated surfaces, they ingest dust containing SVOCs (a particularly important exposure route for infants), and the foods they eat contain SVOCs. Also, it has recently been recognized</p>	<p>Thank you for your comment. The committee agreed and have added more detail to the text on this research recommendation in the evidence review 2.</p> <p>We will pass your comment to the NICE surveillance team which monitors guidelines to ensure that they are up to date so that they can consider if more emphasis should be given to semi-volatile organic compounds in any update of this guideline.</p>

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				<p>that airborne SVOCs can adsorb directly on the skin and then move into the body. SVOCs are different from VOCs because they tend to stay in the home for longer periods and could not be removed simply through ventilation strategies. As SVOCs deposit on surfaces, they might stick to dust particles and cleaning is required to remove them in addition to robust ventilation. It has been calculated that many SVOCs have long persistence indoors. Even if the original sources are removed, SVOCs will persist indoors for weeks or years because all indoor surfaces have become coated with SVOCs. SVOCs that may be found in homes and other buildings, and also as detectable body burdens of occupants, include pesticides, plasticizers, and flame retardants. Calculations also indicate that human uptake of SVOCs by absorption on the skin can be much larger than previously thought, potentially equal to or in some cases exceeding intake through inhalation.</p> <p>References: Weschler and Nazaroff, 2012 Damalas and Koutroubas, 2016) Shi et al., 2018 Lucatinni et al., 2018 [Fire%20retardants%20are%20particularly%20</p>	<p>House of Commons, Environmental Audit Committee, Toxic Chemicals in Everyday Life, 2019 This was not included in the evidence review as it does not meet our inclusion criteria as specified in the review protocols</p>

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				<ul style="list-style-type: none"> <li>• Borsboom W, De Gids W, Logue JM, Sherman MH, Wargocki P. TN 68: Residential Ventilation and Health. Air Infiltration and Ventilation Centre, Brussels, Belgium; 2016. –</li> </ul> <p>Audits and monitoring</p> <ul style="list-style-type: none"> <li>• Jones BM, Phillips G, O'Leary C, Molina C, Hall IP, Sherman MH, editors. Diagnostic barriers to using PM2.5 concentrations as metrics of indoor air quality. AIVC 2018 Smart Ventilation for Buildings; 2018; Juan-Les-Pins, France. –</li> <li>• Jones BM. What's Cooking? CIBSE Journal 2018:67.</li> </ul> <p>Cooking and air quality:</p> <ul style="list-style-type: none"> <li>• NHBC research: <a href="https://www.nhbcfoundation.org/publication/assessment-of-mvhr-systems/">https://www.nhbcfoundation.org/publication/assessment-of-mvhr-systems/</a></li> <li>• O'Leary C, de Kluizenaar Y, Jacobs P, Borsboom W, Hall I, Jones B. Investigating measurements of fine particle (PM2.5) emissions from the cooking of meals and</li> </ul>	<p>outcomes over exposure levels. The scope and review protocols set out what will and won't be covered in the guidance (within the time and resources available). However, we will pass your comment to the NICE surveillance team which monitors guidelines to ensure that they are up to date so this prioritisation can be revisited when the guideline is updated</p> <ul style="list-style-type: none"> <li>• Jones BM, Phillips G, O'Leary C, Molina C, Hall IP, Sherman MH, editors. Diagnostic barriers to using PM2.5 concentrations as metrics of indoor air quality. AIVC 2018 Smart Ventilation for Buildings; 2018; Juan-Les-Pins, France. – This study report is a conference abstract only</li> <li>• Jones BM. What's Cooking? CIBSE Journal 2018:67. – This study is not an experimental study but an overview of cooking and particulate matter.</li> <li>• NHBC research: <a href="https://www.nhbcfoundation.org/publication/assessment-of-mvhr-systems/">https://www.nhbcfoundation.org/publication/assessment-of-mvhr-systems/</a> This study is not carried out in lived-in homes and analysis of pollutant levels does not adjust for confounders</li> <li>• O'Leary C, de Kluizenaar Y, Jacobs P, Borsboom W, Hall I, Jones B. Investigating measurements of fine particle (PM2.5) emissions from the cooking of meals and mitigating exposure using a cooker hood. Indoor Air. 2019;29(3):423-38. –This</li> </ul>

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				<p>mitigating exposure using a cooker hood. Indoor Air. 2019;29(3):423-38.</p> <ul style="list-style-type: none"> <li>Abdullahi KL, Delgado-Saborit JM, Harrison RM. Emissions and indoor concentrations of particulate matter and its specific chemical components from cooking: A review. Atmospheric Environment. 2013;71:260-94. –</li> </ul> <p>ASTM. E3087 – 18: Measuring capture efficiency of domestic range hoods. American Society for Testing and Materials; 2018.</p>	<p>study was published after the searches were completed. We will pass your comment to the NICE surveillance team which monitors guidelines to ensure that they are up to date</p> <ul style="list-style-type: none"> <li>Abdullahi KL, Delgado-Saborit JM, Harrison RM. Emissions and indoor concentrations of particulate matter and its specific chemical components from cooking: A review. Atmospheric Environment. 2013;71:260-94. – This study is an overview of particulate matter levels associated with cooking not primary research.</li> </ul> <p>ASTM. E3087 – 18: Measuring capture efficiency of domestic range hoods. American Society for Testing and Materials; 2018. – This study is not carried out in lived-in homes but in test chambers.</p>
CHEM Trust	Guideline	General	General	<p>We welcome the opportunity to input to the guidelines as we know there is strong evidence of a link between chemicals in indoor air and human health concerns. However, there has been little debate about this in the public health sphere in the UK. Although the guidelines do provide some advice and information on how to reduce exposure to some chemicals found in the home – such as formaldehyde – there are other chemicals found in everyday products in our homes, that impact on human health that are missing from the guidelines.</p>	<p>Thank you for your comment. The guideline addresses pollutants as agreed and pre-specified in the scope. The committee were aware that, while there was a lot of evidence for some of these products (and the committee made recommendations on for example, cleaning products and paints), there was no evidence for some pollutants, for example, flame retardants, and so drafted a research recommendation to prompt further research in this area.</p>

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				<p>Many everyday consumer products and building materials including soft furnishings, electronic goods, cleaning products, wall and floor coverings contain chemicals that leach, migrate, off-gas and are worn off products resulting in exposure to humans (1,2). Chemicals such as phthalates, phenols, per and polyfluorinated chemicals (PFAS) and flame retardants have all been found in household dust (3). And subsequently adults, children and the unborn child are exposed to these chemicals within the home environment.</p> <p>Some chemicals of concern in household dust. Brominated flame retardants (BFRs), including polybrominated diphenyl ethers (PBDEs) are widespread contaminants of the environment and the human body. Although Octa and Penta BDE are now banned, and DecaBDE is also being restricted in the EU, exposure to PBDEs is still widespread from their use as flame retardants in existing consumer products such as furniture, building materials, textiles and electronics. They are blended physically and not chemically in these products which leads them to migrate into the environment and build up in household dust (4). These chemicals persist in the environment and some</p>	

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				<p>bioaccumulate, building up in the body over time.</p> <p>PBDEs induce neurodevelopmental effects in rodents (5), and a recent Dutch review reported that PBDEs were associated with lower mental and psychomotor development and IQ in preschool children, and poorer attention in those of school age (6). Studies in US children also found decreases in attention, processing speed, fine motor coordination and cognition and poor working memory in pre-adolescent children (7). Earlier studies in the US had already reported that younger children, 1 to 6 years, showed lower mental and physical development (8). Researchers have also found a correlation between plasma PBDE levels and prevalence of hypothyroidism in Canadian women aged 30–50 years (9). The flame retardant HBCD is a persistent organic pollutant (POP) and it was added to the list of globally banned POPs under the Stockholm Convention in 2013. A 2009 study looked at different ways that we are exposed to HBCD and discovered that “house dust provided the major contribution to personal exposure via dust ingestion,” and concluded that young children are most susceptible to ingestion of flame retardants via</p>	

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				<p>dust (10).                      Children may also be exposed to BFRs in dust from their classrooms, as a UK study found that levels of PBDEs and HBCDs in dust in classrooms and daycare centres were significantly higher than those in cars and offices (11).                      Research in Birmingham (12) has also found so-called 'novel' brominated flame retardants in dust, illustrative of the problem of companies moving from one chemical that is restricted to similar ones that are not (yet) restricted.                      PFAS are highly persistent and bioaccumulative chemicals and are used as water repellents on outdoor clothing and as stain repellents on clothing and furnishings and in greaseproof food packaging, particularly fast food and takeaway and in non-stick pans. Although some PFAS have been restricted, many are still in routine use. PFOA (perfluorooctanoic acid) and PFOS (perfluorooctane sulfonic acid) are the most researched members of this family, but there are a very large number of other PFAS in use. Blood stocks across the world have been shown to be contaminated with PFOA and PFOS. Human studies have found that certain PFAS interfere with normal thyroid hormone</p>	

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				<p>action (13). Thyroid hormones play a fundamental role in brain development during gestation and early life, and a decrease in thyroid hormone during pregnancy has been associated with impaired brain development. There is also evidence of negative effects on the immune system, with PFOA and PFOS at normal population levels being found to decrease the antibody response to tetanus vaccine in children in a cohort study in the Faroe Islands (14).</p> <p>Phthalates are a family of chemicals with multiple uses, the most common of which is as plasticizer to make hard plastic materials soft and flexible. Many consumer products including building materials, furnishings, clothing, paints, toys, medical devices, and pharmaceuticals (15) contain phthalates. Three members of this class of chemicals, dibutyl phthalate (DBP), benzylbutyl phthalate (BBP) and diethylhexyl phthalate (DEHP), are best known for their anti-androgenic properties and association with altered reproductive organ development in boys (16). A recent US study looked at levels of phthalates in pregnant women in relation to language development in their children. The study included 963 children and mothers from Sweden, and 370 mothers</p>	

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				<p>and children from the United States. The researchers found that DBP and BBP — both classified in the EU as being reprotoxic and as endocrine disruptors – were statistically significantly associated with language delay in both the Swedish and US cohorts (17). Another US study found that urine levels of some phthalates in children were associated with increased odds of attention deficit disorder (ADD) and learning disabilities at ages 6-15 years (18). The use of a number of phthalates is the process of being restricted at EU level but, as with brominated flame retardants, they will remain as contaminants of our houses and workplaces.</p> <p>Bisphenol A (BPA) is a well-known endocrine disruptor due to both its current widespread use in consumer products as well as the extraordinary number of studies demonstrating its adverse health effects, often at low doses, in animals, as well as studies that associate exposure with health effects in people. BPA has been found in people's urine worldwide, with most studies showing a detection frequency of over 90% (19). A study published by the German Environment Agency in 2009 found BPA in the urine of in 591 out of 599 children between 3 and 14 years old (20). BPA</p>	

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				<p>is a high-production volume chemical used to make plastics and polymers commonly used in food manufacturing and packaging and many consumer products. BPA's effects on animal behaviour have been reported for many years (21,22). More recently, emerging human data suggests that similar adverse effects may occur in children. For example, it has been described that Spanish children with higher concentrations of BPA in urine had worse behavioural scores and social problems (23). In the US, pre-teen and teenage children with higher BPA in urine had a higher prevalence of ADHD (24). A 2016 systematic review of studies in children younger than 12 years found that prenatal exposure to maternal BPA was related to higher levels of anxiety, depression, aggression, hyperactivity, inattention, and conduct problems in children (25). A number of other bisphenols are also in use, with similar toxic properties (see <a href="http://www.chemtrust.org/toxicsoup/">http://www.chemtrust.org/toxicsoup/</a>)</p>	
CHEM Trust	Guideline	8	23	<p>This advice needs to be extended to include advice to reduce exposure from other chemicals from household products. People should be advised to vacuum and dust often to prevent the build-up of dust, they should also be advised to not buy stain-resistant carpets</p>	<p>Thank you for your comment. The committee did not have strong evidence on these interventions and so have also cross-referenced the guideline to the NHS advice on allergen for more information</p>

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				and furnishings and to ventilate homes frequently.	
CHEM Trust	Guideline	10	19	<u>As exposure to the chemicals we have listed above have been linked to developmental issues in children it is vital that exposure to the above chemicals during pregnancy are reduced. The advice under Comment 2 needs to be also shared with pregnant mothers. Healthcare professionals may want to advise pregnant mothers to inform themselves of other actions that they can take to reduce their exposure in the home to harmful chemicals via other routes, not just via indoor air pollution. Our website has more tips <a href="https://chemtrust.org/takeaction-home/">https://chemtrust.org/takeaction-home/</a>.</u>	Thank you for your comment. The committee agree and have now added a cross reference to the section on advice and general information on chemical pollutants
CHEM Trust				References to our Comment 1.  Rudel, R. A.; Perovich, L. J. Endocrine disrupting chemicals in indoor and outdoor air Atmos. Environ. 43 (1) 170– 181, 2009 DOI: 10.1016/j.atmosenv.2008.09.025	Thank you for the references  Rudel, R. A.; Perovich, L. J. Endocrine disrupting chemicals in indoor and outdoor air Atmos. Environ. 43 (1) 170– 181, 2009 DOI: 10.1016/j.atmosenv.2008.09.025: This was not included in the evidence review as it does not meet our inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a non-systematic narrative review.  Weschler, C. J. Changes in indoor pollutants since the 1950s Atmos. Environ. 2009, 43 (1) 153– 169, 2009 DOI: 10.1016/j.atmosenv.2008.09.044: This was not included in the evidence review as it does not meet our inclusion criteria as

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				<p>Weschler, C. J. Changes in indoor pollutants since the 1950s Atmos. Environ. 2009, 43 (1) 153– 169, 2009 DOI: 10.1016/j.atmosenv.2008.09.044</p> <p>Susanna D. Mitro et al. Consumer Product Chemicals in Indoor Dust: A Quantitative Meta-analysis of U.S. Studies Environ. Sci. Technol.,50 (19), pp 10661–10672, 2016 DOI: 10.1021/acs.est.6b02023</p> <p>Al-Omran LS, Harrad S. (2016) Distribution pattern of legacy and "novel" brominated flame retardants in different particle size fractions of indoor dust in Birmingham, United Kingdom. Chemosphere;157:124-31</p> <p>European Food Safety Authority (EFSA) EFSA Panel on Contaminants in the Food Chain (CONTAM); Scientific Opinion on Polybrominated Diphenyl Ethers (PBDEs) in Food. EFSA Journal 2011;9(5):2156, 2011</p>	<p>specified in the review protocols (Appendix A of the evidence reviews) as it is a narrative review on the changes in indoor pollutants since the 1950s</p> <p>Susanna D. Mitro et al. Consumer Product Chemicals in Indoor Dust: A Quantitative Meta-analysis of U.S. Studies Environ. Sci. Technol.,50 (19), pp 10661–10672, 2016 DOI: 10.1021/acs.est.6b02023: This was not included in the evidence review as it does not meet our inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a descriptive study addressing consumer product chemicals found in settled indoor dust.</p> <p>Al-Omran LS, Harrad S. (2016) Distribution pattern of legacy and "novel" brominated flame retardants in different particle size fractions of indoor dust in Birmingham, United Kingdom. Chemosphere; 157:124-31: This was not included in the evidence review as it does not meet our inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a a narrative review</p> <p>European Food Safety Authority (EFSA) EFSA Panel on Contaminants in the Food Chain (CONTAM); Scientific Opinion on Polybrominated Diphenyl Ethers (PBDEs) in Food. EFSA Journal 2011;9(5):2156, 2011: This was not included in the evidence review as it does not meet our inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a narrative review</p>

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				<p>Kelley KE, Hernandez-Diaz S, Chaplin EL, Hauser R, Mitchell AA, Identification of phthalates in medications and dietary supplement formulations in the United States and Canada, Environ Health Perspect 120:379-384, 2016</p> <p>Swan SH, Sathyanarayana S, Barrett ES, Janssen S, Liu F, Nguyen RH, Redmon JB, TIDES Study Team, First trimester phthalate exposure and anogenital distance in newborns, Human Reproduction 30:963-972, 2015</p> <p>Carl-Gustaf Bornehag, PhD; et al Association of Prenatal Phthalate Exposure With Language Development in Early Childhood, JAMA Pediatr. 2018;172(12):1169-1176. doi:10.1001/jamapediatrics.2018.3115</p>	<p>Kelley KE, Hernandez-Diaz S, Chaplin EL, Hauser R, Mitchell AA, Identification of phthalates in medications and dietary supplement formulations in the United States and Canada, Environ Health Perspect 120:379-384, 2016: This was not included in the evidence review as it does not meet our inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is not concerned with indoor air quality</p> <p>Swan SH, Sathyanarayana S, Barrett ES, Janssen S, Liu F, Nguyen RH, Redmon JB, TIDES Study Team, First trimester phthalate exposure and anogenital distance in newborns, Human Reproduction 30:963-972, 2015: This was not included in the evidence review as it does not meet our inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is concerned with phthalates from all sources not just airborne</p> <p>Carl-Gustaf Bornehag, PhD; et al Association of Prenatal Phthalate Exposure With Language Development in Early Childhood, JAMA Pediatr. 2018;172(12):1169-1176. doi:10.1001/jamapediatrics.2018.3115: This was not included in the evidence review as it does not meet our inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is concerned with phthalates from all sources not just airborne.</p>

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				<p>Chopra V, Harley K, Lahiff M, Eskenazi B. Association between phthalates and attention deficit disorder and learning disability in the US children, 6-15 years. Environ Res. 128:64-69, 2014</p> <p>Covaci et al, Urinary BPA measurements in children and mothers from six European member states: Overall results and determinants of exposure, Environ Res, 141:77-85, 2015</p> <p>Becker et al., Umweltbundesamt (UBA), Kinder-Umwelt-Survey (KUS) 2003/06, Human-Biomonitoring-Untersuchungen auf Phthalat- und Phenanthrenmetabolite sowie Bisphenol A (German and English summary) <a href="https://www.umweltbundesamt.de/sites/default/files/medien/376/publikationen/umwelt_und_gesundheit_04_2009_kurzfassung_1.pdf">https://www.umweltbundesamt.de/sites/default/files/medien/376/publikationen/umwelt_und_gesundheit_04_2009_kurzfassung_1.pdf</a></p>	<p>Chopra V, Harley K, Lahiff M, Eskenazi B. Association between phthalates and attention deficit disorder and learning disability in the US children, 6-15 years. Environ Res. 128:64-69, 2014: This was not included in the evidence review as it does not meet our inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a cross-sectional study</p> <p>Covaci et al, Urinary BPA measurements in children and mothers from six European member states: Overall results and determinants of exposure, Environ Res, 141:77-85, 2015: This was not included in the evidence review as it does not meet our inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a cross-sectional study</p> <p>Becker et al., Umweltbundesamt (UBA), Kinder-Umwelt-Survey (KUS) 2003/06, Human-Biomonitoring-Untersuchungen auf Phthalat- und Phenanthrenmetabolite sowie Bisphenol A (German and English summary) <a href="https://www.umweltbundesamt.de/sites/default/files/medien/376/publikationen/umwelt_und_gesundheit_04_2009_kurzfassung_1.pdf">https://www.umweltbundesamt.de/sites/default/files/medien/376/publikationen/umwelt_und_gesundheit_04_2009_kurzfassung_1.pdf</a>: This was not included in the evidence review as it does not meet our inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a non-English language study</p>

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				Palanza P, Gioiosa L, vom Saal FS, Parmigiani S, Effects of developmental exposure to bisphenol A on brain and behavior in mice, Environmental Research 108:150-157, 2008	Palanza P, Gioiosa L, vom Saal FS, Parmigiani S, Effects of developmental exposure to bisphenol A on brain and behavior in mice, Environmental Research 108:150-157, 2008: This was not included in the evidence review as it does not meet our inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a study on animals not humans
				Hass U, Christiansen S, Boberg J, Rasmussen MG, Mandrup K, Axelstad M, Low-dose effect of developmental bisphenol A exposure on sperm count and behaviour in rats, Andrology 4:594-607, 2016	Hass U, Christiansen S, Boberg J, Rasmussen MG, Mandrup K, Axelstad M, Low-dose effect of developmental bisphenol A exposure on sperm count and behaviour in rats, Andrology 4:594-607, 2016: This was not included in the evidence review as it does not meet our inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a study on animals not humans
				Perez-Lobato R, Mustieles V, Calvente I, Jimenez-Diaz I, Ramos R, Caballero-Casero N, Lopez-Jimenez FJ, Rubio S, Olea N, Fernandez MF, Exposure to bisphenol A and behavior in school-age children, Neurotoxicology 53:12-19, 2016	Perez-Lobato R, Mustieles V, Calvente I, Jimenez-Diaz I, Ramos R, Caballero-Casero N, Lopez-Jimenez FJ, Rubio S, Olea N, Fernandez MF, Exposure to bisphenol A and behavior in school-age children, Neurotoxicology 53:12-19, 2016: This was not included in the evidence review as it does not meet our inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a cross-sectional study
				Tewar S, Auinger P, Braun JM, Lanphear B, Yolton K, Epstein JN, Ehrlich S, Froehlich TE, Association of bisphenol A exposure and	Tewar S, Auinger P, Braun JM, Lanphear B, Yolton K, Epstein JN, Ehrlich S, Froehlich TE, Association of bisphenol A exposure and attention-deficit/hyperactivity disorder in a

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				<p>attention-deficit/hyperactivity disorder in a national sample of U.S. children, Environmental Research 150:112-118, 2016</p> <p>Ejaderar M, Lee Y, Roberts DJ, Sauve R, Dewey D, Bisphenol A exposure and children's behavior: A systematic review, Journal of Exposure Science and Environmental Epidemiology, 2016, doi:10.1038/jes.2016.8</p>	<p>national sample of U.S. children, Environmental Research 150:112-118, 2016: This was not included in the evidence review as it does not meet our inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a cross-sectional study</p> <p>Ejaderar M, Lee Y, Roberts DJ, Sauve R, Dewey D, Bisphenol A exposure and children's behavior: A systematic review, Journal of Exposure Science and Environmental Epidemiology, 2016, doi:10.1038/jes.2016.8: This was not included in the evidence review as it does not meet our inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a systematic review</p>
Clean Air in London	Guideline	General	General	<p>The made (ie adopted) Knightsbridge Neighbourhood Plan includes requirements for indoor air quality in Policy KBR34 and para 10.7. This plan is the starting place for all determinations of planning applications in Knightsbridge. I Chair that Forum. See: <a href="https://www.knightsbridgeforum.org/media/documents/knp_made_version_december_2018_131218_website.pdf">https://www.knightsbridgeforum.org/media/documents/knp_made_version_december_2018_131218_website.pdf</a></p>	<p>Thank you for your comment.</p>
Clean Air in London	Guideline	General	General	<p>Baroness Jones' Clean Air (Human Rights) Bill includes much about indoor air quality including updating standards, workable mechanisms for reporting etc. For example, please see clause 3 on page 4. I would be pleased to provide more details.</p>	<p>Thank you for your comment and the link provided.</p>

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				<a href="https://services.parliament.uk/Bills/2017-19/cleanairhumanrights.html">https://services.parliament.uk/Bills/2017-19/cleanairhumanrights.html</a>	
Clean Air in London	Guideline	General	General	Buildings regulations (para 11.8.1) set some standards eg NO2.	Thank you for your comment. The committee have already given some examples of international standards that could be used to develop or update standards.
Clean Air in London	Guideline	General	General	WHO guidelines for housing (2018) state that ambient standards apply unless specific IAQ guidelines exist. See para 8.2 on page 95. This is relevant for particulate matter and your recommendations for research on page 15. Please mention these points in your guidelines.	Thank you for your comment. The committee have now added more detail to the rationale for this research recommendation in the evidence review.
Clean Air in London	Guideline	General	General	Are you aware that Professor Holgate is working on recommendations to come out this year?	Thank you for your comment. The committee are aware of the RCPCH work in this area.
Clean Air in London	Guideline	General	General	Are you aware that BB101 for schools referred to IAQ standards that were already out of date when they were published eg EN13779 instead of ISO 16890, ISO 16798 and ISO 10121 and their implemented British equivalents? Please mention these ISO guidelines in yours.	<p>Thank you for your comment. The committee noted that this document was updated in 2018 and refers to some of these listed ISOs.</p> <p>This technical reported (EN13779, ISO 16890, ISO 16798 and ISO 10121) would not have been included in our evidence reviews as the committee prioritised studies that reported health related outcomes over exposure levels. The scope and review protocols (Appendix A of the evidence reviews) set out what will and won't be covered in the guidance (within the time and resources available). However, we will pass your comment to the NICE surveillance team which monitors guidelines to</p>

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					ensure that they are up to date so this prioritisation can be revisited when the guideline is updated.
Clean Air in London	Guideline	General	General	Are you aware of 'Well Building' standards for indoor air?	Thank you for your comment. The committee are aware of these standards and decided to refer to the WHO standard as examples that could be used as a basis for local standards.
Clean Air in London	Guideline	General	General	Last but far from least, I consider that your draft guideline needs to explain the difference between air conditioning, ventilation and air filtration. It is very odd that your guidelines only mention air filtration - which can be standalone or part of an air handling unit - three times when air filtration offers a *total* solution to indoor air quality. Why also is there no mention of the need to clean ventilation ducts where I have seen photos of open cement bags left behind in them?!	<p>Thank you for your comment. The committee did not consider air conditioning an issue as it is rarely provided in UK housing. The committee emphasised in recommendation 1.4.1 and the rationale section that ventilation can be categorised as background for example, by using trickle vents or whole house mechanical systems and to provide increased ventilation as a temporary solution by either using mechanical systems or opening windows where possible and safe.</p> <p>The committee were mindful of the need for mechanical ventilation to be fitted with filtration to protect against outdoor pollutants (recommendation 1.7.5) and the need for ventilation systems to be easily accessible for cleaning or maintenance (recommendation 1.8.4) with simple instructions for residents (recommendation 1.9.3).</p>
Coventry and Warwicks hire Air Quality Alliance	Guideline	1.1.4		Whilst we recognise the importance of partnership working to improve indoor AQ, greater detail on joint actions to take for this recommendation would be helpful	<p>Thank you for your comment.</p> <p>There was a lack of research evidence on the benefits of joint working and local inspection protocols to prevent or reduce indoor air pollution and so the committee were unable to add more detail to this recommendation.</p> <p>However, the committee agreed that staff who visit vulnerable people in their homes are ideally placed to report on poor housing conditions, particularly if there are inspection protocols</p>

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					in place. Sharing this information across different local authorities, subject to local data-sharing arrangements, would speed up the process of assessing and remedying poor housing conditions. Please see the 'prioritising indoor air quality in local strategy or plans' section of the rationale and impact for more information.
Coventry and Warwicks hire Air Quality Alliance		1.1.5 and 1.1.6		Identifying the homes with poor indoor AQ is important to start improving it, however the capacity of professionals visiting homes is already limited and resources/training will be required if more tasks are required of them.	Thank you for your comment. The committee were mindful of the lack of adequate resources facing local authorities. However, the committee noted the statutory requirement on local government to promote health and wellbeing amongst its public and concluded that local authorities would benefit from working with local home improvement agencies and other similar organisations. They stated in the rationale and impact section that this should free up resources and allow them to work with local partners to emphasise the importance of maintaining good air quality in the home.
Coventry and Warwicks hire Air Quality Alliance		1.1.7		Are there any external organisations that provide grants to combat poor indoor AQ that the guidelines can signpost users to?	Thank you for your comment. The committee were not able to provide an exhaustive list of organisations that provide grants but have provided some examples of organisations that could help with providing information, which may include advice on available grants, in the rationale and impact section
Coventry and Warwicks hire Air Quality Alliance		1.3.2		Refer to capacity issues and which information to provide comments above	Thank you for your comment. The committee were mindful of the capacity issues and lack of adequate resources facing local authorities. With this in mind, the committee have outlined the information that professionals need to know and to give advice on (section 1.4 on advice and information for the general population and 1.5 on healthcare professionals) and have

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					recommended that continuing professional development opportunities be used to provide this training (recommendation 1,3.2).
Coventry and Warwicks hire Air Quality Alliance		1.6.1		Any local policies that go above and beyond national requirements are very beneficial, however they can also be challenging to get adopted (and even once adopted can be hard to enforce). They can be done as 'aspirational' standards, which is a positive start, however would be hard for professionals to prioritise (for example when speaking to developers) and are often not prioritised by the home owner/developer etc (for example for financial reasons)	Thank you for your comment. The committee agree that there may be challenges in adopting these recommendations but highlighted that using and updating existing standards will facilitate implementation and adoption.
Coventry and Warwicks hire Air Quality Alliance		1.6.2		All of these named enforceable legislation should already be considered by enforcement teams (although having an additional priority of indoor AQ could be beneficial as a prompt for their work). Are there any plans to investigate the possibility of these national requirements and standards to be increased?	Thank you for your comment. Investigating the possibility of national requirements and standards for enforcement are outside the scope of this guideline.
Coventry and Warwicks hire Air Quality Alliance		1.7 and 1.8		As already mentioned, if it is not already part of national legislation potential extra costs of these actions could discourage developers. Additionally, there needs to be consideration to the impact of availability of Affordable Homes in new developments. Are their cost effective ways that NICE can recommend to engage	Thank you for your comment. This is outside the remit of this guideline, but it was noted by the committee that reducing the risk of the ill effects of poor indoor air quality will reduce the risk of litigation due to 'unhealthy' homes. The committee concluded that this could be an incentive for developers and architects.

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				with developers, architects and designers to create healthy, affordable homes?	
Coventry and Warwicks hire Air Quality Alliance		Chapter 9		We welcome recommendations for further research	Thank you for your comment.
Coventry and Warwicks hire Air Quality Alliance		p21		Pleased to see acknowledgement that many professionals outside of the housing system are unaware of processes within housing - this is something that should be addressed across the board for a host of health related housing issues, not just indoor AQ, however consideration still needs to be given to the capacity of these professionals	Thank you for your comment. The committee were mindful of the capacity issues and lack of adequate resources facing local authorities. With this in mind, the committee have outlined the information that professionals need to know and to give advice on (section 1.4 on advice and information for the general population and 1.5 on healthcare professionals) and have recommended that continuing professional development opportunities be used to provide this training (recommendation 1,3.2).
Coventry and Warwicks hire Air Quality Alliance		Throughout		The guidelines rightly refer in several sections to the need for good ventilation to improve indoor AQ. With this there needs to be more consideration to outdoor air pollution. Is there any research (or planned research) around where the greater health impacts are; ie, if we are encouraging people to ventilate their homes are they at greater or lesser risk from outdoor air pollution coming indoors than if they had not ventilated their home (particularly for those in areas of poor outdoor air quality).	Thank you for your comment. The committee highlighted that a whole building approach to ventilation should be adopted which includes the consideration of outdoor pollution where appropriate. The committee have also drafted a research recommendation on air exchange rates which also covers this point.

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				With outdoor air quality high on the agenda in Public Health, we wouldn't want conflicting messages to be given out, possibly causing confusion and therefore leading to citizens to dismiss all messages	
Coventry and Warwicks hire Air Quality Alliance				Although a much wider piece of work professionals that access people's homes (from all areas and organisations) can play a vital role in enhancing people's health and wellbeing in addition to their specific professional interest. There are many areas that these professionals would benefit in awareness training on (from different aspects of a healthy home, including indoor AQ, through to social isolation, domestic abuse, modern day slavery, healthy lifestyles, fuel poverty etc). Consideration should be given to a package encompassing as many of these as possible as this could be more effective than individual adhoc pieces of training on indoor AQ, individual adhoc training on social isolation etc. However, further resources would be needed to create capacity within frontline teams for this to be undertaken.	Thank you for your comment. The committee agree that there are many competing training needs and resource constraints on professionals that can access people's homes but do recognise that using continuing professional development opportunities on this topic would help local authorities improve public health and reduce inequalities.
Coventry and Warwicks hire Air	Question 1			Which areas will have the biggest impact on practice and be challenging to implement? Please say for whom and why. Enforceable legislation will have the biggest	Thank you for your comment. The committee took all these into consideration when revising the guideline and have added additional text as appropriate.

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Quality Alliance				<p>impact on practice, Joint partnership working and awareness training of professionals could also have a big impact and these will be challenging as all partners tend to have limited capacity and resources already and to engage them to embrace what could be perceived as extra work (and for them to have the capacity to take on extra tasks) with no benefit to that department could be challenging</p> <p>Clarity around the messages that we should be giving about the relative risks/health impacts of indoor pollutions vs outdoor air pollution and what people can best do to reduce their overall risks. Impacts of noise also need to be considered as part of this, or how increasing ventilation may have an impact on energy efficiency of homes</p>	<p>The committee have considered enforcement in terms of including indoor air quality standards as part of enforcement activities ( recommendations 1.6.1 and 1.6.2). The committee have also recommended in 1.8.5 that any variations to heating or ventilation should comply with building regulations. Also, in recommendation 1.9.1 the committee have hyperlinked to the Ministry of Housing, Communities and Local Government's advice on ventilation and Housing health and safety rating system operating guidance as part of using regulatory powers. The committee noted that timelines are important and have included this in recommendation 1.6.2 where they have linked to Building Regulations 2010 and Housing health and safety rating system operating guidance, and the Planning Portal's Failure to comply with the building regulations.</p> <p>The committee were mindful of the lack of adequate resources facing local authorities. However, the committee noted the statutory requirement on local government to promote health and wellbeing amongst its public and concluded that local authorities would benefit from working with local home improvement agencies and other similar organisations. They stated in the rationale and impact section that this should free up resources and allow them to work with local partners to emphasise the importance of maintaining good air quality in the home.</p> <p>The committee agree with the point about relative risk associated with different pollutants and have amended</p>

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					<p>research recommendation 1 to include the relative health of individual or combined pollutants and have included other stressors such as noise in the supporting information for this research recommendation in evidence review 2.</p> <p>The committee agree that increasing ventilation may have an impact on energy efficiency and have recommended a balanced approach be taken to heating, insulation and ventilation (recommendation 1.1.3).</p>
Coventry and Warwicks hire Air Quality Alliance	Question 2			<p>Would implementation of any of the draft recommendations have significant cost implications?</p> <p>Improving existing homes would have a significant cost - if landlords are already meeting national legislation they are likely to be unwilling to spend more to improve the indoor AQ of a rental property. Similarly, if a home owner felt their home was adequate they might be unwilling to invest. Opportunities for grants could benefit this</p> <p>For new developments, there could be extra costs to the developer. There is a risk that these would be handed down to the purchaser, limiting affordable housing and increasing health inequalities in some areas.</p>	<p>Thank you for your comment. The committee were aware of the cost associated with improving homes but were mindful of the statutory requirements under the Homes (Fitness for Human Habitation) Act 2019. The committee also considered that additional cost for the developer may be offset by future savings from reduced health risks due to 'unhealthy' homes.</p>
Coventry and Warwicks	Question 3			<p>What would help users overcome any challenges? (For example, existing practical resources or national initiatives, or examples of</p>	<p>Thank you for your comment. Your comments will be considered by NICE where relevant support activity is being planned.</p>

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hire Air Quality Alliance				<p>good practice.)                      Liked to the comments above, the following could help:                      access to grants for private landlords, social landlords and private homeowners                      improvement to national legislation                      Practical resources to engage with professionals (awareness Comms, training packages - as already mentioned, ideally incorporated with a host of other areas that professionals who visit homes can support with)                      Examples of improvements that were made to a home and how much each of the improvements improved the indoor AQ of that home (and therefore what health benefits each of the improvements achieved)                      Clarity on the problem and solutions that don't have other undesirable consequences, because they conflict with other agendas.</p>	
Doncaster Metropolitan Borough Council	Guideline	General	General	<p>The guidance is useful for providing some clear remedial or preventative actions to improve the home and reduce risk at an individual household level and is useful in identifying those most at risk. The great challenge lies in changing wider property conditions, particularly in the private rented sector. The guidance is also useful in clarifying</p>	<p>Thank you for your comment. The committee were aware of the variation in practice amongst local governments and have highlighted ways to reduce resource impacts whilst meeting the statutory requirements of promoting public health and wellbeing.</p>

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				the role of health professionals and those who visit people in their own homes. My local knowledge leads me to believe that the local resource implications may be greater than estimated by the committee, for example, working with Home Improvement Agencies is suggested as a way to free up resources (pp.-19-20), however, locally some of our home improvement agency services are paid for by LA and NHS partners although householders and the Disabled Facilities Grant contribute to some improvements. Models do differ nationally, though. In addition to this, the resource required to train the workforce who already do home visits wouldn't necessarily be substantial and could fit into existing "health homes" work that some Local Authorities are doing, the additional resource required to take action may be more substantial (this is acknowledged in the guidance). The "housing assessments" and associated resources required to undertake them, and any associated enforcement could be of concern. The guidance acknowledges the increased pressure on the worker, who may already expected to identify and deal with a range of wider issues, but the resource implications of data collection also need to be	

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**Indoor air quality at home**

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28/06/2019 to 09/08/2019**

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				considered. Despite this, improving the home as a way of improving health and preventing poor health is something that we strongly support.	
Doncaster Metropolitan Borough Council	Guideline	General	General	<p>Ambient pollution is monitored at façade there is no monitoring done inside houses for this purpose. However there is plenty of research on the internet regarding and often pollution levels are acknowledged to be higher indoors than out.</p> <p>Poor air quality outside will have a cumulative impact along with poor indoor air quality and contribute specifically where close to roads or industry.</p> <p>In terms of locating development close to roadsides there are various mitigation methods that are employed; including non-opening windows on the roadside and mechanical ventilation. Although these sometimes may conflict with the need to ventilate indoor emissions, but is not something which has been a consideration for us (although windows away from the roadside are fully opening and ventilation generally would not be prevented).</p> <p>This link is not explicit in the guidance and I'm sure that ventilation can be designed to co-benefit the indoor and outdoor pollution however.</p>	<p>Thank you for your comment. The committee agreed with this and made recommendations on ensuring design strategies include provision for removing indoor air pollutants and that ventilation systems should be designed to reduce or avoid exposure to outdoor air pollution, taking into account the government's 2019 clean air strategy. The committee also made recommendations on how to reduce exposure to pollutants from open fuel fires by increasing ventilation when these are being used.</p> <p>The committee agreed with the point on wood burners and noted that the recommendation to design or specify heating that minimises exposure to indoor particulate matter covered this point.</p> <p>The committee agreed that location is an important consideration and have added this and infrastructure to the list of housing conditions that put people at increased risk of exposure, and this includes the possibility of setting properties back from roads to minimise ingress of outdoor air pollution.</p>

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				I would also suggest in the guidance to developers/architects that setting back new properties from the roadside would both help reduce the ingress of outdoor pollution into the home but may also mean we do not have to mitigate with non-opening windows and thus helping ventilate sources of pollution inside. I would also strongly suggest that heating forms such as wood burners or any general solid fuel fires should be discouraged, central gas heating and electric are better.	
Doncaster Metropolitan Borough Council	Guideline	General	General	This is welcome; air quality has largely been ignored up to now in refurbishment projects that concentrate on thermal efficiency often at the expense of air quality. Now we are suffering, especially, in low income homes with poor air quality condensation and mould growth. In these homes it is more likely that the heating will not be being used effectively. With the Homes Fitness for Habitation Act now in force we can be liable for claims if there is bad condensation and mould growth that we would have perhaps been better able to defend under the disrepair protocol.	Thank you for your comment.
Doncaster Metropolitan	Guideline	11	3	Enforcement of Building Regulations is undertaken frequently through the inspection of work in progress but formal enforcement is	Thank you for your comment. The committee considered the resource constraints on local authorities and have edited the rationale and impact sections to address your concerns.

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tan Borough Council				undertaken less frequently due to: BC capacity /resource Meeting Council 'Is enforcement in the public interest' test when the public purse may be at risk Time periods to confirm when non-compliance took place Work may be inspected by Approved Inspectors and hence out of time for enforcement when it comes to light	
Doncaster Metropolitan Borough Council	Guideline	28	19	The scope of application of the Building regulations should extend to include alterations and extensions where a proportionate benefit can be realised	Thank you for your comment. The committee considered that this was covered in the recommendation to use existing building regulation enforcement activities to improve indoor air.
Doncaster Metropolitan Borough Council	Guideline	30	4	The use of gas heating appliances in new dwellings is likely to cease in 2025 as advised by the Committee on Climate Change. Linking this to cooking appliances would assist in lowering	Thank you for your comment. The committee were aware of the recommendations by the Committee on Climate Change around gas heating appliances and considered that while it was relevant, extending this advice to gas cookers was outside the scope of this guideline. The committee considered that the documents were complementary.
Doncaster Metropolitan Borough Council	Guideline	30	9 - 18	Air leakage testing is a significant factor in new dwelling energy use and Building Regulation compliance. Air tightness can however reduce ingress of pollutants through the fabric of the building. Alternative methods of preventing pollutant ingress without resort to opening	Thank you for your comment. The committee agreed and have added more detail to the rationale and impact section.

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				windows should be explored. e.g. positive pressure whole house systems.	
Doncaster Metropolitan Borough Council	Guideline	13	4-11	We already routinely use regulation to control identified damp and mould and ensure homes have suitable and sufficient heating and ventilation via HHSRS inspections and licensing schemes.	Thank you for your comment. the committee were mindful that each local authority will have different property risk profiles based on local factors, for example location in UK and weather patterns. The committee were also aware that there are variations in enforcement practices between local authorities.
Doncaster Metropolitan Borough Council	Guideline	13	13-26	All rental properties already have annual gas safety inspections. Excess heat and cold is routinely considered when undertaking inspections. With regard to ventilation – all rooms must have adequate ventilation and this can typically be achieved via openable windows of sufficient size. Where we are dealing with damp and mould problems we would recommend/require trickle vents and mechanical ventilation on a case by case basis. Gas cookers and gas appliances are required to be subject to an annual safety check	Thank you for your comment, which we are interpreting as support for the recommendations.
Doncaster Metropolitan Borough Council	Guideline	14	1-7	I think this already happens in the main	Thank you for your comment.

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Doncaster Metropolitan Borough Council	Guideline	14	13-19	Advise property manager re low emission items, need for ventilation and ensuring sufficient ventilation if installing gas cooker – Gas cookers can only be installed by a Gas Safe engineer so the need to ensure sufficient ventilation will already be happening.	Thank you for your comment, which we are interpreting as support for the recommendations.
Environmental Public Health team, Health Protection Scotland	Guideline	General		A challenge in writing guidance on indoor air quality is in defining what is meant by this and more particularly how good / poor indoor air quality is defined. The guidance does not appear to define these terms or provide a definition of what acceptable indoor air quality at home might look like (perhaps a difficult definition to describe). The guidance states that pollutants and emissions should be reduced as much as possible. This is an understandable approach but may be difficult in practice, i.e. when will people know that sufficient steps have been taken to reduce pollutants in their home, when might a home simply not be safe to live in and when could it then be said to have been made safe?	Thank you for your comment. The committee were aware of the limits of the evidence around safe thresholds and have drafted a research recommendation for further research in this area.
Environmental Public Health team, Health	Guideline	5	1	We would welcome the addition of indoor air quality to strategies to improve public health as this will help raise the profile and resources given to this area.	Thank you for your comment.

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Protection Scotland					
Environmental Public Health team, Health Protection Scotland	Guideline	6	1	The guideline includes a recommendation on referrals for housing assessments. We would welcome more detail on what these assessments may constitute and how they would determine indoor air quality for households. A number of challenges may arise in this process: how will health and social care staff be able to make an initial assessment of indoor air quality issues? If a housing assessment identifies issues with indoor air quality how will these be addressed, especially if this requires a financial outlay – will the householder be supported to make improvements, how will it be determined that improvements have been sufficient? There is a potential here for health inequalities to be exacerbated if some householders are unable to make necessary improvements because of their individual circumstances.	Thank you for your comment. The committee recommend the use of local inspection protocols and of home visits to identify concerns. If concerns are raised, then a formal housing assessment should be requested, and the committee have drafted recommendations for local authorities to develop a process on how to request a housing assessment. The committee have also recommended joint working with external organisations to help identify grants for repairs or modifications to be carried out to improve indoor air quality and have stated in the rationale and impact section that home improvement agencies provide grants which are generally targeted at vulnerable groups.
Environmental Public Health team, Health	Guideline	8	23	People are advised to choose low-emission furniture / flooring – are these products readily available in the UK and sufficiently labelled?	Thank you for your comment. The committee were aware that not all products have adequate labels but that there are some available and the committee noted government plans for a voluntary labelling scheme, as outlined in the clean air strategy which will support this.

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Protection Scotland					
Environmental Public Health team, Health Protection Scotland	Guideline	9	12	We welcome the guidance for healthcare professionals to ask patients about their housing conditions. Many professionals will already do this and this reflects a holistic approach to care that considers broader determinants of health.	Thank you for your comment.
Environmental Public Health team, Health Protection Scotland	Guideline	18	17	We welcome the comment about the need to ensure that the balance between heating and ventilation is right given the need to consider energy efficiency / costs in homes as well as indoor air quality.	Thank you for your comment.
Environmental Public Health team, Health Protection	Guideline	19	3	The guidance mentions the use of low cost sensors to measure pollutant levels at home. If this approach is recommended there would need to be further information available on choice, cost, quality and accuracy of sensors, plus how householders should act if the sensors identify issues.	Thank you for your comment. The committee have edited the recommendation for clarity to say monitoring of pollutant levels. The committee noted that the guideline outlines how householders can request a housing assessment.

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n Scotland					
Environmental Public Health team, Health Protection Scotland	Guideline	19	18	We welcome the recommendation for neighbouring or similar properties that may be at risk to be identified – this is consistent with a public health approach that could over time improve indoor air quality for a wider population.	Thank you for your comment.
Environmental Public Health team, Health Protection Scotland	Evidence reviews	General		What consideration was given to mental health as a relevant health outcome in the evidence reviews?	Thank you for your comment. Mental health was considered and captured as a health related quality of life (HRQoL) / quality of life (QoL) outcome as pre-specified in the protocols. Mental health was also captured as a stand-alone outcome where reported in included studies. For example, in evidence review 2, data on sleep disorders were provided.
Environmental Public Health team, Health Protection Scotland	Guideline	General		Housing assessments will need to consider the location of houses in terms of exposure to outdoor air pollution, and previous land use, e.g. whether houses have been built on former landfill sites or in ex-mining areas with resulting risk from ground gases such as CO2. We have experience of dealing with issues of indoor air quality in a former mining area	Thank you for your comment. Outdoor air pollution (for example, CO2, methane, radon) are outside the scope of this guideline. The committee agreed that the location of the property was important and have included this in Box 1 as a housing condition that may put people at increased risk of exposure to poor indoor air quality.

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n Scotland				where residents were exposed to high levels of CO2. The risks associated with ingress of other ground sourced gases also need to be explicitly acknowledged, e.g. methane, radon etc.	
Federation of Environmental Trade Associations	Guideline	General		<p>We commend NICE for the thoroughness of their approach and the clarity of the style in which the guide is written. We wholly support the need to increase awareness of this key health topic, particularly regarding its relevance to the vulnerable in society. As an organisation representing manufacturers of ventilation related technologies it has long concerned us that IAQ is not taken seriously enough and, despite our efforts, there is not a clear lead for this within Government (with MHCLG, DEFRA, BEIS and PHE (and the devolved nation equivalents) all involved to varying degrees).</p> <p>We are increasingly exasperated by the Building Regulations conundrum whereby over recent years there has been an increasing fixation with energy efficiency in building design: the consequences being insulation and air tightness have been given priority over the actual quality of the indoor air. The current Building Regulations (in particular Part F) lay down ventilation rates as the design parameter</p>	Thank you for your comment.

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				<p>for dealing with this but, irrespective of whether that is the optimal approach we have to note that there is very little real world evidence as to whether the "as built" standard – or indeed the quality of the installation in the first place – is checked properly.</p> <p>We are already engaged closely with MHCLG in the run up to the imminent Building Regs Consultation (the Grenfell Tower tragedy having been a key factor in this) and we are heartened that they have given an assurance that IAQ will be considered as part of this key work. We would encourage inter-departmental coordination (including NICE) as this work unfolds.</p>	
Federation of Environmental Trade Associations	Guideline	General		<p>Although this particular Guide is specifically about the residential sector we make the general observation that much of it applies equally to the wider built environment. Indeed there are specific sub-sets such as hospitals and schools where IAQ guidance is also very important. We would support any thinking about producing further guides in this series.</p>	<p>Thank you for your comment. We will pass your comment to the NICE surveillance team which monitors guidelines to ensure that they are up to date in order to consider including other built environments in any future update of this guideline.</p>
Federation of Environmental Trade	Guideline	General		<p>There is a presumption, not just in the Guide but across the public perception, that ventilating (and hence improvement of air quality) can be achieved simply by facilitating the ingress of outside air. Of course this is</p>	<p>Thank you for your comment. The guideline does not assume that ventilating and improving indoor air quality can be achieved simply by facilitating the ingress of outside air but highlights that a whole building approach should be considered when ventilating or designing ventilation systems. This should</p>

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Associations				entirely dependent on levels of outdoor pollution and hence we make the point that filtration can have a part to play in ventilation systems too. We have specialist expertise in this field and can offer further input if needed.	include a balance between ventilation, insulation and heating for good indoor air quality. The committee also recognised the risk posed by outdoor air pollution and agreed that opening windows should only be used as a temporary measure to dilute high levels of indoor air pollution.
Federation of Environmental Trade Associations	Guideline	General		Much is rightly made of the links between poor IAQ and poverty, and indeed fuel poverty in particular which can be associated with a natural inclination to associate ventilation with draughts and hence as a cold weather "problem". That said, overheating in times of higher than normal ambient temperature is an increasingly concerning health factor, even in NW Europe, and this should be given equal prominence in any such work.	Thank you for your comment. The committee were mindful of the impact of opening windows on energy efficiency, particularly for vulnerable groups and have therefore emphasised the need for balance between ventilation, insulation and heating for good indoor air quality.
Federation of Environmental Trade Associations				The comments below refer to specific entries in the draft	Thank you for your comments.
Federation of Environmental Trade	Guideline	1	Who is it for?	We would suggest that ventilation system manufacturers be included explicitly.	Thank you for your comment. We have added ventilation system manufacturers to the list.

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Associations					
Federation of Environmental Trade Associations	Overheating	5	9	See point 4 above. We note the excellent NICE guideline on winter deaths – perhaps an overheating version would be appropriate too. In the shorter term we would suggest that wherever the cold weather issue is referred to in this guide consideration be given to also noting the heat related health concerns.	Thank you for your comment. The committee agree and have emphasised the need for balance between ventilation, insulation and heating for good indoor air quality.
Federation of Environmental Trade Associations	Guideline	5	23	It is not clear who these “external” organisations are.	Thank you for your comment. The committee have now edited the rationale and impact section with examples of external organisation who can help with information, advice and grants.
Federation of Environmental Trade Associations	Guideline	10	24 onwards	Both these elements are key – and frankly are key weaknesses in the UK as things stand. We would encourage action which puts pressure on regulators to be both clearer and more prescriptive in their approach and also a change of culture whereby building control is more thorough and not just a requirement where boxes are ticked at the build stage and never re-visited. As observed above at point 1 there are opportunities in the wake of the Grenfell tragedy with studies into building safety to encourage cultural change across the	Thank you for your comment. The committee highlighted in the rationale and impact section that enforcement and prosecution practice may vary across local authorities but emphasised the importance of meeting the government Building Regulations 2010 legislation and Housing health and safety rating system operating guidance.

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				entire sector. Many of those this guide is aimed at should be aspiring to raise their standards accordingly.	
Federation of Environmental Trade Associations	Guideline	11	10	"Consider" is <u>far</u> too weak a term regarding specifying and in the real world is practically meaningless. Again we would cite the Grenfell studies where Dame Judith Hackitt was scathing in her analysis of the deep seated cultural issues whereby maximising profit came before adherence to anything approaching best practice.	Thank you for your comment. The use of 'Consider' here is standard NICE terminology to reflect the certainty in the published evidence that was reviewed and informed this recommendation. In this instance, there was limited evidence on the use of materials that emit low levels of pollutants. Also, the committee did not have any evidence of the cost effectiveness of these materials available to them, which is needed to make recommendations based on effective use of resources.
Federation of Environmental Trade Associations	Guideline	11 and 12	16 onwards	We would thoroughly endorse the points made here (under sections 1.7 and 1.8)	Thank you for your comment.
Federation of Environmental Trade Associations	Recommendations for research	15	25	We would, unsurprisingly, endorse your recommendation about the link between the air exchange rate and IAQ. We will of course be raising this in our work with MHCLG regarding the imminent Building Regs consultation(s) and we will encourage them to ensure close liaison with NICE accordingly.	Thank you for your comment.
Health Canada	Guideline	General	General	We strongly support that the document imbeds indoor air quality education and actions into	Thank you for your comment.

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				existing plans and strategies, at multiple levels of government, and in various sectors, including programs that are not traditionally health-related but have the potential to impact health. This approach appears to be an ideal way to target factors that have a greater impact on improving indoor air quality and its related impacts on health.	
Health Canada	Guideline	General	General	We like the approach that the guideline used for presenting information, particularly publishing the evidence review documents for increased transparency and providing evidence to support the recommendations, but as a separate document to streamline the recommendations. The addition of plain language rationales for advice at the end of the document is also beneficial and will help users gain a deeper understanding of the advice.	Thank you for your comment.
Health Canada	Guideline	General	General	We also commend the focus on advice to residents who are not homeowners and may not be able to fully remediate or prevent sources of poor indoor air quality.	Thank you for your comment.
Health Canada	Guideline	1	box	Although the document states that the guidelines are for members of the public, public seems to be addressed indirectly rather than being a target audience of the document. As general public is affected by the guidelines (framed under the information that is directed	Thank you for your comment. NICE does not provide recommendations or advice specifically to the general public and so the recommendations are for local authorities or healthcare professionals when advising and providing services to the general public. The main audience for each set of

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				to local authorities, health professionals, and other groups), but not a target audience (i.e. the communication style used is not appropriate for the general public, and the guidelines do not tell individuals the actions they should take to improve their own indoor air quality), we would recommend that this be clarified in the target audience statements.	recommendations is identified at the beginning of each section of recommendations.
Health Canada	Guideline	4	Box under line 1	It wasn't clear how the information in the box pertains to the rest of the document. Is this a template that will be changed later? Or a generic statement that is required in all NICE guidelines?	Thank you for your comment. This is a generic statement that is required in all NICE guidelines.
Health Canada	Guideline	4	Box under line 3	We would recommend that the box include babies/young children as a vulnerable population from a biological basis. Babies/children were listed as a vulnerable population under the category of people with increased exposure, but based on line 5 on p. 18, there is evidence of increased vulnerability due to compromised immune systems (also other areas, such as 1.5.6 on p. 10).	Thank you for your comment. The committee have considered this and concluded that they did not have the evidence to include all children in the list of people who may be particularly vulnerable to ill health as a result of exposure to poor indoor air quality. However, they did have evidence for pre-school children and have added this group as a separate bullet to this list.
Health Canada	Guideline	7	Section 1.4	We would suggest that advice to the general population on how to deal with mould, when found and prevent future outbreaks, could also be helpful. Such advice could include, identification of the source of moisture (where possible), cleaning patches of mould when	Thank you for your comment. The committee agreed and have revised this recommendation.

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				found, and wiping accumulated moisture from surfaces such as window sills. Such advice could be helpful, even when the resident does not have the means to fully prevent or remediate moisture sources.	
Health Canada	Guideline	9	18-19	We suggest that the advice for use of household sprays could also include: "use with additional ventilation, when possible" (e.g., open windows, open interior doors, use of exhaust fans/vents).	Thank you for your comment. The committee considered the serious consequences sometimes linked to household sprays especially in people with asthma and agreed to recommend that use of these products should be avoided people whose asthma is triggered by them.
Health Canada	Guideline	17	27-29	We would recommend that compromised immune systems of older people be mentioned in this paragraph, since it was similarly mentioned for pregnant women, babies, and younger children on p. 18, line 5.	Thank you for your comment. The committee noted that not all older people have compromised immune systems and decided not to add this detail.
Health Canada	Guideline	25; 34	9-13; 1-4	We would recommend caution about the wording in these paragraphs, as it might mislead readers to believe that the only concern is for older flooring and furniture. As discussed in an accompanying evidence review document (IAQ @ home [1] Evidence review for association between individual or building characteristics and exposure levels), increased formaldehyde concentrations were associated with newer buildings, and new wall coverings, wood, or flooring. We recommend the inclusion of this information in these sections.	Thank you for your comment. The committee have edited this section for clarity.

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Health Canada	Guideline	35		The context seems like it might be more helpful at the beginning of the document, so we recommend it be moved there (unless this is the typical location for context in NICE guideline templates).	Thank you for your comment. This is the typical location for context in a NICE guideline.
INOVYN Chlorviny Is Limited	Evidence Review 2	31	14	While we have no specific comments on the studies reviewed, we would urge that if assessors wish to make detailed assessments of building materials' potential for release of volatile or semi-volatile ingredients that preferences is given to work conducted under the requirements of the EU Construction products regulation (or equivalent post-BREXIT version in the UK). There is significant test data on materials under EN 16000 assessments.	Thank you for your comment. This information would not have been included in our evidence reviews as the committee prioritised studies that reported health related outcomes over exposure levels. The scope and review protocols set out what will and won't be covered in the guidance (within the time and resources available). However, we will pass your comment to the NICE surveillance team which monitors guidelines to ensure that they are up to date so this prioritisation can be revisited when the guideline is updated.
Liability (Oxford) Ltd	Evidence review 2	76	General	This is the first entry under the heading Risk of Bias (Newcastle-Ottawa Scale). These remarks concerning methodological bias were stimulated by the apparent disconnect between the evidence as reported and many of the statements made following Committee. One potential source of the disconnect is a misunderstanding of evidence, how it is generated and how to assess it. The Committee may have misunderstood the evidence statements and what they might mean. In order to explore this option, the	Thank you for your comment. The evidence review follows the methods outlined in the NICE Guidelines manual (2018) <a href="https://www.nice.org.uk/process/pmg20/chapter/introduction-and-overview">https://www.nice.org.uk/process/pmg20/chapter/introduction-and-overview</a> including the use of GRADE methodology which is widely used by systematic reviewers, for example Cochrane and guideline developers, for example the WHO. In brief, evidence is subject to critical appraisal using GRADE which considers a range of factors including risk of bias for each study included alongside consideration of inconsistency, indirectness and imprecision. These assessments are presented to the committee for discussion. Some amendments may be necessary and then the decisions are ratified by the

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				<p>generation of the evidence statements needs to be understood.</p> <p>The evidence review does not make the following issues clear and this could have led to the mistaken statements made by Committee in this document and in the draft guidance. I would ask that the evidence review be made more clear as concerns the following issues.</p> <p>While it is interesting to have sight of the kinds of bias being assessed, none of the terms was adequately defined in this document. For example, what is a 'community', what does 'representativeness' mean? Without definitions, the method by which they were judged can only be guessed at. Committee should not be invited to guess.</p> <p>These are significant points because reading the evidence statements on their own may prompt false understandings. It is important that the evidence statement generation process be understood and accurately reported.</p> <p>In the following examples, it will become clear why evidence statements could be misunderstood.</p> <p>For example:</p>	<p>committee and reflected in the overall assessment and summarised in the committee discussion section of the guideline.</p> <p>Due to the heterogeneity of methods used in the individual studies and the presence of confounding variables, it was not possible to pool the data and provide a single point estimate across the studies.</p> <p>The evidence statements are intended to provide a high level summary of what the evidence shows. This is supplementary to the committee receiving presentations of the evidence and its assessment using GRADE and the committee's subsequent discussion of that evidence. The committee includes professionals who work in a range of settings including health and social care and local authorities. They represent a broad range of expertise including clinical practice, epidemiology and research methods.</p>

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				<p>Representativeness was not defined but presumably relies on a risk-relevant or, hypothesis-relevant cohort selection mechanism. In which case the risk or hypothesis should be spelled out somewhere, along with how it is to be measured. Once measured and reported, reassuring words like “truly representative” can be judged. The meaning of non-representative can be assessed, and it may even be unimportant to the formation of views.</p> <p>For example:                      The outcome of interest was not present at the start of the study.                      This is most important for studies of recurrent symptoms. Most of the research is about symptoms of uncertain origin.                      The best way to know presence or absence for non-recurrent injury is from high rates of diagnostic assessment as part of the study. Most of the studies fail this standard.                      Failing that, referring to GP notes can be useful if the condition concerned e.g. myocardial infarction, is unlikely to be affected by motivation for diagnosis seeking.                      For conditions which are in any respect elective/affective e.g. asthma, GP notes will be</p>	<p>This is accounted for in GRADE bias assessment – and footnotes are provided in the evidence reviews to explain decisions for downgrading.</p>

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				<p>biased. That bias could correspond with the hazard in question. For example, it could be that people who blame their sufferings on others and who have a habit of complaining, also live in low quality housing. Researchers would have to demonstrate that they were actually measuring new outcomes and not just willingness to complain.</p> <p>It is also important to know if the outcome is relapsing in nature. A symptom-free period at study onset is not evidence of absence of a relapsing condition. All it says is that there was no symptom at one point in time. The condition is not absent but may be recorded as absent when the researcher has not taken relapsing into account. This error could easily be propagated by evidence reviewers and misunderstood by Committee.</p> <p>The researcher should aim to show that at the outset of the study the same proportion and general risk profile applied to relapsing cases in the exposed and unexposed cohorts. Or, correct for the differences. If corrected for, the degree to which correction changes the answer (e.g. an aOR value) will be critical to understanding the meaning of the work. This must be taken into account. Not to do so could easily give the wrong impression of the</p>	

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				<p>precision of the aOR value.                      Self-report for elective diagnoses and especially for relapsing conditions is highly likely to be biased in a relevant way. It is however, possible to measure and correct for "willingness to report" for diseases and living conditions in a psychometrically valid way. This is such an obvious point that failure to correct for 'willingness to report' ought to be marked up as a poor quality study at high risk of bias.</p> <p>Relapsing condition status should ideally be assessed at several time points before the study exposure window is opened. In that way, the uncertainty in diagnostic status can be evaluated. Otherwise fluctuations in diagnostic status after study initiation may be misinterpreted as evidence of new diagnoses. Not to allow for this would be a mistake. How "not present" was actually assessed is not stated in any of the reports.</p> <p>Given the above generalities of diagnostic state detection it should be clear that simply stating that the outcome of interest was not present at the start of the study is not a good measure of bias-free work. The degree of bias depends on how the assessment was made and what kind of outcome it was. For</p>	

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				<p>symptoms such as wheeze the potential for bias is very significant. Committee should have been forcefully reminded of these issues before looking at the evidence statements. The stakeholder would have been reassured if these issues had been acknowledge at p 76 or thereabouts.</p> <p>For example Comparability This term appears to mean that analyses were controlled for cohort profile factors such as sex, age, family history, and smoking. The summary reports do not say whether control was on the basis of causation or on the basis of confounding. It makes a difference! Were the committee aware of the difference? Where controls are applied it is most important to indicate the variation attributable to each. For example, if the measured risk of injury among the exposed is 90% explained by a difference in smoking history then a small error in smoking history data could explain any residual measured risk associated with the hazard of interest. None of the data recorded in this evidence review address this issue. It is not possible to understand an adjusted measured risk if the effect of controlling is not</p>	<p>When drafting the protocols for these reviews, the committee agreed on the outcomes to be included and the ideal length of follow-up to provide the best evidence.</p>

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				<p>reported. Committee should have been forcefully reminded of these issues before looking at the evidence statements. The stakeholder would have been reassured if these issues had been acknowledge at p 76 or thereabouts.</p> <p>For example: The follow-up period was long enough for the outcome to occur. A perfectly logical assessment criterion – avoiding false negatives. However: Why would the outcome period introduce differential bias in exposed and unexposed subjects? Answer. It depends on mechanism. For diseases of a cumulative nature, e.g. atherosclerosis leading to MI, the level of atherosclerosis at study onset needs to be defined. The occurrence of MI during follow-up is not a useful indicator of effect of hazard unless the baseline state is known. Significant changes in atherosclerosis take at least 5 years. For infectious diseases which vary in risk and strain by season, a full year of observation would be needed. For respiratory tract infection, was this the criterion used? An upper limit is also desirable if alternate, but</p>	

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				<p>unmeasured, causes are not to intervene or if the condition of interest is self-resolving. Repeat observation during the study would help with the assessment of this. This problem was not mentioned as a quality criterion.</p> <p>In order to assess whether the study period was long enough for the research reported here we need to answer:                      How long is a causally relevant period for asthma or allergy or aches or sleep loss?                      Please advise as to the criterion applied in this assessment.                      How long is the relevant time period for exacerbation of any of the study conditions?                      Please advise as to the criterion applied in this assessment.                      How long is the relevant time period for aggravation? Please advise as to the criterion applied in this assessment.                      There was no indication as to how "long enough" was decided and how this varied by type of outcome. How long was too long?                      Committee should have been forcefully reminded of these issues before looking at the evidence statements. The stakeholder would have been reassured if these issues had been acknowledged at p 76 or thereabouts.</p>	<p>We had two review questions - one on the association between housing characteristic and exposure levels and the second on the association of exposure and health outcomes.</p>

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				<p>Is Bias the right thing to measure? (my own heading)</p> <p>Assessment of the risk of bias is very useful in forming a view about a body of research evidence. However, just because risk of bias is low doesn't ensure logical congruence of method and interpretation.</p> <ul style="list-style-type: none"> <li>o For example, it is very common for proxy variables to be measured but with no in-study assessment of the interpretability of that proxy measure. High quality, but meaningless work. In this present context, damp walls might be mistaken for a measure of microbial activity and the production of endotoxins.</li> <li>o For example, not measuring exposure to confounding variables such as body sprays, deodorants, clothes washed in scented detergent, frequency of bathing, all of which would significant causes of exposure to PM, VOC and dust mites and could correlate with poor housing, ought to be a flag indicating that the work is hard to interpret. Not biased, just meaningless.</li> </ul> <p>Other measures usually allowed for in risk of bias assessments:</p> <ul style="list-style-type: none"> <li>• Blinding. Especially useful to compare blinded and unblinded studies when affect is a</li> </ul>	

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				<p>part of the picture.</p> <ul style="list-style-type: none"> <li>The degree to which variance is explained by measured confounding factors.</li> </ul> <p>Risk of bias is not on its own a measure of study quality</p> <p>Committee should have been forcefully reminded of these issues before looking at the evidence statements. The stakeholder would have been reassured if these issues had been acknowledge at p 76 or thereabouts.</p> <p>The generation and judgment of evidence statements is critical to the</p> <p>A couple approach would work better...</p>	
Liability (Oxford) Ltd	Evidence review 2	66	6	<p>It says:</p> <p>The committee noted that pollutants such as NO<sub>2</sub>, volatile organic compounds (VOCs), particulate matter (PM) from open solid-fuel fires, polycyclic aromatic hydrocarbons (PAHs for example, naphthalene and benzo[a]pyrene) and biological agents such as mould and pet dander are sometimes associated with many symptoms including those affecting the respiratory, cardiovascular and neurological systems.</p> <p>"Sometimes associated with", is not a finding, it is an uncritical observation. As such it has no purpose in the development of guidelines.</p> <p>There was no mention of naphthalene in any of</p>	<p>Thank you for your comment. We have now removed naphthalene and benzo[a]pyrene as examples of PAHs. We have added text to clarify that the committee phrasing 'sometimes associated with' is due to the variation of findings in the evidence base which meant the committee were unable to state categorically that the pollutants listed were associated with symptoms.</p>

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				<p>the evidence. There was no mention of benzo[a]pyrene (BAP) in any of the evidence. BAP is a common component of PAH produced in combustion processes, but to mention it specifically in the absence of any measure of its relevance is rather puzzling. Unless essential to the logic, such un-evidenced and non-evaluative remarks should not be made. They are misleading. This should be re-written or deleted.</p>	
Liability (Oxford) Ltd	Evidence Review 2	66	17	<p>Many of the studies used self-report rather than objective measures for symptoms. This limited the opportunity to get any pooled estimates of the associations between exposure and symptoms. However, a member of the committee highlighted that where point estimates from different studies showed an association but some of the confidence intervals crossed the line of no effect that the latter is a measure of uncertainty which is reflected in the overall certainty, However the committee considered that this doesn't change the positive association shown in the majority of the studies and this was factored into their decision making.</p> <p>In other words a positive association is a positive associate even if it includes null.</p>	<p>Thank you for your comment. The committee agreed that self-reported outcomes were a consideration for concern regarding this evidence review and was a reason for downgrading. However, this was not the sole reason for not pooling the studies.as many for the studies did not adjust for similar confounding variables. We have edited this text for clarity.</p> <p>We have added more detail to the 'The quality of the evidence' section to clarify how the committee used the evidence to make decisions as follows: The technical team asses a range of factors including risk of bias for each study included alongside consideration of inconsistency, indirectness and imprecision. These assessments are presented to the committee for discussion. No amendments were necessary and then the decisions are ratified by the committee and reflected in the overall assessment and summarised in the committee discussion section of the guideline. As part of this process, the committee recognised the potentially large</p>

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				<p>This position statement is in direct contradiction of the summary statements provided and completely at odds with the tradition of evidence assessment. Confidence limits are useful, but not an absolute measure of significance. Experience of epidemiology shows that unmeasured uncertainties are usually significant in assessing the body of evidence. Error bars in an individual study can't include this kind of trial-to-trial variation and so the compromise convention is to describe associations which include 1.0 as unreliable. To believe otherwise is to tend to believe that science research is subject only to random error. It most certainly is not. On this matter the committee seriously misadvised itself.</p> <p>The stated preference for majority is also a fundamentally flawed approach to evidence reviews.</p> <p>Most of the studies in this body of work are of low or very low quality. There should have been a robust debate as to why they should be counted at all! To even be influenced by them suggests a lack of mental discipline. To count them as in a form of opinion poll, as the committee chose to do, is to count as worthless the evaluative work that was done in</p>	<p>limitations of the research and discussed the likelihood and impact of bias and imprecision with the experts in some detail and avoided the use of simple heuristics to summarise evidence.</p>

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				<p>preparing the evidence statements. It is quite clear from this that the committee was rather inexperienced. This prompted Comment 1 above.</p> <p>I therefore propose that the whole body of evidence should be re-evaluated following a proper explanation of the scientific methodology issues, some of which were outlined in Comment 1.</p>	
Liability (Oxford) Ltd	Evidence review 2	66	41	<p>Evidence suggests that exposure to volatile organic compounds (VOCs) during pregnancy was associated with poor health outcomes for the child, for example, cough or wheeze in the first years of life.</p> <p>In fact there was one worthwhile study that found a moderate association with wheeze. To draw attention to this observation is to suggest the finding was more conclusive than this. This is a mistake of policy.</p> <p>If it is the intention to draw uncritical attention to every reported association, whether from a high, moderate or low quality study, then this should be done systematically. Otherwise the Committee is at risk of being accused of sensation seeking.</p> <p>This draft text (quoted above) should either be deleted or a clear statement made as to why attention was drawn to it.</p>	<p>Thank you for your comment. The committee assessed the evidence base in its entirety and then used their expertise to interpret the findings. This is consistent with NICE methodology for developing guidance as laid out in "Developing NICE guidelines the manual 2018". Cough and wheeze are just used as examples.</p>

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Liability (Oxford) Ltd	Guideline	4	Box.1 and a general remark	<p>Page 4 of the draft guidance lists (in Box.1) those who may be particularly vulnerable to air quality-related ill health as those who have pre-existing health conditions such as asthma, allergies or CVD, pregnant women, older people, the housebound. While this sounds like a considered statement drawing attention to different degrees of risk,</p> <p>1) the evidence that healthy people are at risk at all is vanishingly slight. There are no different degrees of risk, only risk in already unhealthy people.</p> <p>2) the description of being vulnerable to ill health is also misleading as it is only exacerbation of existing symptoms that finds clear support from the evidence. Cause and aggravate are not evidenced but most people would assume that both these terms are included in the meaning of the term term ill-health. To leave any reader with such an impression is a mistake.</p> <p>This mistake is propagated throughout the guidance. For example, (at 1.1.1) local authorities are advised to plan to improve air quality in order to improve people's health. An evidence based statement would have been aimed at reducing symptoms.</p>	<p>Thank you for your comment. The committee agreed that it was difficult to determine cause and effect. However, there was limited evidence on healthy populations. On balance the committee considered that local authorities should give general advice on simple actions that could reduce the risk of exposure to poor indoor air quality.</p> <p>This statement on the cost-effectiveness of advice is based on evidence identified in the effectiveness and cost effectiveness reviews and NICE prefers HRQOL outcomes where available.</p>

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				<p>The relationship between ill-health and exacerbation of symptoms is an interesting one and should be researched in the air quality context. Research from other fields finds that reported exacerbation is a health-related problem when the patient either cannot or, prefers not to cope or, sees an advantage. This is a psychosocial phenomenon and should have been corrected for in much of the research presented here. It either wasn't, or, the authors of the evidence section were not alert to its significance and left it out of their summary reports.</p> <p>In high quality research, subjects would be studied without the influence of affect or opportunity loss. To describe studies as high quality when the recorded health state is subject to affect or personal politics would also be a mistake unless the effect of both was corrected for. This would usually be obvious from the study design.</p> <p>This is such an important aspect of symptom research that it is greatly surprising that the evidence commentary didn't mention it specifically and the evidence summaries didn't</p>	

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				<p>have bias criterion especially for affect correction. Some of the evidence described as having low bias was from studies where symptoms were self-reported. Without correction for affect, this is a mistake.</p> <p>A sub-project of interest here would be to record the number of positive health concern findings which become insignificant when outcomes were objectively determined. The general experience is that affect-sensitive outcomes move directly from significant to insignificant association. If this was reviewed by the expert panel it should lead to a very different Box 1.</p> <p>An alternative, if no affect-free research is available, is to note the number of times an association is reported as significant and compare with the number of times it is reported as not significant. In blinded work of equal power, affect dominated findings will often show equal numbers in both.</p> <p>Affect affected research is potentially preferred by evidence committees with a particular policy to pursue. Was this the case? The mistake is propagated throughout the draft</p>	

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		17	16	guide.  As an example: Poor indoor air quality is a risk to everyone's health on page 17 line 16. This goes way beyond what can usefully be said if restricted to the actual evidence.	
		24	3	Another example on page 24 beginning in line 3: Evidence also showed that giving people advice on how to reduce or prevent indoor air pollution is cost effective for people who are already ill, because it can prevent their condition worsening. This is completely false. There was no evidence of aggravation and so it follows that any expense towards prevention of aggravation is a cost without foreseeable benefit to the person concerned. It cannot therefore be cost-effective.	
		25	17	On page 25: The committee agreed that research is needed on ways to improve indoor air quality for people who do not have pre-existing health conditions that put them at risk from poor indoor air quality. True, good research is always useful, but the presumption is that it must be the case that healthy people are being put at risk. This is NOT supported by the evidence and many of the statements in evidence review 2 confirm that the committee	

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				<p>were aware of this. Why did this change when the guidance was drafted? Once re-educated, the Committee should be asked to write new draft guidance with a well-judged and accurate relationship to the evidence.</p>	
Liability (Oxford) Ltd	Guideline	17	27	<p>The Box.1 contents are to identify personal and circumstantial characteristics of vulnerability which increase the risk of ill health. For example, being pregnant. Being pregnant does not indicate that air quality is affecting ill-health. The guidance is either mis-stated or intended to make a political change. Box 1 also says that older people are in the class of persons more at risk yet on page 17 at line 27 of the draft There was no evidence on the effect of poor indoor air quality on older people. It seems likely that Box 1 would be more often looked at than the text on page 17. Readers will be misinformed. Committee should decide which of the versions of the evidence is correct and stick to it.</p>	<p>Thank you for your comment. The committee noted that the scope of this guideline stated "The guideline will look at inequalities relating to the impact of indoor air pollution on: children, older people, people with disabilities, pregnant women, people with pre-existing medical conditions (for example, respiratory and cardiovascular conditions) and disadvantaged groups." While no evidence for older people was identified for evidence review 2 the committee used their experience and expertise to reach a consensus that older people should be included in the list of those who are vulnerable. The committee discussed that respiratory and other systems weaken as people get older reducing the ability to eliminate chemicals from the body. The evidence for the ill health of exposure to poor air quality while pregnant was considered sufficiently robust by the committee to enable them to add pregnant women to the list of those vulnerable. The committee discussed that this could be due to the fact a woman's immune system is altered while they are pregnant.</p>
Liability (Oxford) Ltd	Guideline	9	9	<p>It says: Explain that indoor air pollutants (including nitrogen dioxide, damp, mould, particulate matter and VOCs) can trigger or exacerbate asthma, other respiratory</p>	<p>Thank you for your comment. The committee used their experience and expertise to interpret the evidence and link evidence to recommendations. The committee agreed that increased inhaler use could be interpreted as a proxy for</p>

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				<p>conditions or cardiovascular conditions. The evidence for triggering attacks was not obvious in any section. Exacerbation of asthma was nearly always evidenced by wheeze, but some studies noted the frequency of medication use. The latter being an affect-sensitive measure and is therefore unreliable. There was no high quality evidence relating to CVD. In general terms the advice goes beyond what is actually found, but seems logical, e.g. candles can be a source of exposure to PM, and, if an aerosol triggers an asthma attack then don't use it. Some, are less certain, for example, the proposed counterproductive effect of opening windows for ventilation if the dwelling is near a busy road. This goes way beyond the realm of "must be true". To be certain of this, the different chemical reaction fates of NO<sub>2</sub> would need to be known, the presence of reagents would need to be known and a balanced kinetic model prepared. It is far from self-evident that the outcome would imply leaving the window closed, with all the hypothesised disadvantages of doing so. Also, it is asserted that pregnant women may have compromised immune systems and so may be more vulnerable. This prejudice at</p>	<p>asthma attacks. The committee also deliberated over the recommendation to open windows when near sources of outdoor air pollution such as busy roads but noted that this was a common way of using purge ventilation to prevent the build-up of indoor air pollutants, for example, whilst cooking on a gas stove.</p>

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				<p>least explains why pregnancy is included in Box 1. Pregnancy is a time of heightened immune potency. The use of committee members own experience in drafting guidance is not wrong in principle but where this has occurred it should be allowed for that it is wrong in fact. Users of the guidance should be advised to check for themselves. Extemporisation from well-intentioned but misguided findings to circumstances not actually addressed by the evidence, but seem like common sense to some people, should be avoided. I propose that Committee go back to the evidence, and once they have properly understood it, write guidance which is directly supported by that evidence and extemporise only when ruthlessly logical to do so.</p>	
Liability (Oxford) Ltd	Guideline	26	16	<p>There is a reasonable [but inaccurate] statement of case on page 26 of the draft guidance beginning at line 16. Good evidence showed that exposure to poor indoor air quality is linked to a range of health problems. This includes respiratory conditions such as a cough, wheezing or asthma, and allergic symptoms such as a runny nose or eye irritation.</p>	Thank you for your comment. The committee agreed and have edited the text for clarity.

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				<p>Based on the evidence, the committee agreed that if people keep getting these type of symptoms – or they are getting worse – then they might be linked to the home environment. In the first part of this, the definition of poor indoor air quality is precisely that it does exacerbate those symptoms. A circular statement. Circularity doesn't help. Please avoid it.</p> <p>Continuing with this first part: It should be understood that cough and wheezing are not respiratory conditions, but they are symptoms. The statement as it is, is a mistake. Asthma is a condition which is evidenced to some extent by wheezing. 'Wheezing or asthma' may be a misleading combination of words. Please review.</p> <p>Runny nose and eye irritation can be associated with allergy but they are not specific to allergy. A careless reader might think he has an allergy if he has a runny nose or eye irritation. Surely it would better to avoid such misunderstandings? Please review.</p> <p>If these caveats are understood then the statement in the first part is informative. In simpler terms: some aspects of air quality can exacerbate the symptoms of pre-existing ill-health. This would do as an accurate substitute</p>	

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				<p>for the first part. The second part is a useful speculation that may help medical practitioners in relieving symptoms.</p>	
Liability (Oxford) Ltd	Guideline and evidence review		General remarks	<p>It is good practice for Committee to produce a summary evidence statement at the end of each evidence subsection. The statements should be indexed in some way. Each can then be referred to in discussion. Each should be rated with some description of the confidence in that summary statement. This might draw attention to the strengths and weaknesses of the evidence before giving a final verdict. The full set of statements should be reproduced immediately ahead of the narrative opinion given about the evidence. Each such opinion should also be indexed in some way. These can then be referred to in Draft Guidance. Some would describe this methodical approach as being auditable. Without an auditable trail of evidence, the risk is that opinion statements and guidance seem arbitrary, incomplete and potentially subject to an unstated purpose. NICE has a good record in evidence assessment. Perhaps NICE should review the</p>	<p>Thank you for your comment. Due to the varied nature of the evidence base it was not often possible to pool data and obtain an overall effect size to summarise the evidence. As such, overarching summary evidence statements were not possible in this guideline and the committee used the evidence statements based on individual studies as reported when discussing the evidence and drafting the recommendations.</p> <p>The evidence reviews, expert testimony and guideline (the latter includes the committee's consideration of the evidence) are all published on the NICE website and in this regard provides an audit trail of the evidence that informed the development of the guideline. These documents can be assessed on the NICE website by clicking through from the recommendations.</p>

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				way this present guidance project was approached?	
National Energy Action	Guideline	General	General	<p>National Energy Action (NEA) response draft NICE guideline on Indoor Air Quality About National Energy Action (NEA)</p> <p>NEA works across England, Wales and Northern Ireland to ensure that everyone in the UK can afford to live in a warm, dry home. To achieve this, we aim to improve access to energy and debt advice, provide training, support energy efficiency policies, deliver local projects, carry out research and co-ordinate other related services which can help change lives. This practical insight plays a crucial part in enhancing the authenticity and insights within NEA's national advocacy.</p> <p>Background to this response</p> <p>Research suggests that the factors which cause fuel poverty, including living on a low income and living in an energy inefficient property, may also increase poor indoor air quality (including Carbon Monoxide CO) risk in domestic dwellings.</p> <p>Ezratty et al. speculate that low income households may be exposed to unsafe levels of CO because in efforts to meet heating costs 'they may reduce ventilation and use unsuitable heating appliances'. Similarly,</p>	Thank you for your comment. The committee agreed and have edited the guideline where appropriate to reflect the issues of low socio-economic status and fuel poverty.

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				<p>Ormandy and Ezratty suggest that households in fuel poverty may resort to using inappropriate unflued heat sources while Sterling and Sterling cite the use of gas stoves for room heating in low income housing as an area of concern. , Measuring CO concentrations in low income households, Croxford et al. found levels above recommended guidelines in 18% of homes, generally caused by old and poorly maintained gas appliances. The authors speculate fuel poverty could increase CO concentrations if households reduce ventilation to retain heat while keeping their old and inefficient appliances.</p> <p>Meanwhile, a gas appliance investigation carried out by Croxford for the UK Health and Safety Executive (HSE) found a higher prevalence of problem and unsafe gas appliances in homes with occupants in receipt of benefits. Kokkarinen et al. also found that residents in deprived areas of Liverpool and Coventry were less likely to own a CO alarm than residents in non-deprived areas, while homeowners were more likely to own alarms relative to tenants. They suggest fuel poverty could be a reason for low alarm ownership rates if households prioritise other basic needs</p>	

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				<p>over purchasing an alarm.</p> <p>Overall, these findings indicate a possible link between vulnerability to fuel poverty and elevated poor indoor air quality (including CO) risk. Households on low incomes and in vulnerable situations may be living with older, inefficient and riskier heating appliances, using heating appliances inappropriately such as reducing ventilation to retain heat or are unable to maintain or upgrade appliances or purchase a CO alarm for cost reasons.</p> <p>Our response to this consultation</p> <p>NEA's response to this consultation is structured as a general comment on the draft guideline and includes information based on NEA's experience and insight around:</p> <ul style="list-style-type: none"> <li>- Identifying fuel poor households as being at risk of poor indoor air quality</li> <li>- Identifying actors additional to those already highlighted by NICE as having a role to play in minimising the risk of poor indoor air quality in fuel poor households</li> <li>- Outlining vulnerability-related considerations that should be taken into account when designing behaviour change interventions relating to improving indoor air quality</li> <li>- Presenting case studies of work carried out by NEA to monitor ventilation and indoor air</li> </ul>	

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				quality as part of energy efficiency interventions Risk of low indoor air quality in fuel poor households In 2017 NEA carried out research for the Gas Safety Trust to investigate the relationship between fuel poverty and carbon monoxide (CO) risk in households on low incomes and in vulnerable situations. Over the course of two heating seasons (October to April) in 2015/16 and 2016/17 NEA collected data from 349 households, targeting those on low incomes and with a range of vulnerabilities. The main conclusion to draw from this and other existing research is that the factors which cause or expose households to the risk of fuel poverty – low income, poor quality housing and the age and health of occupants – can impact on the heating and servicing behaviours of households to elevate CO risk in homes. NEA therefore believes that NICE should explicitly list fuel poor households as one of the groups facing an elevated risk of experiencing indoor air pollution. Our study that fuel poor households are at an elevated risk of experiencing indoor air pollution through the following insights: • CO and temperature measurements were	

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				recorded in 90 homes. CO data showed 35% of properties with exceedances (spikes) greater than 10 ppm (the threshold at which prolonged exposure can have possible health effects) and 22% recorded spikes greater than 10 ppm lasting longer than 15 minutes. Statistical analysis showed that the number of CO spikes increased in households with lower minimum and mean temperature. This could indicate a possible relationship between under-heating and elevated CO. Notably, one fifth of households with extended CO spikes (lasting longer than 15 minutes) reported rarely turning their central heating on and a number were fuel poor under the Government definition. Furthermore, working-age households, amongst which the highest fuel poverty rates are found across England, recorded lower mean temperatures in our study and also a greater number of CO spike events. <ul style="list-style-type: none"> <li>• Nearly half of participants had combustion secondary space heating in their homes (mainly gas and solid fuel fires). These appliances emerged as a key source of warmth for households vulnerable to fuel poverty and a possible cause of CO spikes in these properties. Specifically, households displaying financial, structural, health and age</li> </ul>	

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				<p>vulnerabilities were more likely to be reliant on a gas or solid fuel fire; running it for extended periods in place of central heating or together with a primary system. Factors contributing to this behaviour were: low income (preventing a household replacing an inefficient boiler, installing first time central heating or causing occupants to ration central heating); a lack of agency amongst tenants (forced into using secondary heating to cope with a cold home); and susceptibility to the cold (where attempts to achieve adequate warmth led to households relying on a fire to supplement their primary system). Using these appliances frequently and for long periods increases opportunity to be exposed to CO from these sources, particularly if the appliances are older and not maintained.</p> <ul style="list-style-type: none"> <li>• While servicing rates of boilers in the sample were relatively high, only 40% of gas fires were reported by households as checked over the past 12 months. Cost was cited as a factor by 21% of owner-occupants with un-serviced appliances. This group of households may be conscious of gas safety but do not always have the disposable income available to practise gas safe behaviour.</li> <li>• Another area of concern is gas cookers.</li> </ul>	

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				<p>While 59% of homes had a gas cooker fitted only one quarter report having this appliance checked. Amongst households monitored for CO, maximum CO levels were significantly increased in homes with ovens fuelled by mains gas or Liquefied Petroleum Gas (LPG) and also hobs fuelled by mains gas or LPG. Worryingly, a lack of awareness that cookers can pose a CO risk was observed widely in the sample. Additionally, in social rented properties, most tenant-owned cookers are going un-serviced as they are not covered by landlord safety checks. Neglect of these appliances is particularly concerning given 15% of households with gas cookers reported using the appliance for room heating. While this behaviour is not practised regularly, the factors which drive fuel poverty – living on a low income and in an inefficient home – are contributing to a small but notable number of households turning to their cooker occasionally as a source of ‘cheap’ and ‘instant’ heat or because their primary system is insufficient.</p> <ul style="list-style-type: none"> <li>• Of 132 households where CO alarm ownership could be verified, 35% had an alarm fitted. Rates of ownership were highest in the owner-occupied sector (44%) while 22% of alarm owners reported receiving theirs from a</li> </ul>	

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				<p>charity, local authority or fire and rescue service. This underlines the importance of frontline service providers in supporting and protecting vulnerable households. One factor contributing to low alarm ownership rates may be a lack of awareness about the dangers of CO, particularly in comparison to the threat of fire in homes. CO-related behaviours were perceived by households to pose less risk relative to behaviours such as failing to fit a smoke alarm. Furthermore, not servicing a boiler was considered less risky than not having a CO alarm fitted. This is concerning given CO alarms should not replace maintenance of appliances.</p> <p>Additional actors with a role to play in minimising the risk of poor indoor air quality in fuel poor homes:                      Gas Distribution Networks (GDNs)                      NICE rightly notes that a key role is required for frontline service providers such as local authorities and community organisations, who are already reaching and protecting households in need. However, NEA emphasises that these agencies should be supported to deliver integrated fuel poverty and CO safety initiatives, including providing</p>	<p>Gas distribution networks are outside the scope of this guideline.</p>

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			<p>measures such as CO alarms to fuel poor households. Here, there is a clear role for gas distribution network companies (GDNs) to support these agencies. GDNs have existing obligations on fuel poverty and CO awareness under the regulator Ofgem’s RIIO-GD1 price control model. Ofgem is likely to further incentivise the gas networks to join up action on fuel poverty and CO awareness in the next price control period (RIIO-GD2, after 2021). Under the price control model which specifies what outputs and revenues the GDNs (natural monopolies) must deliver to, and can collect from, consumers, Ofgem requires the GDNs to connect a certain number of fuel poor homes to the gas networks they own and manage in order to address fuel poverty in off gas homes. They also maintain a Priority Services Register (PSR), a free service provided by suppliers and network operators to customers in need. Each energy supplier and GDN maintains its own register. Customers on the PSR may be eligible for free services such as free gas safety checks (e.g. for appliances such as a gas boiler) once every 12 months. This is available for customers who are:</p> <ul style="list-style-type: none"> <li>- In receipt of a means-tested benefit and live with a child under five;</li> <li>- in receipt of a means-tested benefit and:</li> <li>- are of pensionable age, disabled or chronically sick and live alone; or</li> </ul>	
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				<p>- are of pensionable age, disabled or chronically sick and live with others who are all of pensionable age, disabled, chronically sick or under 18.</p> <p>For those who do not own their own home and live in rented accommodation (both social housing and PRS), the responsibility for such checks falls to the landlord.</p> <p>Research carried out by NEA suggests that Gas Distribution Networks (GDNs) can disconnect up to 3,000 immediately dangerous appliances from supply. If a household faces financial or other barriers to repairing or replacing their faulty appliance there is a risk that occupants will be left without a critical heating or cooking supply and that, by resorting to unsafe or unserviced secondary appliances, may face an elevated risk of low indoor air quality.</p> <p>Currently, when offering follow-up support, company practice varies but is mainly limited to issuing temporary electric heating and cooking appliances and advising the occupant to contact a Gas Safe engineer or their landlord to arrange repairs. Leave-behind materials provided by engineers following a gas disconnection do not often signpost customers to sources of financial aid which</p>	

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				<p>could support low income households repair or replace an appliance. For example, energy supplier trust funds and local and national fuel poverty schemes. This is a particular issue for private tenure households who may have less recourse to support than in social housing. It is not common practice for GDNs and their engineers to refer vulnerable customers into local or national services for follow-up support. Despite this, local service providers are undertaking critical work to assist vulnerable households following gas disconnections. We have identified case studies of some households being supported by organisations in the local government and charity sectors after being off supply for months and even years. Such households, often with pre-existing vulnerabilities such as mental ill health, have fallen through gaps in communication and service provision to increase detriment following a gas disconnection.</p> <p>Network engineers would benefit from further training and assistance to identify household vulnerability and advise on and refer to follow-up support. In rental properties, while it is encouraging that GDNs take steps to notify the landlord of an unsafe appliance, this contact</p>	<p>Training of network engineers is outside the scope of this guideline and it is recommended in NICE's guideline on winter deaths and illness and cold homes (Recommendation 10 on Train heating engineers, meter installers and those providing building insulation to help vulnerable people at home).</p>

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				<p>relies on the tenant providing the GDN with the landlord's address details. This step will not always be sufficient in cases where vulnerable tenants cannot represent their interests or take critical next steps. In such cases, improved communication between GDNs and local councils is recommended. Here, local authorities could make best use of existing legal powers to threaten enforcement action against landlords if condemned appliances create health and safety hazards (e.g. excess cold).</p> <p>Gas Distribution Networks (GDNs) and energy suppliers:</p> <p>There are further ways that gas networks and suppliers could work together, and with third sector and local authority partners to support customers at risk of poor indoor air quality, which could be further highlighted within the NICE guideline. For example, NEA has been working with Northern Gas Networks to pilot a new protocol for safeguarding vulnerable customers during the disconnection process. This involves making every contact count when it comes to identifying vulnerability; adopting a risk-based approach to vulnerability; providing support at the most immediate (local) level by referring customers</p>	

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				<p>on for follow-up support; making best use of existing partnerships and services to get such support to households, and prioritising a simple, streamlined and time-sensitive protocol.</p> <p>Industry-wide recommendations could include developing principles to improve safeguards for customers with condemned gas appliances/installations, similar to Energy UK's improved standards for prepayment meter customers. Companies could then set out working practices to meet these principles. They could also consider opportunities to establish an industry fund to finance remedial work in low income and vulnerable households with critical appliances disconnected from supply and no recourse to alternative funding sources.</p> <p>NEA would also recommend that gas networks and suppliers explore how improvements to PSR data recording and sharing being led through the ENA Safeguarding Customers Working Group can assist engineers to identify, record and refer vulnerable households during visits to disconnect supply. This should include, where appropriate, using the DNO PSR to update customer records when vulnerabilities have been identified and</p>	

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**Indoor air quality at home**

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				<p>passporting households into free gas safety checks through the gas supplier PSR. Energy industry Historically, non-gas homes have disproportionately missed out on heating measures under ECO and our research has found that rural households with boilers not fuelled by mains gas are disproportionately older, riskier and inefficient models. Rural off-gas homes are at increased risk of living in severe fuel poverty, nor are they served by free safety checks of gas appliances offered to low income owner-occupants under the Priority Services Register (PSR). For both energy affordability and safety reasons these households must be targeted in future government energy efficiency programmes. Specifically, NEA recommends a minimum target for installation of first-time central heating systems ECO (from October 2018) and that this target is aligned to Ofgem's fuel poor network extension scheme to provide free connections to the mains gas network for fuel poor non-gas homes. As such, NEA highlights the role of energy suppliers, energy efficiency scheme delivery bodies, Ofgem, the UK Government and gas distribution networks in working to join up available energy efficiency</p>	

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				<p>support to deliver targeted affordable warmth interventions that can simultaneously reduce the risk of poor indoor air quality in fuel poor homes.</p> <p>Gas suppliers are required to offer free gas safety checks to low income and vulnerable households, but the volume of these checks has historically been very low. This is unfortunate because this service can help to address CO risk in low income owner-occupant households who may be neglecting to service appliances for cost reasons but may also be more susceptible to adverse effects from CO exposure for reasons of age or ill health. The gas industry (suppliers and network distributors) have a clear role to play in addressing indoor air quality by increasing sign-up low income and vulnerable customers to the PSR and passport eligible households into annual free servicing plans.</p> <p>Changing indoor air quality-related behaviours in fuel poor homes</p> <p>Households servicing gas boilers do not always extend this behaviour to include other gas appliances in the home. Gas cookers in particular are perceived to pose a low CO risk relative to boilers and households are largely unaware that such appliances require</p>	

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				<p>maintenance. Gas safety messages should be made clearer to communicate about the risks posed by different gas appliances and advised on their proper installation, use and maintenance. Gas fires and gas cookers should be prioritised in such messages and catch-all and ambiguous terms such as 'appliance' should be avoided.</p> <p>Safety may not always be the most effective message to prompt households to check their appliances. Instead, an understanding of the appliance and household type should inform CO campaigns. For example, emphasising reliability and comfort may help drive boiler servicing, particularly in older age households susceptible to the cold. While a focus on safety may be more suitable for appliances such as cookers. Amongst low income families and working-age households, integrated CO and fuel poverty interventions should be considered. Clear messaging about landlord and tenant responsibilities is also critical, particularly in social rented housing where appliances are more likely to be owned by tenants and not covered by landlord gas safety checks. Households off mains gas should be targeted with bespoke campaigns addressing servicing of oil, solid fuel and LPG appliances.</p>	

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				<p>Energy efficiency interventions and ventilation: insights from NEA projects</p> <p>The Technical Innovation Fund (TIF) was designed and administered by NEA, and formed part of a larger £26.2m Health and Innovation Programme (HIP) (2015-2018). TIF facilitated a number of trials to identify the suitability of a range of technologies in different household and property types and had two strands: a large measures programme to fund the installation and evaluation of technologies costing up to a maximum £7,400 per household, and a smaller measures programme with up to the value of £1,000 per household. As part of the technical project evaluations, NEA assessed changes to humidity and ventilation in properties following an intervention.</p> <p>Example: Airtightness measures Ceredigion County Council</p> <p>This project used airtightness tests to identify sources of uncontrolled ventilation and cold spots in poor energy efficiency (SAP bands D - G) properties in a rural area of Wales, highly exposed to sea winds, often solid-walled or other hard-to-treat (HTT) construction, and most not being served by mains gas. Results of the tests highlighted appropriate airtightness</p>	

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				<p>measures which could be installed to address and reduce uncontrolled air exchange, to provide energy savings and improved comfort to residents vulnerable to fuel poverty. A variety of technologies were tested as required for each property: general sealant around floors, skirting boards, window-sills, chimneys, and entry points for utility pipes; QuattroSeal expandable sealant on windows, doors and loft hatches; door / window repairs or replacement; insulation around water tanks; secondary glazing; under-floor insulation; and heat recovery ventilation.</p> <p>The tests identified that in high humidity properties, humidity levels can be better controlled after installation of the measures. However, one home still had very high living room humidity levels after the measures, which could be due to over-occupation of the property. We also found that in order for measures to be effective, behaviour change is needed and that households may need to form the habit of actively airing cooler rooms like bedrooms by opening windows at the warmest time of day, now that uncontrolled ventilation has been reduced.</p> <p>NEA agrees with NICE that further research on the inter-relationship between domestic energy</p>	

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				efficiency, ventilation and indoor humidity is required. However, NEA feels that the UK Government, Ofgem and suppliers delivering mandated schemes such as ECO should work to develop appropriate guidance and specification for the delivery of energy efficiency support that take ventilation and indoor air quality into account. Furthermore, installers, engineers and energy efficiency delivery bodies should be required to pay due attention to ventilation and building materials used when providing energy efficiency interventions in fuel poor households, and this should be captured as part of scheme reporting/auditing requirements.	
Norfolk County Council	Guideline	1	general	There appears to be little, if any specific reference to residents of care homes, sheltered accommodation or similar. Do the recommendations need to cover providers of such accommodation?	Thank you for your comment. The committee noted that the evidence on indoor air quality in care homes or sheltered accommodation was limited but agreed that the recommendations also apply to these properties.
Norfolk County Council	Guideline	1	general	We suggest adding suppliers and retailers of DIY/improvement products to the list on page 1.	Thank you for your comment. The committee agreed and have added the suggested text.
Norfolk County Council	Guideline	4	3	In box 1, under housing conditions, please could you add smokers within the household and solid fuel heating. We welcome the reference to smoking and to current NICE guidance on smoking in the home later in the	Thank you for your comment. The committee agreed and have added people exposed to smoke in their home to the list of people who are vulnerable,

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				publication and feel this should be given more prominence earlier on.	
Norfolk County Council	Guideline	5	General	At various points the document refers to the local authority. It would be appropriate to differentiate between the tiers of local government or to specify the local authority function that is being referred to. To use the generic term local authorities is unhelpful where functions are split between upper and lower tier authorities, for example private sector housing is a function of a lower tier authority through its environmental health function, public health is located within upper tier authorities.	Thank you for your comment. The committee discussed your comment and how best to target each recommendation to the appropriate level or tier of local authority. The committee did not consider that this was feasible given the different responsibilities the each local authority has and concluded that it would be more appropriate to include a statement at the front of the recommendations as follows "For the purposes of this guideline, the term 'local authorities' covers all types of local authority in England; these are county councils, district councils, unitary authorities, metropolitan districts and London boroughs. Each local authority should decide which of the following recommendations are relevant to their local responsibilities".
Norfolk County Council	Guideline	5	15	Could the recommendation for local inspection of indoor air quality be included within a broader inspection protocol for housing quality. It doesn't appear practical to separate it in this way.	Thank you for your comment. The committee concluded that inspection protocols, including visual inspection, checklists or monitoring, should be used during home visits as a means to identify homes where a formal housing assessment may be needed.
Norfolk County Council	Guideline	6	3	We agree that it makes sense to use existing inspection processes where possible. However this may be difficult to make effective for those visitors with little or no direct housing knowledge and / or under other priority time constraints such as e.g. health or social care visitors. It may be unrealistic to expect training could be provided to up-skill health and social	Thank you for your comment and the suggested e-learning package.

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				care visitors though this may be possible through an e-learning package such as a module within 'All our health' <a href="https://www.e-lfh.org.uk/programmes/all-our-health/">https://www.e-lfh.org.uk/programmes/all-our-health/</a> .	
Norfolk County Council	Guideline	6	4	There may be a number of residents either unknown to services or not needing their input for whom there are no pre-existing visit processes for whom robust and understandable messaging may be the only reasonable way of passing on good practice. A communications strategy as referred to in 1.3.1 needs to accommodate this.	Thank you for your comment. The committee agreed that there may be a number of residents who will be or need to be in contact with local authorities but concluded that existing local authority communication strategies would be targeted at all residents, not just those who are in contact with local authority provided services. Existing communication strategies could include leaflets or newsletters delivered to every property in the area.
Norfolk County Council	Guideline	6	12	Local communications will probably go so far and we would welcome a wider national easy to understand campaign to reinforce messaging (e.g. along the lines of 5 a day, "Know Your Numbers" etc.)	Thank you for your comment. NICE produces evidence-based guidance and advice for health, public health and social care practitioners ( <a href="https://www.nice.org.uk/about/what-we-do">https://www.nice.org.uk/about/what-we-do</a> ) so recommendations for central government are outside of the remit of NICE. Your comment will be considered by NICE where relevant support activity is being planned.
Norfolk County Council	Guideline	9	12	We welcome support for medical professionals to engage in discussions about housing conditions and how, for example, they may be able to link to possible Primary Care Network funded social prescribers to triage appropriate support.	Thank you for your comment.
Norfolk County Council	Guideline	10	25	Unsure whether the ability to design and enforce local building regulations would require more robust national standards and we would	Thank you for your comment. Your comment will be considered by NICE where relevant support activity is being planned.

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				want to avoid the risk of different standards in different local authority areas.	
Norfolk County Council	Guideline	11	23	There may be a potential conflict of priorities where windows should be opened for indoor AQ concerns but in e.g. urban centre or conversion of flats under "permitted development" they are designed shut to minimise external AQ and / or noise pollution. Clear advice on the balance or mechanical options to meet all criteria would be helpful nationally or via a recognised design body.	Thank you for your comment. The committee were aware of the risks associated with both indoor and outdoor sources of pollution and have recommended a balanced approach to heating and ventilation (recommendation 1.1.3) as well as the use of purge ventilation, for example opening windows (recommendations 1.4.1 to reduce damp and condensation, 1.4.3 to increase ventilation when indoor air pollution may be high, 1.7.4 to ensure design strategies make provision for removing indoor pollution and 1.7.5 to design ventilation systems to reduce or avoid exposure to outdoor air pollution) as a temporary solution to high levels of indoor air pollution. The committee have expanded on this in the rationale and impact section for Heating and ventilation and for vulnerable groups.
Norfolk County Council	Guideline	12	15	Here (and elsewhere) references to e.g. low VOC materials and products should tie in with outcomes of the Clean Air Strategy and clean and understandable labelling for new and old products to make consumer, builder and DIY choices easy.	Thank you for your comment. The committee were aware of the government plan for a voluntary labelling scheme as outlined in the clean air strategy 2019 and drafted these recommendations to ensure that this guideline is consistent with and complements the clean air strategy and facilitates the use of low VOC materials and products.
Norfolk County Council	Guideline	17	12	Agree that indoor air quality should be a consideration within air quality management zone action plans but recognise that air quality management zones often only cover part of the local authority area. Could the guidance state or provide examples of which other local	Thank you for your comment. The committee have given examples, in recommendation 1.1.1 of local authority strategies and policies that could be used, such as policies in wellbeing or inequalities. The committee have also inserted text stating that local authorities that have been declared an 'air quality management area' must have an air quality action plan

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				authority health related strategies it is referring to?	which should include indoor air quality in the home. Please see rationale and impact section on 'prioritising indoor air quality in local strategy or plans'.
Norfolk County Council	Guideline	18	16	Agree that the balance between ventilation, damp and affordable warmth is a complex one, especially in existing stock requiring some form of retrofit. We need to recognise that for low income households, for example, the perception of venting expensive energy to the outside world may be counter-intuitive	Thank you for your comment. The committee agreed with this point and emphasised the need to balance heating, insulation and ventilation.
Norfolk County Council	Guideline	19	24	The problem here is that the resource to deliver the home visits for example or enforce local standards will fall on one partner (e.g. local authority) but savings accrue to another (e.g. primary and secondary care). System wide savings may not be cashable and / or sit disproportionately across organisations	Thank you for your comment. The committee were mindful of the lack of adequate resources facing local government. However, the committee noted the statutory requirement on local government to promote health and wellbeing amongst its public and have provided examples of how local government can make best use of resources by working efficiently with other organisations.
Norfolk County Council	Guideline	20	3	Agree that this training is required alongside time allocated within the "day job" to convey these messages. This has cost implications for e.g. health and social care colleagues	Thank you for your comment. The committee highlighted that training could be covered alongside continuous professional development. The committee also noted that increased time to give this advice could lead to future savings.
Norfolk County Council	Guideline	22	16	It is important that residents have information which allows them to assess relative risk and benefit and cost e.g. indoor AQ vs. warmth vs. external AQ to avoid unintended consequences. For example high profile messaging about external AQ may have inadvertently made people more prone to stay	Thank you for your comment. The committee agreed that this is a difficult area and have made recommendations for local authorities to use existing communication strategies to raise awareness on the risks of poor indoor air quality (recommendation 1.3.2) and simple steps members of the public can take to reduce exposure in recommendation 1.4.1 by using ventilation to reduce damp and condensation or in

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				inside where AQ may be as bad as well as impacting physical activity.	recommendation 1.4.3 to increase ventilation when indoor air pollution may be high. The committee also emphasised the risks associated with both indoor and outdoor sources of pollution and have recommended a balanced approach to heating and ventilation (recommendation 1.1.3).
Norfolk County Council	Guideline	22	20	Agree with these comments about low income households (see response 8)	Thank you for your comment.
Norfolk County Council	Guideline	23	15	We are not convinced there would not need to be additional resource, or at least resource deployed in different organisations (see previous comments above), however a nationally developed training resource (for example 'all our health') and national communications campaigns could help.	Thank you for your comment. The committee were mindful of the information and training that staff may need and have highlighted that professional development opportunities could be used to do this. However, it is outside of the remit of NICE guidelines to advise on nationally organised training. Our guidelines make evidence-based recommendations to local government, the NHS, social care and other organisations on how to improve the health and well-being of individuals and local communities.
North Yorkshire County Council	Guideline	General	General	Guideline does not set the context. Suggest moving page 35, context, to the beginning of the guideline	Thank you for your comment. This is the typical location for context in a NICE guideline.
North Yorkshire County Council	Guideline	General	General	Guideline does not specifically cover smoking indoors, this is a missed opportunity	Thank you for your comment. The committee have inserted cross-references to other NICE guidance on smoking and have added people exposed to smoke in their homes to the list of vulnerable groups.
North Yorkshire	Guideline	5	12	Needs context here so readers are educated as to what improves AQ in people's homes	Thank you for your comment. The committee have added a cross-reference to the raising awareness and advice sections for clarity.

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County Council					
North Yorkshire County Council	Guideline	5	15	What local inspection protocols? May be better to say link with staff who visit people's homes e.g.: social care, Fire and Rescue Service, Health Visitors etc. Link to page 18 line 22	Thank you for your comment. The committee have added details on local inspections and the professionals who may need this information.
North Yorkshire County Council	Guideline	5	25	Use audit data, what audit data do you mean? May be better to suggest locally people listed in box 1 are identified	Thank you for your comment. The audit data refers to data collected during local inspection. The committee have signposted the reader to recommendation 1.1.5 for clarity and have re-ordered the recommendations in this section for ease of use.
North Yorkshire County Council	Guideline	6	23	Staff groups will need more guidance on how to identify – refer to 1.4 and the context section on page 35	Thank you for your comment. The committee agreed and have added a cross reference to section 1.4.
Nottingham City Council	Guideline	4	Box 1	In addition to the 8 points, there are additional factors and behaviours that increase the risk of exposure of poor indoor air quality and perhaps ought to be mentioned as a third group:- 'Factors and behaviours that increase the risk of exposure to poor indoor air quality: Fuel poverty, leading to occupiers keeping windows closed, occluding window/wall vents and installing temporary insulation measures to reduce heat loss in winter, leading to increased humidity/higher risk of condensation/mould etc. and increased risk of	Thank you for comment. The committee sought to highlight examples of people who may be vulnerable to ill health as a result of exposure to poor indoor air quality rather than provide a detailed account of all vulnerable groups and their circumstances and have added in text on activities that might contribute to poor indoor air quality and a cross-reference to section 1.4 (Advice and information for the general population).

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				<p>carbon monoxide emissions from gas fires and chronic health effects. Lack of available secure drying space to dry clothing. Results in clothing being dried in the home, again increasing humidity and reducing real and perceived effectiveness of radiators/heating – increased fuel costs, Use of 'air fresheners', often used to counter pet odour, cooking odour, damp/mould odour Cleaning regimen and frequency (particularly of vacuuming – and type of vacuum cleaner) and cleaning product use.</p>	
Nottingham City Council	Guideline	4	3	Reference to groups outside of the HHSRS i.e. 'vulnerable groups' – although some are clearly vulnerable to air quality. LAs can't consider occupants when rating so will affect banding of hazard, but we can still take action on cat 2's and can consider the vulnerable group at this point. Ventilation is not a specific hazard but cuts across a number HHSRS hazards	Thank you for your comment. The committee agreed with your point,
Nottingham City Council	Guideline	5	9	Balanced approach ought to also include education and behavioural change to reduce emissions/concentrations and exposure in the home covering: sources of indoor air pollution, importance of and correct use of installed passive/active ventilation systems, activity/behaviour that increases/reduces	Thank you for your comment. The committee agreed and have added a cross-reference to the raising awareness and advice sections for clarity.

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				indoor air pollution and risks including drying clothing, cleaning regimen and cleaning product/chemical use. Advice and education material can be available on Local Authority and others websites, and provided to landlords and tenants as part of enquiries to LAs and LA regulatory activity re housing.	
Nottingham City Council	Guideline	5	9-11	Need to consider the approach in other national guidance documents, i.e., CIEH guidance on the enforcement of excess cold, and linking to fuel poverty strategies, both national and local.	Thank you for your comment. The committee noted existing national guidance in the rationale and impact section.
Nottingham City Council	Guideline	5	23-24	Grants will be important as this is going to be another economic pressure on PRS landlords as well as home owners. This could also be tied into funding to achieve MEES as they are linked. Removing the current restrictions on ECO could help with this; rather than focusing on boilers and external insulation, recognising alternative heating technologies and insulation of flat roofs, rooms in roof etc.	Thank you for your comment. The committee agreed that identifying grants to support home improvement are a useful tool for local authorities.
Nottingham City Council	Guideline	6	3-9	Assuming that reference to a 'housing assessment' would be carried out by Environmental Health, resourcing of this would be an issue if this led to increased complaints.  How is the poor indoor air quality going to be	Thank you for your comment. The committee agreed that this could have a resource impact and lead to more housing assessments and more remedial work or legal actions, However the committee also noted that improved health outcomes and resource savings elsewhere in the system might offset costs. The committee also considered the impact of not

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				<p>identified? This will place a training need on the 'identifier' to ensure quality of referrals,</p> <ul style="list-style-type: none"> <li>- Will different referrals be developed for differing tenures? Will Local authorities be able to levy a charge for assessments depending on tenure?</li> <li>- When we talk about identifying poor air quality, will this be a uniform, measured standard?</li> <li>- HHSRS physiological hazards 1. Damp &amp; mould, 4. Asbestos and MMF, 5. Biocides, 6. Carbon monoxide and fuel combustion products, 8. Radiation, 9. Uncombusted fuel gas and 10. VOC'S</li> <li>- The above hazards 4,5,6,8,9,10 are probably the least rated and understood, even amongst EHO practitioners, a national training need?</li> </ul> <p>Referral mechanisms from NHS clinics and GPs should be considered as part of an NHS-LA action plan established within the Health and Wellbeing board's health protection and/or health improvement plan(s).</p> <p>It is worth noting as you state that Cat 1 hazards under HHSRS , the Council has a duty to act. However as many of these indoor</p>	<p>taking action. This may increase the risk of any future litigation arising from 'unhealthy' homes.</p> <p>The committee agree that the training staff will incur costs but considered that continuing professional development opportunities could be used for this purpose to minimise costs and standardise the quality of referrals.</p> <p>The committed outlined that there are different processes for requesting a housing assessment based on tenure and these are outlined in the section on 'Why the committee made the recommendations' for referral pathways.</p>

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**Indoor air quality at home**

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				<p>pollutants, (Except mould and VOCs) may be undetectable to the human nose. Extraction systems are advisable to be fitted and must be fitted under building regulations, however, officers may need additional sampling kit to evidence a need for them to be fitted if cant be detected using the olfactory sense which is neither scientific, measurable/ quantifiable. HHSRS doesn't take into account those sensitise to a particular allergen or those with breathing difficulties. It uses ages of person. The guidance may need to be more person specific in its risk assesmsment to thos sensitised with ailments such as COPD, asthma etc. Could this lead to Landlords refusing people with allergies in the future? This may sit better as a health service function? Additional test equipment is needed..</p>	
Nottingham City Council	Guideline	6	12-14	<p>When we talk about LA raising awareness there is a wide difference in who would be best placed to engage members of the public, relevant professions, property management and letting agencies, landlords, Housing Associations, school curriculum etc. Awareness campaigns on cigarettes have been effective for second hand smoke, something similar could be used for indoor air quality.</p>	<p>Thank you for your comment. The committee agreed that existing communication strategies were an efficient way of raising awareness The committee were mindful of the increased vulnerability of those on low incomes.</p>

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				<p>The majority of the problems are financial. People can't afford to heat homes. People can't afford to privately rent a decent quality home. People are tied to areas due to schools, services, family support etc. People have other priorities such as feeding family and paying rent.</p> <p>Some of the tax on tobacco could be used to pay for this service.</p> <p>People on low incomes should get free mattress protectors.</p>	
Nottingham City Council	Guideline	6	15-18	Landlords often focus on how 'residents activities' affect air quality; i.e., damp and mould/condensation/ventilation, so this information needs to be delivered carefully alongside other causal relationships.	Thank you for your comment. The committee were aware of this and also made recommendations (1.9) to ensure property managers and landlords uphold their duty of care to the residents.
Nottingham City Council	Guideline	7	4-14	<p>– a major barrier to this giving of such advice will be language barriers and the lack of available funding around translation services.</p> <ul style="list-style-type: none"> <li>- alongside training around the air quality, agencies having realistic expectations around what repairs and improvement are likely to be achievable</li> <li>- Engagement of planning and Building Control, and private building control companies around property conversions to prevent flaws in design that impact on indoor air quality before they occur</li> </ul>	Thank you for your comment. The committee agreed with your point and noted that local authorities will have plans in place to deal with language barriers. The committee were also minded to ensure that the recommendations on building regulations apply to refurbishments as well as new builds.

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Nottingham City Council	Guideline	7	17-25	– Resources for translated materials - Guidance needed for landlords and property professionals on reducing the likelihood of condensation by improving heating and ventilation rather than blaming the tenants lifestyle	Thank you for your comment. Resources for translations should be within existing communication strategies. The committee have highlighted housing conditions and activities that may contribute to poor indoor air quality and have cross-referenced to section 1.4 (Advice and information for the general population) in Box 1 which covers examples of people who may be vulnerable to ill health as a result of exposure to poor indoor air quality.  The committee have also recommended that property managers and landlords develop and undertake maintenance programmes in recommendation 1.9.3.
Nottingham City Council	Guideline	9	12-15	– necessary but bear in mind the possibility of landlords targeting certain groups of people to avoid renting to, or attempting to evict anyone they find to have certain illnesses	Thank you for your comment.
Nottingham City Council	Guideline	10	25	'Update existing standards or develop new ones for indoor air quality.' This will not be as simple to do as building control and other regulators cannot do this alone. Changes to regulations and standards requires relevant government departments to co-ordinate a holistic review of building materials/design, standards and regulations with those professions and organisations involved in design and construction e.g. BRE, RIBA, ARICS, CIBSE, and for the DoH to set indoor air quality standards or design criteria	Thank you for your comment. The committee agreed that this would have resource implications and have suggested that using existing international guidelines will minimise the resource impact of developing new standards or updating existing ones. The committee were also aware of government plans to set up a voluntary labelling scheme for VOCs. The committee also drafted research recommendations to quantify the health effects of individual and combined air pollutants and a research recommendation on air exchange

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				for the regs/guidance to achieve: incorporating ventilation systems (with heat recovery(?) to achieve minimum air changes for the dwelling (based on typical occupancy for a 1, 2 3 etc. bedroom property), All new dwellings designed with sufficient and secure clothing drying spaces, Require all new build property to have mechanical systems that adequately ventilate kitchens and bathrooms (recirculating/filter systems are likely not to be adequate, require ongoing maintenance). If Environmental Health/Building Control are to resolve issues in existing buildings there needs to be affordable and practicable low power ventilation systems with heat recovery that can be retrofitted by landlords and home owners that achieve appropriate ventilation rates AND minimise heat loss. How will standards be improved within existing property without a robust method of assessment / measurement of indoor air quality against a standard which leads to a specific HHSRS Cat 1 hazard & which will be able to withstand appeal by landlords & agents?	rates. If carried out, this research should help with the issues raised. The committee made a recommendation on a balanced approach to heating, insulation and ventilation which covers some of the suggested additions.

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Nottingham City Council	Guideline	11	3	Reducing local authority resources could result in an inadequate level of regulatory oversight by Building Control of new build, refurbishment and conversions, and subsequent check/enforcement activity.	Thank you for comment. While the committee acknowledged the constraints on local authority resources, they also agreed that local authorities have a responsibility regarding public health and so have suggested ways to minimise costs for the recommendations.
Nottingham City Council	Guideline	11	3-7	review of private building control firms needed	Thank you for your comment. This is outside the scope of this guideline.
Nottingham City Council	Guideline	13	5-6	in terms of prompt regulation, good education needed of First Tier Tribunals in terms of the importance of effective regulation in this area or LA enforcement will be overturned	Thank you for your comment. The committee agreed with this point but noted that the recommendations on raising awareness and advice for the public would increase knowledge of the hazards posed by poor indoor air quality.
Nottingham City Council	Guideline	13	7-11	Insert additional reference to CIEH guidance on tackling excess cold hazards	Thank you for your comment. The committee considered that reference to the existing NICE guideline on excess winter deaths was sufficient.
Nottingham City Council	Guideline	13	14-18	in terms of preventing excessive heat loss, educating practitioners and the First Tier Tribunal about the importance of insulating properties adequately	Thank you for your comment. The committee agreed with this point but noted that the recommendations on raising awareness and advice for the public would increase knowledge of the hazards posed by poor indoor air quality.
Nottingham City Council	Guideline	14	9-12	it's important that education and guidance should all be made as concise as possible, currently landlords find it confusing to understand differing standard; planning, building control, HHSRS, MEES, licensing – don't impose another standard without tying it all together.	Thank you for your comment. In the section on rental properties, the committee sought to highlight the responsibilities of property managers and landlords around compliance with design and regulation requirements (recommendation 1.9.2), for regular maintenance of heating and ventilation systems (recommendation 1.9.3), the health risks of poor indoor air (recommendation 1.9.4) and steps that they can take (section 1.9 and 1.4).

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Nottingham City Council	Evidence	17	23-26	In Nottingham's experience this isn't really accurate, houses are assessed on an individual basis, we can't say homes with serious damp problem have a cat 1 hazard, we could say they are likely to perhaps.	Thank you for your comment. The committee agreed and have edited this section.
Nottingham City Council	Evidence	18	10-15	calling for more LA's to assess crowding and space under HHSRS rather than using the outdated Housing Act 1985 would assist with removing more overcrowded housing, however this has obvious impacts on the housing stock.	Thank you for your comment. The committee have added more detail to this paragraph.
Nottingham City Council	Evidence	18	16-21	any requirements for insulation should also go hand in hand with ventilation, works for any property should be assessed individually and great care given where standard clauses for schedules of work re used. This is of particular relevance in the increase of older buildings converted into housing in change from their original use – i.e., listed buildings, converted pubs and offices etc.	Thank you for your comment. The committee agreed and have emphasised the need for a balanced approach to heating, insulation and ventilation.
Nottingham City Council	Evidence	20	7-11	this is a good idea in theory, but in practice doesn't tend to happen, the health cost calculator is poorly used in terms of existing HHSRS assessments and improvement works because of the additional time cost involved in doing this.	Thank you for your comment.
Nottingham City Council	Evidence	21	4-8	increased awareness among private homeowners carried many difficulties. Whilst LA EH can and should use their part 1 powers	Thank you for your comment. The committee considered that local authorities would have processes in place to deal with owner-occupied properties where poor indoor air quality has

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				as appropriate, there is the burden and complications that comes with finding a cat 1 hazard in an owner occupied home, and the duty to take the most appropriate course of action. Does the owner agree with course of action? Where there is limited budget, should an LA be using their resources to carry out extensive work in default on owner occupied homes?	been identified or suspected, and have stated in the rationale and impact section for 'Referrals for a housing assessment' that owner-occupiers can ask the local authority for advice.
Nottingham City Council	Recommendations for research			Additional research into ventilation system designs for new homes and for retrofit to existing properties that achieve appropriate ventilation air exchange rates. The systems should be either passive/very low energy/very low maintenance/high reliability designs with good heat energy recovery to warm incoming fresh ventilation air using heat recovered from the extracted air.	Thank you for your comment. The committee have expanded on the supporting information to the research recommendation in the evidence review to cover this point.
Nottingham City Council	Q1			Health visitors and Environmental Health (Housing) Professionals. Why- 1, Financial, 2, Time, 3, Lack of trained professionals. 4, Austerity forced on Councils. 5, Priorities. 6, Legal issues - Taking action under part 1 of the HA2004 related to a person specific health	Thank you for your comment. The issues raised have been covered in the rationale and impact section where the committee discuss the resource impact of the recommendations as well as their responsibilities to improve public health.

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				issue rather than age group doesn't meet the HHSRS regulations, operating guidance, enforcement guidance and Housing Act 2004.	
Nottingham City Council	Q2			Cost Implications – Though we currently do look at a number of these issues while undertaking HHSRS inspections, we are already stretched and prioritised and triage complaints such that these may not get prioritised. An increase in requests for inspection may lead to further delays for other possibly more pressing health and safety risks.	Thank you for comment. While the committee acknowledged the constraints on resources, they noted that local authorities have a responsibility for public health and have suggested ways to minimise the costs of these recommendations.
Nottingham City Council	Q3			Education on how to heat, ventilate and insulate a home. End of austerity to increase income for low end, You tube public health advice scheme. How to ventilate, how to heat, how to avoid mould, how the three (Heating ventilation and insulation) interact. Rate properties on their susceptibility to mould (scores on doors).	Thank you for your comment and the examples provided.
Oxfordshire County Council	Guideline	General	General	Its positive to have NICE guidance to provide guidelines and direction on the role of Indoor Air Quality	Thank you for your comment.
Oxfordshire County Council	Guideline	General	General	Was there a reason why Radon was not mentioned at all, it being an indoor air pollutant that can cause health problems?	Thank you for your comment. Radon is outside the scope of this guidance.

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Oxfordshire County Council	Guideline	General	General	There seemed to be a lack of understanding around the differences between local authorities, whether as a Unitary authority, with social housing, a County Council, who has a public health function and District Councils who have the housing standards and Building Regulation functions. This could undermine the confidence in the advice offered.	Thank you for your comment. The committee discussed your comment and how best to target each recommendation to the appropriate level or tier of local authority. The committee did not consider that this was feasible given the different responsibilities the each local authority has and concluded that it would be more appropriate to include a statement at the front of the recommendations as follows "For the purposes of this guideline, the term 'local authorities' covers all types of local authority in England; these are county councils, district councils, unitary authorities, metropolitan districts and London boroughs. Each local authority should decide which of the following recommendations are relevant to their local responsibilities.
Oxfordshire County Council	Guideline	General	General	At times it was not clear which "staff" were being tasked with housing assessments, whether it was health care staff of local authority/Environmental Health staff, or indeed "other" staff/professions. Would be useful to elucidate which professions rather than just "staff". It will make it easier to direct the recommendations to a particular professional group to own the task. As so many organisations are involved responsibilities for compliance need to be clearly stated.	Thank you for your comment. The committee agreed that this relates to local authority staff and health and social care professionals who may visit homes. This is elaborated on in the 'why the committee made the recommendations' section for referral pathways.
Oxfordshire	Guideline	General	General	There could be some additional detail about which healthcare staff you wish to target. For example, highlighting respiratory nurses,	Thank you for your comment. The committee agreed that and have added community health services to this recommendation.

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County Council				respiratory physiotherapists, District nurses, as well as including social care staff, who visit older people's homes to provide personal care.	
Oxfordshire County Council	Guideline	General	General	The distinction between social housing owned by a local authority, a Registered Social Landlord and private landlords seemed to get muddled, particularly when talking about the possible remedies open to tenants.	Thank you for your comment. This has now been amended so that recommendations 1.9.3, 1.9.4 and 1.9.5 are targeted at property managers and landlords. The committee have clarified that the recommendations in this section are for local authorities and covers both private and public rented housing.
Oxfordshire County Council	Guideline	General	General	<p>From Oxfordshire's experience working on a pilot project to deliver improvements to care to respiratory patients through an Integrated Respiratory Team (consisting of a respiratory consultant from the acute NHS trust, respiratory nurses and pulmonary physiotherapists from the community NHS trust, and others) there is</p> <p>a) Patchy buy-in to the concept that indoor (and outdoor) air quality matters to the health outcomes of a patient with COPD or asthma in the clinical staff.</p> <p>b) The lack of awareness that indoor air quality has an impact on health and what those risk factors are.</p> <p>c) The priority it is given, as demonstrated by its lack of appearance in patient advice on how to manage their condition, its lack of inclusion on pulmonary rehabilitation courses and self-management plans.</p>	Thank you for your comment. The committee discussed this comment and have now added additional text around activities that might contribute to poor indoor air quality. The committee noted that there was a general lack of awareness around the risks posed by poor indoor air quality. The committee have drafted recommendations for different groups of professionals including health care professionals, architects and property managers as well as for local authorities and the general public. These recommendations also highlighted steps that can be taken to avoid poor indoor air quality and if this is not possible on how to mitigate it.

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				<p>d) The confidence for health care staff to have these conversations about indoor air quality. This is replicated across all wider determinant conversations (weight, smoking, physical activity)</p> <p>e) Confusion between the advice to open windows but keep them closed if near a road with poor outdoor air quality or on a high air pollution day.</p> <p>f) The time clinicians have due to the pressures on the NHS to acquire, implement and deliver this “new” knowledge and additional referral to make. Practically there is a challenge in local authority two tier areas and where NHS trusts and CCG footprints do not match, clinicians (and commissioners) struggle to navigate the local district council footprints to make a referral, even if they even know about the offer of housing assessments from Environmental Health.</p> <p>There is a focus on tenants which only make up about 20% of the market. The remaining 80% is owner occupied homes and in particular the over 65s are more likely to own their home, outright perhaps. Those over 75 (and owning their own home) are more likely to have pre-existing health conditions, particularly</p>	<p>The committee were mindful that the majority of people are not tenants but noted that owner-occupiers can also request housing assessments.</p> <p>The committee considered that people over 75 with pre-existing health conditions are covered by the recommendations for healthcare professionals.</p> <p>The committee agreed and noted the recommendation to work with external agencies to identify grants to support home improvements.</p>

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				<p>COPD and other respiratory conditions, that will be affected by poor air quality and therefore in the shorter term will have a bigger impact on the NHS through unplanned and emergency admissions.</p> <p>It would be useful to see in the guidelines improve the advice/points around information and advice and support to help older people maintain their homes, particularly through home improvement agencies and consider those occupiers who may be cash poor and asset rich, as well as less able to navigate the demands of project management to instruct and oversee repair works necessary.</p> <p>Box 1 – It seems like it is missing a section on “householder behaviours”, which could include overcrowding. Behaviours such as smoking, drying washing indoors, cooking/ventilation practices, use of candles/incense.</p> <p>Could be useful to be more explicit and mention health and wellbeing strategy and the inclusion in the Joint Strategic Needs Assessment.</p> <p>Could be useful to have some examples of some good practice. Could cite the referral</p>	<p>The committee have now added reference to occupant behaviours in Box 1</p> <p>The committee have suggested health and wellbeing strategy as an example of an existing strategy that could be used</p> <p>The committee have recommended that local authorities so that health and social care professionals and housing and local authority staff can use existing referral pathways for housing assessments.</p> <p>The committee considered that the addition of community health services covers these professionals.</p>

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				<p>pathways in place for excess winter deaths/cold homes.</p> <p>Could be useful to mention respiratory nurses, home oxygen nurses, pulmonary rehab physiotherapists.</p>	
Oxfordshire County Council		4	3	This sentence could benefit from some specific examples	Thank you for your comment. The sentence refers to the content of Box 1 which included people that may be particularly vulnerable and housing conditions that may increase the risk of exposure as well as activities that might contribute to poor indoor air quality.
Oxfordshire County Council		5	4	Might be useful to use Referral Pathway as well as structured process, as this terminology is more familiar to clinicians, if you are wanting to engage them.	Thank you for your comment. The committee retained the wording to avoid confusion as there are existing referral pathways for a housing assessment.
Oxfordshire County Council		5	19	<p>The term "local authorities" could be confusing where you have two tier authorities, who have different responsibilities, compared to unitary authorities.</p> <p>Using professional development opportunities, is a good solution, however my experience with introducing traditional no clinical training, even smoking cessation training, in clinicians already busy training schedules is not without challenge. Besides a lack of time, the buy-in to the idea that indoor air quality impacts on patient health, is low. The interface between Environmental Health officers and say</p>	Thank you for your comment. The committee have highlighted what they mean by local authority for this guideline in a paragraph at the start of the recommendations. The committee agree that awareness of the health impact of poor indoor air quality is low and expect this guideline to improve understanding of poor indoor air quality as a health concern.

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				respiratory or asthma nurses is minimal, if non-existent.	
Oxfordshire County Council		6	11	There would need to be some patient advice leaflets developed to enable clinicians feel comfortable giving this advice outside of the mainstream training/clinical practice.	Thank for your comment. The committee agreed with this but highlighted that this can also be incorporated into existing general training and continuous professional development for healthcare professionals.
Oxfordshire County Council		7	1	Its not clear what a "housing assessment" is. Currently, most local authority environmental health departments do not have the expertise to provide a housing assessment specifically for the purpose of indoor air quality and also do not have capacity where the resident is an owner occupier with a health condition. If the expectation is it is a housing assessment as part of a cold homes assessment, this would lack the focus on indoor air quality and pick up issues such as smoking, burning candles, extract fans, other than reducing damp/mould.	Thank you for your comment. The committee noted that housing assessment is a general term for assessments such as the HHSRS. This covers aspects of poor indoor air quality as well as other hazards. The committee do not expect that local authorities would develop new indoor air quality housing assessments.
Oxfordshire County Council		7	14	I'd suggest that reduce is used instead of avoid. The expectation of 100% compliance with advice is unrealistic and reduction seems more practical. For example, some residents may have no out-door space to dry clothes, so they need a method to control how clothes are dried.	Thank you for your comment. The committee were mindful of the risk of poor indoor air quality posed by some activities and to avoid them where possible and where not possible to minimise this impact by ensuring adequate ventilation.
Oxfordshire		7	22	For clarity advise people to choose low-emission materials when buying soft	Thank you for your comment. The committee have retained the term materials as a catch-all term. The committee noted that

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28/06/2019 to 09/08/2019**

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County Council				furnishings. Materials seems a bit non-descript. Suggest buying instead of installing. A bit late when installing if it isn't possible to ventilate.  The recommendation to a housing assessment for this purpose is unlikely to be sufficiently resourced in LAs to carry out an assessment specifically for indoor air quality, it will probably focus on damp and mould or excess cold and my not pick up other potential sources/causes.	ventilation should always be considered by the engineer installing a gas cooker. The committee agreed that the housing assessment may not pick up on all indoor air pollutants present but considered that this would still be useful in terms of identifying problems so that remedial action can be taken.
Oxfordshire County Council		8	23	Useful to add clarification of what the pregnant women are at increased risk of. e.g. asthma, wheezing	Thank you for your comment. The committee have edited for clarity.
Oxfordshire County Council		8	26	I'm not sure what level of understanding there is about formaldehyde and the impacts it can have, think this point would need to be explained in more detail.	Thank you for your comment. The committee agreed that awareness of indoor air quality is low and drafted recommendations to raise awareness of indoor air pollutants including formaldehyde and to give advice on steps to be taken to minimise exposure.
Oxfordshire County Council		9	12	Rental properties only make up 20% of the housing stock	Thank you for your comment. The committee were mindful that the majority of people are not tenants but noted that owner-occupiers can also request housing assessments.
Oxfordshire		18	1	May be useful to include some numbers of people with existing health conditions, such as those with asthma or COPD.	Thank you for your comment. We have now added text saying that over 5 million people are receiving treatment for asthma in

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County Council					the UK though the committee accepted that prevalence might vary regionally.
Oxfordshire County Council		19	28	Whilst staff who visit vulnerable people see some of the issues first hand the knowledge and referral pathways are limited – responsibilities need to be clearly defined for all agencies.	Thank you for your comment. The committee were aware of this but agreed that training could help with this issue.
Oxfordshire County Council		19	3	Not sure who would be expected to buy these sensors, the NHS or the local authority. Neither have the budget available for existing required equipment.	Thank you for your comment. The committee changed sensors to monitoring and agreed that this is one option alongside visual inspection or checklists that could be used to identify homes that may need a formal housing assessment. The committee did not specify who should fund the purchase of monitoring equipment but noted in the impact section that improved health outcomes and resource savings elsewhere in the system (for example, by reducing the need for enforcement teams to intervene) might offset costs. The committee also considered the impact of not taking action which may lead to greater expenditure in the future.
Oxfordshire County Council		19	14	Which local authority would check strategies, districts, unitaries or counties? responsibilities need to be clear for compliance	Thank you for your comment. The committee discussed your comment and how best to target each recommendation to the appropriate level or tier of local authority. The committee did not consider that this was feasible given the different responsibilities the each local author has and concluded that it would be more appropriate to include a statement at the front of the recommendations as follows "For the purposes of this guideline, the term 'local authorities' covers all types of local authority in England; these are county councils, district councils, unitary authorities, metropolitan districts and London

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					boroughs. Each local authority should decide which of the following recommendations are relevant to their local responsibilities".
Oxfordshire County Council		19	24	The entire system will save, however the "additional" costs to one part (LAs) are not offset by the savings made to the other part (NHS). It will therefore unlikely impact practice unless that money is transferred.	Thank you for your comment. We agree with your point that whilst the entire system might save, it may be that only some parts will actually benefit unless there are transfer payments. However, in this particular example, we are suggesting that savings could accrue to both the NHS and to LAs. In the first instance this would be as a result of a reduction in use of health care resources and in the second as a result of a reduction in the need for enforcement teams to intervene.
Oxfordshire County Council		20	11	See same as above	Thank you for your comment.
Oxfordshire County Council		21	1	<u>Need to add the ombudsman first and foremost, <a href="https://www.housing-ombudsman.org.uk/residents/">https://www.housing-ombudsman.org.uk/residents/</a> EH less likely to get involved.</u>	Thank you for your comment. The committee agreed and have edited this section.
Oxfordshire County Council		21	3	Tenants can also take action themselves	Thank you for your comment. The committee have highlighted the different ways individuals can request a housing assessment and have also recommended that healthcare professionals can help them do so.
Oxfordshire County Council		21	17	In a climate of severe scarcity in local government and NHS even "minimal additional resources" are a big ask.	Thank you for comment. While the committee acknowledged the constraints on resources, it noted that local authorities have a responsibility for public health and so have suggested ways to minimise the impact of the recommendations.

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Oxfordshire County Council		21	21	Not all local authorities have houses, and not all have health and social care staff so costs of enforcement are not offset within the same budget/organisation when it comes to local authorities.	Thank you for your comment. The committee acknowledged the different types of local authority in England and have added text outlining what they mean by local authority for this guideline at the start of the recommendations. The committee were also aware costs might not be offset in the same budget but were mindful of local authority responsibility for public health and reducing inequalities.
Oxfordshire County Council		23	11	Not clear why it is only tenant's satisfaction improve health outcomes in other parts of the system, the same would be the case for any resident.	Thank you for your comment. The committee agreed and have edited this section.
Oxfordshire County Council		23	20	Again, similar issue investments in staff training to those outside of the health system who benefit, means practice is less likely to be changed as they are not directly benefitting (neither is it mandated)	Thank you for your comment. The committee are aware of this and agreed that staff may need training. But incorporating this into existing training and continuous professional development could minimise costs. The committee also highlighted that local authorities have a duty of care to ensure both public sector and private homes are maintained to a 'decent' standard and are responsible for ensuring people's health and wellbeing.
Oxfordshire County Council		25	12	Not clear why its only landlords which are advised of furniture. Currently tenanted properties have a high turnover of tenancies compared to owner occupiers who will keep furniture for longer and stay in their homes for longer.	Thank you for your comment. The committee noted that this section is for advice that local authorities should give to property managers and landlords. The committee have outlined in section 1.3 (on raising awareness) and section 1.4 (on advice and information) the information that should be given to the general population.
Policy Connect	Guideline	General	General	Informing health professionals about carbon monoxide and its risk factors is essential to reducing incidents, improving indoor air quality, and saving lives. The draft guidelines address	Thank you for your comment. Acute exposure to carbon monoxide is outside the scope of this guideline. NICE has a guideline on 'unintentional injuries in the home: interventions for under 15s' which includes carbon monoxide alarms.

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				<p>several areas that contribute to the risk of carbon monoxide exposure (such as insufficient ventilation) but these causative links are not explicitly discussed.</p> <p>We recommend future guidance directly highlights these risk factors and provides additional information on topics including: the usage of carbon monoxide alarms; which groups are more vulnerable to carbon monoxide; and why regularly servicing fuel-burning appliances (such as boilers) is needed to prevent carbon monoxide exposure and maintain indoor air quality.</p>	
Policy Connect	Guideline	General	General	<p>Although the draft guidelines acknowledge how individual risk factors (such as housing quality and age) affect the likelihood and impact of poor indoor air quality, the relationships between these factors have been ignored.</p> <p>For example, young children are both more susceptible to the effects of carbon monoxide exposure and more likely to be exposed because children are disproportionately affected by poverty (according to the House of Commons Library). Living in poverty increases their risk of living in poor-quality housing without a carbon monoxide alarm or regularly serviced fuel-burning appliances, which both</p>	<p>Thank you for your comment. The committee have added more examples to the list of people who are vulnerable and recognised that those in vulnerable groups may also be in poor housing conditions.</p>

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				increase the risk of carbon monoxide exposure. Additionally, living in poverty increases a household's risk of being in fuel poverty, which research from National Energy Action shows has a positive correlation with the risk of carbon monoxide exposure. It is essential that future guidance explicitly acknowledges these relationships if health professionals are to make effective home visits. We therefore recommend NICE guidance clearly explains how individual risk factors for indoor air quality can affect each other and compound this risk.	
Policy Connect	Guideline	4	3	Whilst we welcome NICE's acknowledgement of poor-quality housing as a risk factor, we recommend this guidance is accompanied by information on why a lack of carbon monoxide alarms increases the risk of carbon monoxide exposure and poor indoor air quality.	Thank you for your comment. Acute exposure to carbon monoxide is outside the scope of this guideline. NICE has a guideline on 'unintentional injuries in the home: interventions for under 15s' which includes carbon monoxide alarms.
Policy Connect	Guideline	5	15-18	We welcome support for the use of visual inspections and sensors to improve indoor air quality in homes and we recommend NICE guidance highlights the utility of carbon monoxide monitors in achieving this goal.	Thank you for your comment. Acute exposure to carbon monoxide is outside the scope of this guideline. NICE has a guideline on 'unintentional injuries in the home: interventions for under 15s' which includes carbon monoxide monitors.
Policy Connect	Guideline	5	19-22	We welcome the usage of existing home visits to identify poor indoor air in homes and we recommend NICE guidance highlights specific risk factors related to carbon monoxide	Thank you for your comment. Acute exposure to carbon monoxide is outside the scope of this guideline. NICE has a guideline on 'unintentional injuries in the home: interventions for under 15s' which includes carbon monoxide alarms.

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				exposure, such as a lack of carbon monoxide alarms, insufficient ventilation, and the use of un-serviced fuel-burning appliances. We also recommend NICE guidance acknowledges how carbon monoxide can leak between conjoined buildings, which is a risk factor that may not be addressed by individual home visits.	
Policy Connect	Guideline	8	1-6	We support NICE advising people to increase ventilation when using fuel-burning appliances. However, it is essential that NICE acknowledges how socioeconomic factors can complicate this recommendation. For example, households in fuel poverty may intentionally block or limit ventilation in order to reduce heat loss and vicariously their energy costs. We recommend NICE guidance explicitly acknowledges socioeconomic factors such as fuel poverty when discussing heating and ventilation in order to fully inform health professionals who inspect ventilation systems.	Thank you for your comment. The committee agreed and have added people who live in poverty to the list of people who are vulnerable.
Policy Connect	Guideline	8	10-15	Whilst we support providing health professionals with guidance on landlord obligations pertinent to indoor air quality, we recommend providing more detailed information on key regulations, such as The Smoke and Carbon Monoxide Alarm	Thank you for your comment. Acute exposure to carbon monoxide is outside the scope of this guideline. NICE has a guideline on 'unintentional injuries in the home: interventions for under 15s' which includes carbon monoxide alarms.

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				Regulations 2015, and the role they play in maintaining indoor air quality.	
Policy Connect	Guideline	9	9-11	We recommend NICE's guidance specify carbon monoxide exposure as being particularly hazardous to people with respiratory or cardiovascular conditions.	Thank you for your comment. Acute exposure to carbon monoxide is outside the scope of this guideline. NICE has a guideline on 'unintentional injuries in the home: interventions for under 15s' which includes carbon monoxide alarms.
Policy Connect	Guideline	10	5-23	We recommend NICE's guidance specify carbon monoxide exposure as being particularly hazardous to pregnant people, foetuses, and young children.	Thank you for your comment. Acute exposure to carbon monoxide is outside the scope of this guideline. NICE has a guideline on 'unintentional injuries in the home: interventions for under 15s' which includes carbon monoxide alarms.
Policy Connect	Guideline	11	17-23	We recommend NICE's guidance specify which indoor air quality hazards (such as carbon monoxide exposure) are affected by using adequate ventilation.	Thank you for your comment. The committee considered that all indoor air pollutants can be mitigated by adequate ventilation.
Policy Connect	Guideline	12	7-8	We strongly support NICE's guidance on ensuring energy efficiency measures maintain the effectiveness of ventilation, as this is essential in reducing the risk of carbon monoxide exposure.	Thank you for your comment.
Policy Connect	Guideline	14	12	We strongly recommend that NICE guidance specifies landlord obligations pertinent to indoor air quality – especially the obligation to carry out Gas Safety Checks and for certain landlords to install carbon monoxide alarms – as this will inform health professionals who make home visits.	Thank you for your comment. The committee agreed and have recommended that local authorities advise landlords of their maintenance responsibilities especially regarding heating and ventilation systems.

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Policy Connect	Guideline	17	18-22	We welcome NICE's acknowledgement of poor-quality housing as a risk factor for indoor air quality; however, we recommend future guidance is more specific in order to aid health professionals identify hazards, such as a lack of carbon monoxide alarms or un-serviced fuel-burning appliances.	Thank you for your comment. We will pass your comment to the NICE surveillance team which monitors guidelines to ensure that they are up to date.
Policy Connect	Guideline	18	28-29	We agree that 'staff who visit vulnerable people in their homes are ideally placed to report on poor housing conditions'. We therefore recommend these staff are given detailed guidance on the training needed to identify risk factors including a lack of carbon monoxide alarms, un-serviced fuel-burning appliances, and a reliance on secondary heating systems such as gas hobs.	Thank you for your comment. The committee were not able to advise on the content of the training that should be delivered as they did not review training materials.
Policy Connect	Guideline	19	3-6	We agree that devices which measure pollutants, such as carbon monoxide alarms, are becoming increasingly common and this is being driven by their declining cost and growing lifespan.	Thank you for your comment.
Policy Connect	Guideline	20	25	We recommend NICE explicitly acknowledge the barriers preventing tenants from reporting their landlords to Local Authorities – such as the threat of eviction – and account for these when justifying their recommendations.	Thank you for your comment. The committee concluded that barriers to tenants asking for a housing assessment, such as fear of eviction or fear of rent increases to cover maintenance or repairs, are serious concerns and have added this detail to the rationale and impact section.
Policy Connect	Guideline	22	26-30	We welcome NICE's recognition of the barriers preventing tenants from carrying remedial work	Thank you for your comment. The committee have drafted recommendations advising local authorities to inform

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				(such as servicing a boiler) and the health risks these pose. We recommend NICE guidance provides healthcare professionals with information on how to advise these tenants and address these barriers.	healthcare professionals on the process for requesting or helping a patient request a housing assessment which will help them as regards remedying the problem.
Policy Connect	Guideline	24	10-15	We recommend NICE's guidance explicitly acknowledge how open solid-fuel fires can increase the risk of carbon monoxide exposure if used in confined and insufficiently ventilated spaces. This includes the improper usage of barbeques in confined and unventilated spaces.	Thank you for your comment. The committee concluded that, as there was no evidence, that it was not possible to add a recommendation on the use of barbeques in confined and unventilated spaces. The committee emphasised that acute exposure to carbon monoxide is outside the scope of this guideline. NICE has a guideline on 'unintentional injuries in the home: interventions for under 15s' which includes carbon monoxide alarms.
Policy Connect	Guideline	26	12-15	We recommend NICE's guidance specifies carbon monoxide exposure as being particularly hazardous to people with respiratory or cardiovascular conditions.	Thank you for your comment. Acute exposure to carbon monoxide is outside the scope of this guideline. NICE has a guideline on 'unintentional injuries in the home: interventions for under 15s' which includes carbon monoxide alarms.
Policy Connect	Guideline	27	17-21	We recommend NICE's guidance specifies carbon monoxide exposure as being particularly hazardous to pregnant people, fetuses, and young children.	Thank you for your comment. This is outside the scope of this guideline.
Policy Connect	Guideline	28	2-4	Whilst it is encouraging that NICE recognises the need for training specific to indoor air quality, we recommend NICE provides greater detail on the contents of this training and how it could be delivered in practice given the limited time of healthcare professionals.	Thank you for your comment. The committee were not able to advise on the content of the training that should be delivered as they did not review training materials.

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Policy Connect	Guideline	28	15-18	We strongly support using the World Health Organization's guidelines on indoor air pollutants (such as carbon monoxide) as the basis for national regulations or guidelines.	Thank you for your comment.
Policy Connect	Guideline	33	4	We recommend NICE explicitly acknowledge landlord obligations regarding carbon monoxide alarms under The Smoke and Carbon Monoxide Alarm (England) Regulations 2015, particularly in relation to home visits that inspect heating and ventilation systems.	Thank you for your comment. Acute exposure to carbon monoxide is outside the scope of this guideline. NICE has a guideline on 'unintentional injuries in the home: interventions for under 15s' which includes carbon monoxide alarms.
Royal College General Practitioners	Guideline	General	General	There are several statements highlighted below regarding healthcare professionals referring for housing assessments. The committee should consider making recommendations for local authorities to enable the person to self-refer once issues are identified rather than being reliant on the professionals to do this for them since this referral is outside of standard clinical care.	Thank you for your comment. The committee have highlighted the different ways individuals can request a housing assessment and have also recommended that healthcare professionals can help them do so.
Royal College General Practitioners	Guideline	5	19	The committee should consider expanding on how health care practitioners who are attending homes on visits can identify poor air quality. This is not in any formal curriculum and therefore out side of the competency of most clinicians and carers.  Can the committee provide a clear definition of	Thank you for your comment. The committee agreed that continuous professional development opportunities could be used for this purpose. However, it is outside the remit of NICE to advice on the details of curricula. d

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				poor air quality, detail how to identify poor air quality, what training would be required to enable health care professionals to identify poor air quality, who will provide that training and fund it and what expertise is required to teach this if organisations will be responsible.	
Royal College General Practitioners	Guideline	6	3	Can the committee consider emphasising that the person should be responsible to self refer for housing assessment rather than a health care professional. The healthcare professional can encourage the person but should not be responsible for this	Thank you for your comment. The committee agreed and have reworded recommendation 1.2.2 to make it clear that the person must request the housing assessment, but the health care professional can help them with this.
Royal College General Practitioners		6	7	Can the committee consider emphasising that the person should be responsible to self refer for housing assessment rather than a health care professional. The healthcare professional can encourage the person but should not be responsible for this	Thank you for your comment. The committee agreed and have reworded recommendation 1.2.2 to make it clear that the person must request the housing assessment, but the health care professional can help them with this.
Royal College General Practitioners		7	14	Can the committee consider emphasising that the person should be responsible to self refer for housing assessment rather than a health care professional. The healthcare professional can encourage the person but should not be responsible for this	Thank you for your comment. The committee agreed and have reworded recommendation 1.2.2 to make it clear that the person must request the housing assessment, but the health care professional can help them with this.
Royal College General		9	14	Can the committee consider emphasising that the person should be responsible to self refer for housing assessment rather than a health care professional. The healthcare professional	Thank you for your comment. The committee agreed and have reworded recommendation 1.2.2 to make it clear that the person must request the housing assessment, but the health care professional can help them with this.

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Practitioners				can encourage the person but should not be responsible for this	
Royal College of Nursing	Guideline	General	General	The Royal College of Nursing have no comments to submit on the NICE draft guideline consultation – Indoor air quality at home at this present time.	Thank you.
Royal College of Physicians and Surgeons of Glasgow	Guideline	General	General	<p>The Royal College of Physicians and Surgeons of Glasgow although based in Glasgow represents Fellows and Members throughout the United Kingdom. While NICE has a remit for England, many of the recommendations are applicable to all devolved nations including Scotland. They should be considered by the relevant Ministers of the devolved governments.</p> <p>The College welcomes this Guideline covering indoor air quality in residential buildings. It explains how to reduce indoor air pollution. Strategies include controlling indoor pollution sources, ensuring good ventilation and achieving effective property maintenance. It also includes raising awareness of the importance of good air quality in people's homes and how to achieve this.</p> <p>The guideline is aimed at a broad range of practitioners and agencies, reflecting the complex nature of improving indoor air quality. Two key groups are healthcare and public</p>	Thank you for your comment. The committee noted that NICE guidelines cover health and care in England. Decisions on how they apply in other UK countries are made by ministers in the Welsh Government, Scottish Government, and Northern Ireland Executive.

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				<p>health professionals. The legislative and regulatory issues differ throughout the legal jurisdictions of the United Kingdom and this should be taken into account. Indoor air quality is an increasing and important aspect of air pollution which perhaps has not had the attention it should have had historically. The evidence base for this guideline varies but the recommendations are consistent with the evidence. The impact of health inequalities on indoor air quality should not be underestimated and should be emphasised more in the guideline.</p>	<p>The committee agreed and have added further examples to the list of those who are vulnerable.</p>
Royal College of Physicians and Surgeons of Glasgow	Guideline	4	2 Recommendations Box1	<p>The College considers these groupings are too restrictive. We recommend including the following People living in poverty who have no/less choice in moving accommodation or to modify it. People who have increased risk of infection People who are on immunosuppressive drugs for various diseases eg connective tissue diseases and rheumatoid arthritis People who have malignancy whether they are on chemotherapy or not. People with longstanding chronic disease which may mean they are prone to infection</p>	<p>Thank you for your comment. The committee have added some more examples to the list of groups who are vulnerable but considered that many of the groups provided are covered in this list already.</p>

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				because of poor respiratory reserve, eg multiple sclerosis and other chronic neurological disease	
Royal College of Physicians and Surgeons of Glasgow	Guideline	5	9	It is useful to note the importance for a broad and balanced approach to ventilation, insulation and heating.	Thank you for your comment.
Royal College of Physicians and Surgeons of Glasgow	Guideline	7	1	This requires enhanced Cooperation between Health and Social services. It gives a stronger case for integration. Health and social care partnerships in Scotland and Northern Ireland could use these opportunities for their staff to assess accommodation and advise people accordingly.	Thank you for your comment.
Royal College of Physicians and Surgeons of Glasgow	Guideline	7	15	The advice for the general population by local authorities is evidence-based and feasible.	Thank you for your comment.

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Royal College of Physicians and Surgeons of Glasgow	Guideline	8	16	It is noted that the housing legislation will differ in various legal jurisdictions. There is a case for uniformity of regulation across the UK .	Thank you for your comment. The committee noted the various legal jurisdictions across the UK but also noted that NICE guidelines cover health and care in England. Decisions on how they apply in other UK countries are made by ministers in the Welsh Government, Scottish Government, and Northern Ireland Executive.
Royal College of Physicians and Surgeons of Glasgow	Guideline	9	7	The advice to be given by health professionals seems appropriate. There is a case to make this a statutory task for the health professional. The advice needs to be extended to a wide group of people with diseases which put them at risk as in comment 2.	Thank you for your comment.
Royal College of Physicians and Surgeons of Glasgow	Guideline	11	8	The importance of involving architects and designers in preventing poor ventilation in housing cannot be emphasised enough.	Thank you for your comment.
Royal College of Physicians	Guideline	12	9 Paras 1.8	We note and welcome the importance of these recommendations for builders, contractors and developers.	Thank you for your comment.

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s and Surgeons of Glasgow			and 1.9		
Royal College of Physicians and Surgeons of Glasgow	Guideline	15	7	It would also be important to evaluate the use of housing assessments by local authorities to ensure a consistent approach nationally.	Thank you for your comment. The committee agreed that this is an important issue but it is outside the remit of NICE guidance.
Royal College of Physicians and Surgeons of Glasgow	Guldeline	22	1	There is a need for wider knowledge particularly in the public arena of the causes and consequences of poor quality	Thank you for your comment. The committee highlighted that the local government should use existing communication strategies to raise awareness of poor indoor air quality and this would help meet their responsibilities to improve public health.
Sheffield City Council	Guideline	General	General	However, and it's a big however beyond the scope of this guideline per se. .... I worry whether it will get traction in a field outside of a very tight group of experts I fear that it will be largely ignored at local level. Not because it doesn't say useful stuff (it does), but because of the context Its really really important NICE and others	Thank you for your comment. The committee considered that if indoor air quality is embedded in a local strategy then this will help with the issues you have outlined. We are sorry that you don't think the guideline has been written in a way that will encourage local authority staff to engage with it. We have been encouraged by the number of LAs who have responded to consultation and hope that our response to their comments may have helped improve the readability of the

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				<p>understand the context</p> <p>1) NHS and social care professionals just aren't oriented in a way that allows and enables them to engage in this stuff – they do illnesses and diseases. This one will be seen in the “housing” box and thus “for someone else”</p> <p>2) “public health” as a group of staff with those words in their title is so asset stripped that bandwidth is a rate limiting step. Due to cuts in PH grant, my core team has shrunk from 100 to 20 over recent years. The cost is we simply cant engage meaningfully in the stuff we ought to</p> <p>3) one might frame this as a housing thing. LA staff working in that sector (or social housing, or building homes – mainly private sector) wont engage in NICE as they will see it as a “health” thing. Its not written in such a way that would enable housing staff (building, planning, regulation, enforcement, strategy) to readily engage with it.</p> <p>Tricky space</p> <p>So on skim, there's nothing inherently “wrong with the draft. In fact there is a lot to support, its just there is an uphill struggle to give it the traction needed.</p>	<p>guideline for local authority staff. We are also aware that there is a growing awareness of the risk posed by indoor air quality as a result of this guidance and, the clean air strategy 2019 and the RCPCH review of the impact of indoor pollution on child health.</p>

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The Royal College of Paediatrics and Child Health, &	Guideline	General, & 4	3 (Box 1)	<p>The guideline identifies pre-school children as particularly vulnerable to poor quality indoor air. There is evidence that this should be extended more broadly to all children. Children in the UK are spending less than two hours a day outside on an average weekday<sup>1</sup>. Their homes and schools, are a key to their overall exposure to pollution. Children are still developing, making them vulnerable to pollution-related health effects both in childhood and later life.</p> <p>Royal College of Paediatrics and Child Health (RCPCH) and Royal College of Physicians (RCP)'s forth-coming systematic review of the effects of indoor air quality on child health includes over 221 studies of health effects in childhood. The evidence is that exposure to indoor pollution increases risks for developing asthma, rhinitis and eczema in childhood; other effects include lower birthweights when home renovations or household chemical use (without ventilation) occurs in pregnancy. The guideline recognises these health risks in birth and early childhood and the risks do seem to be most acute at these early years<sup>2</sup>. However, there is evidence that school age children are also vulnerable to health effects from their indoor air. This includes from indoor:</p>	<p>Thank you for your comment. The committee have considered this and concluded that they did not have the evidence to include all children to the list of people may be particularly vulnerable to ill health as a result of exposure to poor indoor air quality</p> <p>However, they did have evidence for pre-school children and have added this groups as a separate bullet to this list</p>

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				damp 3, a range of chemicals and gases <sup>4</sup> , and particulate matter <sup>5</sup> . The UNCRC (United Nations Convention on the Rights of the Child 1989) apply in this issue. UNCRC was ratified by the UK Government in 1991/92 and sets out clear guidance in relation to protect the rights of children and young people, including: <ul style="list-style-type: none"> <li>• Article 3 where the best interests of the child must be a top priority in all decisions and actions that affect children such as the recommendations within this guideline.</li> <li>• Article 24 where every child has the right to the best possible health including access to education on health and wellbeing such as on topics contained within the guideline remit.</li> <li>• Article 27 where every child has the right to a good standard of living that meets their needs, with governments and services supporting this where the family is unable – such as improving access to equipment and housing stock that is fit for purpose in relation to indoor air quality.</li> </ul> 1 Mullan K. A child's day: trends in time use in the UK from 1975 to 2015. Br J Sociol 2019; 70: 997-1024.	Mullan K. A child's day: trends in time use in the UK from 1975 to 2015. Br J Sociol 2019; 70: 997-1024: This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a survey on how children spend their time throughout the day

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				<p>2 Bjerg A, Hedman L, Perzanowski M, Wennergren G, Lundbäck B, Rönmark E. Decreased importance of environmental risk factors for childhood asthma from 1996 to 2006. Clin Exp Allergy 2015;45:146-153.</p>	<p>Bjerg A, Hedman L, Perzanowski M, Wennergren G, Lundbäck B, Rönmark E. Decreased importance of environmental risk factors for childhood asthma from 1996 to 2006. Clin Exp Allergy 2015;45:146-153. This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as the original study is cross-sectional in design</p>
				<p>3 Cibella F, Cuttitta G, La Grutta S, Melis MR, Lospalluti ML, Uasuf CG, et al. Proportional Venn diagram and determinants of allergic respiratory diseases in Italian adolescents. Pediatr Allergy Immunol 2011;22:60-68.</p>	<p>Cibella F, Cuttitta G, La Grutta S, Melis MR, Lospalluti ML, Uasuf CG, et al. Proportional Venn diagram and determinants of allergic respiratory diseases in Italian adolescents. Pediatr Allergy Immunol 2011;22:60-68: This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a cross sectional study</p>
				<p>Knibbs LD, Woldeyohannes S, Marks GB, Cowie CT. Damp housing, gas stoves, and the burden of childhood asthma in Australia. Med J Aust 2018;208:299-302. Bjerg A, Rönmark E. Asthma in school age: prevalence and risk factors by time and by age. Clin Respir J 2008;2:123-126.</p>	<p>Knibbs LD, Woldeyohannes S, Marks GB, Cowie CT. Damp housing, gas stoves, and the burden of childhood asthma in Australia. Med J Aust 2018;208:299-302. : This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a risk modelling study on damp housing, gas stoves, and the burden of childhood asthma</p>
				<p>4 Madureira J, Paciência I, Ramos E, Barros H, Pereira C, Teixeira JP, et al. Children's</p>	<p>Madureira J, Paciência I, Ramos E, Barros H, Pereira C, Teixeira JP, et al. Children's health and indoor air quality in primary schools and homes in Portugal-study design. J Toxicol</p>

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				<p>health and indoor air quality in primary schools and homes in Portugal-study design. J Toxicol Environ Health A 2015;78:915-930.</p> <p>Cakmak S, Dales RE, Liu L, Kauri LM, Lemieux CL, Hebborn C, et al. Residential exposure to volatile organic compounds and lung function: results from a population-based cross-sectional survey. Environ Pollut 2014;194:145-151.</p> <p>5 McCormack MC, Breyse PN, Matsui EC, Hansel NN, Williams D, Curtin-Brosnan J, et al; Center for Childhood Asthma in the Urban Environment. In-home particle concentrations and childhood asthma morbidity. Environ Health Perspect 2009;117:294-298.</p>	<p>Environ Health A 2015;78:915-930. This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a cross-sectional study</p> <p>Cakmak S, Dales RE, Liu L, Kauri LM, Lemieux CL, Hebborn C, et al. Residential exposure to volatile organic compounds and lung function: results from a population-based cross-sectional survey. Environ Pollut 2014;194:145-151: This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a cross sectional study.</p> <p>McCormack MC, Breyse PN, Matsui EC, Hansel NN, Williams D, Curtin-Brosnan J, et al; Center for Childhood Asthma in the Urban Environment. In-home particle concentrations and childhood asthma morbidity. Environ Health Perspect 2009;117:294-298. This study was included in evidence review 2</p>
The Royal College of Paediatrics and Child Health, &	Guideline	4	5	Although the scope of these guidelines are for homes, local authorities are responsible for many schools. The recommendations for local authorities strategies for indoor air quality (IAQ) could include education also. In the work with RCPCH &Us, children and young people had concerns about their school environments. They are not able to open	Thank you for your comment. Schools are outside the scope of this guideline though the committee have referenced published guidance on ventilation, thermal efficiency and indoor air quality published by the Department for Education.

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				windows, there is poor air quality due to older buildings/damp, where there are challenges around ventilation in science labs, home economics rooms, sports changing areas and other areas within school. Children and young people spend approximately 190 days in school each year	
The Royal College of Paediatrics and Child Health, &	Guideline	5 & 11	15, 3	<p>These two recommendations specify the use of local inspections and building regulations to identify poor indoor air. Inspection and enforcement activity are especially important for occupied buildings, as evidence demonstrates the impact of occupant activities on the indoor air quality<sup>1</sup>.</p> <p>Studies have also found pollutants such as formaldehyde remaining high for a considerable period in new-build properties<sup>2</sup>; also suggesting the need for longer-term monitoring.</p> <p>Question 3 example of good practice: National Building Codes of Finland (Suomen rakentamismääräyskokoelma). Section D2 of the codes concerns the indoor climate and ventilation of buildings. It requires that: 'Buildings are designed and constructed in such a way that the indoor air does not contain any gases, particles or microbes in quantities that will be harmful to health, or any odours</p>	Thank you for your comment and for the examples of good practice

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				<p>that would reduce comfort'.3 There are set limits for specific pollutants including formaldehyde, particulates and styrene. Air quality is measured after the building has been occupied for 6 months.</p> <p>1 Taylor J, Shrubsole C, Symonds P, Mackenzie I, Davies M (2019) Application of an indoor air pollution metamodel to a spatially-distributed housing stock. Science of the Total Environment 667 (2019) 390–399.</p> <p>Dimitroulopoulou, C., Ashmore, M.R., Hill M.T.R., Byrne, M., Kinnersley, R., 2006. INDAIR: A probabilistic model of indoor air pollution in the U.K. Atmospheric Environment, Vol 40, 33, 6362-6379.</p> <p>Bartzis, J, Wolkoff P, Stranger M, Efthimiou G, Tolis EI, Maes F, Nørgaard A.W, Ventura G, Kalimeri K.K, E. Goelen E, Fernandes O (2015) On organic emissions testing from indoor consumer products' use. Journal of Hazardous Materials; 285: 37–45.</p>	<p>Taylor J, Shrubsole C, Symonds P, Mackenzie I, Davies M (2019) Application of an indoor air pollution metamodel to a spatially-distributed housing stock. Science of the Total Environment 667 (2019) 390–399.: This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a study on meta-model to housing stock.</p> <p>Dimitroulopoulou, C., Ashmore, M.R., Hill M.T.R., Byrne, M., Kinnersley, R., 2006. INDAIR: A probabilistic model of indoor air pollution in the U.K. Atmospheric Environment, Vol 40, 33, 6362-6379.: This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a probabilistic modelling study.</p> <p>Bartzis, J, Wolkoff P, Stranger M, Efthimiou G, Tolis EI, Maes F, Nørgaard A.W, Ventura G, Kalimeri K.K, E. Goelen E, Fernandes O (2015) On organic emissions testing from indoor consumer products' use. Journal of Hazardous Materials; 285: 37–45.: This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a study on the identification and quantification of organic emissions</p>

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				<p>2 Park and Ikeda, 2006. Variations of formaldehyde and VOC levels during 3 years in new and older homes. Indoor Air; 16: 129-135.</p> <p>3 An English translation of the 2003 code is available: <a href="https://www.edilex.fi/data/rakentamismaarayks-et/d2e.pdf">https://www.edilex.fi/data/rakentamismaarayks-et/d2e.pdf</a></p>	<p>Park and Ikeda, 2006. Variations of formaldehyde and VOC levels during 3 years in new and older homes. Indoor Air; 16: 129-135.: This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a narrative review</p>
The Royal College of Paediatrics and Child Health, &	Guideline	8	1	<p>There is evidence that ventilation should also be increased when: using incense<sup>1</sup>; air fresheners<sup>2</sup>; during dusting and vacuuming<sup>3</sup> (as this can re-suspend dust particles in the air); both during and after home re-decoration or renovation<sup>4</sup>.</p> <p><sup>1</sup>Chen LY, Ho C. Incense burning during pregnancy and birth weight and head circumference among term births: The Taiwan Birth Cohort Study. Environ Health Perspect 2016;124:1487-1492.</p> <p>Bekö, G., C.J. Weschler, A. Wierzbicka, D.G. Karottki, J. Toftum, S. Loft, and G. Clausen, Ultrafine Particles: Exposure and Source Apportionment in 56 Danish Homes.</p>	<p>Thank you for the information and references but they do not meet our inclusion criteria</p> <p>Chen LY, Ho C. Incense burning during pregnancy and birth weight and head circumference among term births: The Taiwan Birth Cohort Study. Environ Health Perspect 2016;124:1487-1492. This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a carried out in a country not similar to UK</p> <p>Bekö, G., C.J. Weschler, A. Wierzbicka, D.G. Karottki, J. Toftum, S. Loft, and G. Clausen, Ultrafine Particles: Exposure and Source Apportionment in 56 Danish Homes. Environmental Science &amp; Technology 2013 47 (18), 10240-</p>

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				<p>Environmental Science &amp; Technology 2013 47 (18), 10240-10248. 2</p> <p>Nørgaard AW, Kudal JD, Kofoed-Sørensen V, Koponen IK, Wolkoff P. Ozone-initiated VOC and particle emissions from a cleaning agent and an air freshener: risk assessment of acute airway effects. Environ Int. 2014; 68 :209-218. 3 Hwang HM, Park EK, Young TM, Hammock BD. Occurrence of endocrine-disrupting chemicals in indoor dust. Sci Total Environ. 2008; 404: 26-35. 4</p> <p>Herbarth et al., 2006. Association between indoor renovation activities and eczema in early childhood. Int J Hyg Environ Health; 209: 241-247.</p>	<p>10248: This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a narrative review.</p> <p>Nørgaard AW, Kudal JD, Kofoed-Sørensen V, Koponen IK, Wolkoff P. Ozone-initiated VOC and particle emissions from a cleaning agent and an air freshener: risk assessment of acute airway effects. Environ Int. 2014; 68 :209-218: This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a narrative review.</p> <p>Herbarth et al., 2006. Association between indoor renovation activities and eczema in early childhood. Int J Hyg Environ Health; 209: 241-247: This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a cross-sectional study.</p>
The Royal College of Paediatrics and Child Health, &	Guideline	9	9	Healthcare professionals should be especially aware of this for children presenting with asthma, repeated wheeze/cough, eczema or rhinitis. Many children will not be receiving healthcare, or other professional, visits to their home. Findings from studies in Italy <sup>64</sup> , Australia <sup>65</sup> and Sweden <sup>62</sup> suggest that between 7% and 14% of childhood asthma can be attributed to damp housing. Indoor	Thank you for your comment. The committee agree that awareness of the health risks is not high amongst professionals but noted that NICE does not have a remit to provide details on professional education curricula. However, the committee agreed that incorporating this training into existing continuous professional development could help minimise costs

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				<p>exposure to volatile organic compounds (VOCs) and particulate matter have links to these childhood health conditions. Public awareness of indoor air quality can be quite limited. Asking patients or parents a general question about the condition of the home or the air may not be helpful. Questions should explore the child's housing (and school/nursery if relevant) in detail around: smoking; damp/mould; gas or solid fuel use; use and access to ventilation; proximity to outdoor pollution sources like busy roads or farms; use of candles, incense or air fresheners; types of cleaning products. One solution would be a further recommendation for the effects of indoor air pollution to be included in health and public health training and continuous professional development. Especially for those whose role is in paediatrics, respiratory or cardiovascular health, and allergies. Health professionals should be aware of the possible signs of poor indoor air, and to feel confident exploring this (and preventative actions) with their patients. Children and young people in an RCPCH &amp;Us indoor air pollution project day suggested creating a social prescribing / food bank model for families where there are long term</p>	

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				<p>conditions affected by indoor air quality in households where they are not in sufficient control of their surrounding e.g. due to financial restrictions, ownership. This could include being able to "borrow" dehumidifiers from your GP or "indoor air quality bank", being given vouchers which reduces the price of buying equipment or changing to a more expensive cleaning products but with low VOC.</p> <p>1 Cibella F, Cuttitta G, La Grutta S, Melis MR, Lospalluti ML, Uasuf CG, et al. Proportional Venn diagram and determinants of allergic respiratory diseases in Italian adolescents. <i>Pediatr Allergy Immunol</i> 2011;22:60-68</p> <p>2 Knibbs LD, Woldeyohannes S, Marks GB, Cowie CT. Damp housing, gas stoves, and the burden of childhood asthma in Australia. <i>Med J Aust</i> 2018;208:299-302.</p> <p>3 Bjerg A, Rönmark E. Asthma in school age: prevalence and risk factors by time and by age. <i>Clin Respir J</i> 2008;2:123-126.</p>	<p>Cibella F, Cuttitta G, La Grutta S, Melis MR, Lospalluti ML, Uasuf CG, et al. Proportional Venn diagram and determinants of allergic respiratory diseases in Italian adolescents. <i>Pediatr Allergy Immunol</i> 2011;22:60-68 This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a cross-sectional study</p> <p>Knibbs LD, Woldeyohannes S, Marks GB, Cowie CT. Damp housing, gas stoves, and the burden of childhood asthma in Australia. <i>Med J Aust</i> 2018;208:299-302. This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a risk assessment modelling study</p> <p>Bjerg A, Rönmark E. Asthma in school age: prevalence and risk factors by time and by age. <i>Clin Respir J</i> 2008;2:123-126. This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is the original study was cross-sectional in design</p>

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The Royal College of Paediatrics and Child Health, &	Guideline	10	20	<p>The risks of smoking and second-hand smoke are widely known, and will dominant exposure to indoor pollution if allowed in the home. It may be helpful to also raise awareness about the potential for third-hand smoke lasting a long time in the home. Third hand smoke can result from other indoor pollutants reacting with the chemicals in smoke, or where pollutants from smoke 'stick' to indoor surfaces.</p> <p>Jacob P 3rd, Benowitz NL, Destailats H, Gundel L, Hang B, Martins-Green M, Matt GE, Quintana PJ, Samet JM, Schick SF, Talbot P, Aquilina NJ, Hovell MF, Mao JH, Whitehead TP. Thirdhand Smoke: New Evidence, Challenges, and Future Directions. Chem Res Toxicol. 2017; 30: 270-94.</p> <p>Sleiman, M.; Gundel, L. A.; Pankow, J. F.; Jacob, P., III; Singer, B. C.; Destailats, H. (2010) Formation of carcinogens indoors by surface mediated reactions of nicotine with nitrous acid, leading to potential thirdhand smoke hazards. Proc. Natl. Acad. Sci. U.S.A., 107, 6576-6581</p>	<p>Thank you for your comment. Exposure to third-hand smoke occur via a number of routes not just inhalation of airborne particles but also dermal uptake or orally when eating or drinking and so is outside the scope of this guideline,</p> <p>Jacob P 3rd, Benowitz NL, Destailats H, Gundel L, Hang B, Martins-Green M, Matt GE, Quintana PJ, Samet JM, Schick SF, Talbot P, Aquilina NJ, Hovell MF, Mao JH, Whitehead TP. Thirdhand Smoke: New Evidence, Challenges, and Future Directions. Chem Res Toxicol. 2017; 30: 270-94: This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is an overview of the evidence to data including animal and biomarker studies.</p> <p>Sleiman, M.; Gundel, L. A.; Pankow, J. F.; Jacob, P., III; Singer, B. C.; Destailats, H. (2010) Formation of carcinogens indoors by surface mediated reactions of nicotine with nitrous acid, leading to potential thirdhand smoke hazards. Proc. Natl. Acad. Sci. U.S.A., 107, 6576-6581; This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a laboratory experiment study</p>

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**Indoor air quality at home**

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The Royal College of Paediatrics and Child Health, &		12	4	<p>The evidence suggests emissions from local agriculture<sup>2</sup> are also important sources of local outdoor air pollution, and one which people may be less aware of than urban transport/industry sources.</p> <p>1 Air Quality Expert Group. Air Pollution from Agriculture. DEFRA 2018. <a href="https://uk-air.defra.gov.uk/assets/documents/reports/aqeg/2800829_Agricultural_emissions_vfinal2.pdf">https://uk-air.defra.gov.uk/assets/documents/reports/aqeg/2800829_Agricultural_emissions_vfinal2.pdf</a></p>	<p>Thank you for your comment. The committee discussed this point but agreed to retain the example of busy roads, which includes those in rural areas, and the committee have added other examples of outdoor air pollution to the rationale and impact section.</p> <p>Air Quality Expert Group. Air Pollution from Agriculture. DEFRA 2018 This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a report not primary research.</p>
The Royal College of Paediatrics and Child Health, &	Guideline	15	10	<p>We welcome this as a priority, especially to grow the evidence base from homes in the UK. However there is a substantial evidence base on the negative effects of smoking and wood, gas, or solid fuel burning. Focusing this recommendation on researching health impacts of lower-level, but chronic/long-term, exposure to particulate matter may be most relevant to homes in the UK.</p>	<p>Thank you for your comment. We have now expanded this research recommendation to cover the relative health impact of exposure to individual and combined air pollutants in the home not just particulate matter.</p>
The Royal College of Paediatrics and Child Health, &	Guideline	19	13	<p>Our recent systematic review has identified a lack of data about indoor air in UK homes (and schools). Collecting data during visits and inspections would help this. Given the impact of temperature/weather, outdoor sources, and occupant behaviours on the indoor environment it would be helpful if local authorities were to monitor their buildings over a longer period of time.</p>	<p>Thank you for your comment. The committee agreed and have edited this section.</p>

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The Royal College of Paediatrics and Child Health, &	Guideline	25	5	The guideline currently reads 'while painting, decorating, or renovating', but raised levels of pollutants from the materials used can persist for a surprisingly long time. Increased ventilation is also needed after these activities.	Thank you for your comment. The committee agreed and have edited this section.
The Royal College of Physicians	Guideline	4 & 5	3 (Box 1), 6	We welcome the focus on housing conditions that put people at risk. RCPCH &Us (the RCPCH's children, young people and family patient and public involvement network) led a child and youth engagement programme about Indoor Air Quality with over 200 children, young people and parents. This identified the kinds of barriers to opening windows mentioned in box 1: presence of outdoor pollution, noise (external), home security, and heat loss. There were additional concerns relating to the noise of mechanical ventilation and the energy or maintenance costs involved. With barriers to ventilation, source control is especially important to avoid pollutants entering the home. The 'standard of housing' bullet point recognises damp and disrepair risks. It should also include the presence of high-emission (or untested) building materials, fixtures or fittings.	Thank you for your comment. The committee have added pre-schoolchildren to the list of may be particularly vulnerable to ill health as a result of exposure to poor indoor air quality.

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				Children, young people and families were vocal about the lack of control they have on their housing. This can be due to such as living in temporary, social or rented accommodation where they do not have scope to change or improve ventilation (e.g. windows that are "safety" locked, heating having fixed temperatures within temporary accommodation/hostels, not being able to change from gas to electricity in the kitchen, or not allowed to install extractor fans).	
The Royal College of Physicians	Guideline	5 & 11	9, 17	<p>Question 1: We feel these recommendations (to achieve a balance between energy efficiency and ventilation) will be challenging to implement successfully while buildings receive an energy rating, but not an equivalent rating for the air quality or health properties.</p> <p>The 'Building our Future' White Paper (All Party Parliamentary Group for Healthy Homes and Buildings, 2018) makes two recommendations of potential solutions: Recommendation 3.6 Improved tools should be developed for the rental and sale of properties. These would assess health and wellbeing (not simply energy performance) in homes and buildings and making recommendations for improvement, e.g. the</p>	<p>Thank you for your comment. The committee agree that it is a fine line but noted that this was consistent with previous NICE guidelines on Excess winter deaths. We will pass your comment to the NICE surveillance team which monitors guidelines to ensure that they are up to date.</p> <p>The 'Building our Future' White Paper (All Party Parliamentary Group for Healthy Homes and Buildings, 2018) This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a government report not primary research.</p>

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				development of a new energy and health performance certificate or a full building renovation passport. Recommendation 3.2 The Government should adopt a holistic approach and ensure that future renovation of homes and buildings, in addition to making them energy efficient, improves other elements vital for health and wellbeing, such as ventilation and air quality, lighting and acoustics. This approach should, for example, be adopted in Building Regulations.	
The Royal College of Physicians		7	15	There is limited awareness of the ways indoor air can affect health so ensuring the general population have the necessary advice and information is very important. The advice will need to recognise and address barriers to improving indoor air. These include behavioural, economic and structural factors. It should sign-post support and services for aspects that are beyond individual responsibility, and consider households prevented from making changes by conditions of tenancy agreements or similar. Children and families, working with RCPCH &Us about indoor air, sometimes felt unable or unsure about how to improve their air quality which can be a source of worry (especially	Thank you for your comment. The committee were aware of the need to raise awareness of the ill-health effects on poor indoor air quality and so have recommended that those in contact with vulnerable groups should be made aware of the issue and also should know what advice to give when asked in recommendations 1.2.2 and 1.3.2.

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				<p>where children or others have related health-conditions or there are in low income households). Guidance and information will help. But heating systems, mechanical ventilation, the type of cooker, and building or furnishing materials in the home were not things all are able to choose and change. Tailoring information – and support – for home owners, social or private tenants, the vulnerable groups identified in the guidance, may be needed.</p> <p>Parents and children living near outdoor sources of pollution may need additional information and enhanced support. For example, air quality data and guidance tailored to their exact location to enable informed decisions about the relative quality of their indoor vs outdoor air, identifying the best times to ventilate their homes, or need for air filtration systems.</p>	
The Royal College of Physicians	Guideline	8	23	Question 1: This recommendation will be challenging in practice because most products/materials do not have clear labelling about their chemical content or the potential health effects. If this recommendation is directed to the public, it may be better to focus on advising people how they can choose lower-emission products. Alternatively, it may	Thank you for comment. The committee were aware of government plans to introduce a voluntary labelling scheme. This should help with labelling about chemical content.

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				<p>be something for government and industry to take forward (to make the information needed for this choice clear). Question 3: Low-VOC paint labelling is an example of where this is improving (VOC = volatile organic compound). Children and young people in an RCPCH &amp;Us indoor air pollution project day proposed a similar rating scheme for air fresheners, aerosols and household cleaning products to that of food labelling. This could use a Red-Amber-Green (RAG) rated system to support individuals to make better choices and to encourage companies to create products that are lower RAG rated.</p>	
The Royal College of Physicians	Guideline	10	5	<p>There is also evidence to recommend that women who are pregnant should also avoid indoor home renovations if possible. The Pollution and Asthma Risk Infant Study reports this as a risk factor for respiratory symptoms and allergies in infancy (potentially due to formaldehyde<sup>1</sup>). 1 Roda C, Kousignian I, Guihenneuc-Jouyaux C, Dassonville C, Nicolis I, Just J, et al. Formaldehyde exposure and lower respiratory infections in infants: findings from the PARIS cohort study. Environ Health Perspect 2011;119:1653-1658.</p>	<p>Thank you for your comment. The committee consider that is covered under the advice for the public. The reference provided Roda C, Kousignian I, Guihenneuc-Jouyaux C, Dassonville C, Nicolis I, Just J, et al. Formaldehyde exposure and lower respiratory infections in infants: findings from the PARIS cohort study. Environ Health Perspect 2011;119:1653-1658. was included in evidence review 1.</p>

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The Royal College of Physicians	Guideline	11	10,	Question 1: This could be challenging to implement alongside the recommendations to builders on a later page (12,15). To 'consider' (rather than ensure, specify or adopt which are used in other recommendations) specifying low-emission materials can undermine the recommendation made on page 12, line 15. That recommendation is for builders to use the specified materials and only substitute to an equivalent or higher standard. To provide effective source control that later recommendation relies on a good standard being specified in the original design (and therefore would benefit from a stronger stance in this recommendation to architects and designers).	Thank you for your comment. The committee did not consider it appropriate to strengthen the recommendation as architects may not be able to specify low emission materials. However, the committee noted that builders must use materials that have been specified or the closest substitute.
The Royal College of Physicians	Guideline	General and 11 & 12	16, 14	Heating and ventilation need to account for climate change. The whole-building approach should also recognise that buildings in the UK must increasingly be able to perform in extreme heat.	Thank you for your comment. The committee agreed that ensuring a balanced approach to heating, insulation and ventilation covers this point.
The Royal College of	Guideline	15	17	Research of effective interventions may be different for children. Children have less choice or control over their indoor environments, and – even without pre-existing health conditions – can react differently from adults due to their	Thank you for your comment. The committee agreed and have added children to the list of vulnerable groups.

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Physicians				physical characteristics, behaviour and growth/development.	
The Royal College of Physicians	Guideline	21	8	Paediatricians and community child health professions will see children with asthma, repeated wheeze/cough, eczema or rhinitis that can be caused by indoor pollution. This will often not be during a home visit. For children especially, if health professionals have concerns about the home – regardless of the healthcare setting – it could be helpful if they were also able to request a housing assessment.	Thank you for your comment. The committee agreed and have edited this section.
United Kingdom Indoor Environments Group	Guideline	General	General	The United Kingdom Indoor Environment Group (UKIEG) welcome the NICE guideline for raising awareness of the risks to health associated with poor indoor air quality in homes. While appreciating that the scope excludes acute exposure to CO arising from malfunctioning combustion appliances this important risk factor should be recognised in the guideline and appropriate references provided. Elevated CO levels may arise from inadequate ventilation when a 'normally' functioning appliance is used. Further as CO is readily detectable at low cost the widespread use of appropriate measurement devices (including alarms) should be recommended	Thank you for your comment. Acute exposure to carbon monoxide is outside the scope of this guideline. NICE has a guideline on 'unintentional injuries in the home: interventions for under 15s' which includes carbon monoxide alarms.

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				<p>and all official (first responders, health and social services) visitors to properties should have available such a measuring device for routine checking.</p> <p>While noting that the scope of the work excludes radon the guidelines should include the risk of entry into the home of other pollutants associated with ingress from the ground, particularly from contaminated land; methane, VOCs etc. There are examples of this being a major public issue e.g. the evacuation and demolition of homes at Weston (near Runcorn, Cheshire) and the associated COT statement on HCBd (hexachlorobutadiene) in June 2000.</p> <p>There is a lack of guidance on precautions related to building refurbishment; in particular the issue of asbestos and paints with a high lead content in older buildings.</p> <p>While we welcome the appreciation of the risks of emissions from consumer products the recommendations should include provision of appropriate storage areas that limit emissions to the living space, particularly areas where people spend the majority of their time.</p> <p>NB; The European standard tests for characterising VOC emissions from many product types, including building materials,</p>	

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				require first measurement 3 days after product installation. This is because of rapidly changing VOC levels and the difficulty of reproducible results for evaluating products during this high emission phase. In consequence the assessment criteria used in labelling schemes relate only to emissions after 3 days until 28 days. Therefore exposure to products should be avoided for a period after installation.	
United Kingdom Indoor Environments Group	Guideline	4	Box 1	This Box, which is reoffered to throughout the document and it is thus very important, does not explicitly mention "young children" as being at risk (other than implicitly those in pre-school age). On page 18, line 3-4 it is stated that "Pregnant women, those who have recently given birth, and young children are also at increased risk from damp and other indoor pollutants. This is partly because 5 people in these groups may have compromised immune systems, and also because 6 young children are likely to be at home for longer than average periods of time.". This point is not adequately captured in Box 1, especially regarding young children and also women who have recently given birth.	Thank you for your comment. The committee have considered this and concluded that they did not have the evidence to include all children to the list of people may be particularly vulnerable to ill health as a result of exposure to poor indoor air quality However, they did have evidence for pre-school children and have added this group as a separate bullet to this list.
United Kingdom	Guideline	7	17-25	Section 1.4.1 These suggestions are appropriate however it should be explicitly	Thank you for your comment. The committee agree that it may not always be possible to avoid these activities and have

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Indoor Environm ents Group				acknowledged in this section that some circumstances do prevent people from taking these actions, especially those in overcrowded conditions (where more moisture-producing activities per volume will occur) and in poverty (where ventilation might be avoided in winter to minimise need to heat with associated costs).	identified these groups as examples of people who are vulnerable and housing conditions that increase risk of exposure.
United Kingdom Indoor Environm ents Group	Guideline	8	11-13	Section 1.4.4: This should also include the case where ventilation is inadequate because of overcrowding (insufficient ventilation provision in relation to users' needs) and/or due to single-sided design (i.e. no cross-sided ventilation) and/or with small openable window areas.	Thank you for your comment. The committee noted that this point is covered in the "Why the committee made the recommendations' section for Prioritising indoor air quality.
United Kingdom Indoor Environm ents Group	Guideline	8	20	Section 1.4.6 This section should also advise people not to use gas fuelled cooker oven for heating of kitchen	Thank you for your comment. The committee agreed and have added a new recommendation to cover this point.
United Kingdom Indoor Environm ents Group	Guideline	8	23-25	Section 1.4.8 A specific additional statement should emphasise the importance of such considerations when refurbishing areas where children spend most of their time, notably bedrooms. A general statement about providing a period of high ventilation, if possible for at least a several days before	Thank you for your comment. The committee agreed that it was sufficient to recommend following product instructions and ensure adequate ventilation.

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				occupancy by children (particularly the new born) should be included.	
United Kingdom Indoor Environment Group	Guideline	9	12 - 15	Section 1.5.2 This recommendation implies that the health professional would be able to make a judgement on housing conditions asking about them and deciding whether "these are a concern". For this, training and/or information/support is required as health professionals are not typically trained to assess housing conditions: indeed the need for training of professionals is included in the rationale; page 20 (lines 3-6). But where is the need for training/guidance for health professionals made? This point does not come across strongly in the guidance.	Thank you for your comment. The committee emphasised that training needs for healthcare professionals on how to identify poor indoor air quality and how to take steps to reduce its effects could be incorporated within existing training pathways. The committee also noted that the healthcare professional can then, if concerns are raised, help to request a housing assessment (in the rationale and impact section for health care professionals). This is to support recommendations 1.2.2 and 1.3.2 on advice for healthcare professionals.
United Kingdom Indoor Environment Group	Guideline	09-10	23-24 & 1-4	Section 1.5.4 This section should clarify that moist and warm environments are supportive of house dust mite growth, therefore the general advice provided in 1.4.1 is also applicable. Whilst the avoidance of excessive moisture and dampness will not remove the risk from any existing dust mite allergen, it should help reduce the risk of their growth in future.	Thank you for your comment. The committee have now cross-referred to section 1.4 on advice and information to this section for clarity.
United Kingdom Indoor Environment	Guideline	12	1 - 6	Section 1.7.5 This should also refer to siting of air inlets for mechanical ventilation (not just windows).	Thank you for your comment. The committee agreed and have edited this recommendation for clarity.

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ents Group					
United Kingdom Indoor Environment Group	Guideline	15	25-27	Research recommendation no. 3: In order to establish appropriate air exchange rates, it is necessary to also know typical exposure profiles indoors. Data on indoor sources and exposures in UK housing is scarce and/or out of date. Without this information, the determination of appropriate air exchange rates cannot be adequately estimated. In fact, the need for more extensive indoor air quality exposures should be a separate and critical research gap.	Thank you for your comment. The supporting information for this research recommendation has been updated in the evidence review.
United Kingdom Indoor Environment Group	Guideline	16	14-15	Research recommendation 'Other': in practical terms, it is essential that building inspectors have clear guidance on safe and non-safe dampness and mould levels. E.g. is a small patch of mould on the wall a critical health risk which requires urgent remediation? How small is small? Without this specific guidance, there is not a compelling need to act.	Thank you for your comment. The supporting information for this research recommendation has been updated in the evidence review.
United Kingdom Indoor Environment Group	Guideline	18	23-24	Joint working, inspection protocols, home visits: this section states there is evidence for home visits by healthcare professionals – this point, however, does not come across strongly in the earlier recommendations. Further explanation is required to clarify on what	Thank you for your comment. This section provides a brief summary of the committee's evaluation of the evidence and their rationale for the recommendations. Full details about the evidence reviewed by the committee can be found in evidence review 4.

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				grounds or occasions these are recommended.	
United Kingdom Indoor Environments Group	Evidence review 1	General	General	The authors should check the reason for the non-inclusion of the largest study of indoor air quality undertaken in UK homes that is summarised in a peer reviewed journal paper and supported by detailed reports available from BRE. The government funded study is not included in either the list of included or excluded studies. The journal publication is; Raw G, Coward S, Brown V and Crump D. (2004). Exposure to air pollutants in English homes. Journal of Exposure Analysis and Environmental Epidemiology, 14, S85-S94, 2004.	Thank you for your comment. We have checked the study you have provided Raw G, Coward S, Brown V and Crump D. (2004). Exposure to air pollutants in English homes. Journal of Exposure Analysis and Environmental Epidemiology, 14, S85-S94, 2004. This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it presents results as geometric means but does not report on geometric mean ratios.
University of Birmingham	Guideline	4	1 - 5	In developing local strategies to prioritise indoor air quality it is important to consider the proportion of time spent in indoor environments by the local population is a key factor and time-activity patterns will determine indoor exposure patterns. Findings from time-activity diaries recorded by 100 individuals participating in the MATCH (Measurement and Modelling of Exposure to Air Toxic Concentrations for Health Effect Studies) project, identified participants spent 90% of their time indoors, including 63% at home. (1) The relative distribution of indoor/outdoor time-	Thank you for your comment and this contextual information.

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				<p>activity is also recognised to differ by personal characteristics (e.g. age, gender) and between urban and rural contexts; within MATCH urban participants spent more time at work and less time at home (58% home, 21% work, 5% transit) than suburban (64% home, 15% work, 6% transit) and rural sub-populations (65% home, 10% work, 7% transit). These contextual differences in time-activity patterns should be reflected in the guidance, notably for identifying those population sub-groups who have the highest relative levels of exposure to sources of indoor air pollution.</p> <p>The draft guideline could note that building age is not necessarily a good determinant of exposure – in that modern houses, and particularly apartments, are much better sealed and hence experience less outside air infiltration, and potentially greater internal air pollution source retention. They are also more likely to have HEPA and other incoming air filtration systems.</p>	<p>The committee agreed that building age is not a good determinant of exposure and so have not added this factor to the list of housing conditions that increase exposure.</p>
University of Birmingham	Guideline	4	3	<p>People experiencing chronic illnesses and diseases are liable to spend a larger proportion of their time at home than healthy subjects; therefore the home environment is likely to be the most influential microenvironment affecting their overall personal exposure to pollution.</p>	<p>Thank you for your comment and the contextual information. The committee agreed and have added children and older people to the list of people who are vulnerable.</p>

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**Indoor air quality at home**

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				<p>Patients with chronic respiratory disease (e.g. Chronic Obstructive Pulmonary Disease) are a vulnerable risk group omitted from the draft guideline.(2) Children are a sensitive population to health effects of pollution since their biological systems and organs are at various stages of development and experience a greater volume of inhaled air per unit mass of body weight compared to adults.(3) Older persons, including adults aged 55-64 and &gt;64 years have also been shown to spend more hours at home than younger age groups (in high income settings), and therefore experience higher contribution of domestic exposure to total personal indoor exposure. There are also potential influences from housing unit size, with smaller units intensifying air pollutant local concentrations in the home. Therefore for design and construction should include a focus on reducing air quality issues. The sealed nature of the modern housing unit is also perhaps a factor requiring consideration. The relative contribution of the indoor compared to external environmental exposure is recognised to vary by pollutant type. Benzene has typically higher concentrations in indoor compared to outdoor environments. In a</p>	

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				study conducted in Birmingham, the home was identified as the largest contributor to benzene exposure, with higher exposures reported among homemakers and elderly people compared to students and office workers.(4) Further studies indicate that the home environment is most relevant to wider Volatile Organic Compound exposure, contributing an average of 64% to personal exposures across all VOCs, ahead of the workplace (13%) and commuting by car (6%). (5)	
University of Birmingham	Guideline	5	9	Joint working is essential with relevant national and local Government policy initiatives for climate change adaptation measures in the built environment and planning processes. Changes to housing intended to reduce greenhouse gas emissions have potential to affect indoor air quality – including energy efficiency measures which may increase pollutant concentrations (such as PM2.5, CO, radon) and additional evidence is required concerning the role of mechanical ventilation and air filtration.(6) Embedding relevant guidance within relevant building regulations guidance is essential for effective policy implementation.	Thank you for your comment.
University of	Guideline	5	20	A number of Fire and Rescue services have begun working with public health teams in local	Thank you for your comment and this example. The committee have added fire and rescue services to this recommendation.

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Birmingham				authorities to use the 'Safe and Well Visit' programme to improve health and quality of life of vulnerable residents at most risk in the communities in the UK. Existing initiative have included falls risk assessments, mental health advice and improved understanding of access to services. This visit and contact point provides an opportunity to both identify sources of poor air quality, and to raise awareness of the health harms of poor indoor air quality. Such integrated assessments could be facilitated by joint working of the fire prevention approach with local authority services.(7) The effectiveness of such integrated visits to deliver public health action is currently undergoing research evaluation, and is an existing evidence gap for further investigation.	
University of Birmingham	Guideline	6	3+	Note that there are measures that can be taken outside the home, to improve air quality / reduce exposure at the home façade – for example use of barriers, green infrastructure to modify dispersion patterns	Thank you for your comment. Outdoor infrastructure interventions are outside the scope of this guideline.
University of Birmingham	Guideline	8	1 - 2	Additional measures include installing fume extraction hoods in kitchens and replacing gas cookers to reduce indoor exposure to NO2. Housing conditions - experimental evidence suggests that open fire places and use of peat	Thank you for your comment. The committee noted that Fume extractor is implied in the recommendation by 'using extractor fans'. The committee also noted the Committee on Climate Change advice to phase out gas cookers. The recommendations already cover advice on open fires and

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				(compared to coal and wood) for domestic heating are associated with increased levels of indoor and outdoor PM2.5 concentrations.(8)	domestic heating and also recommendations on designs on minimising exposure to indoor sources of PM.
University of Birmingham	Guideline	8	3-9	Regular servicing or replacement of woodburning stoves (upgrading to Defra approved) and sweeping open chimneys to remove particulate debris. An area wide programme in the US has been shown to effectively reduce particulate emissions by 27% to within US legal limits; however such schemes need to be at large scale to have an overall impact. (9) Consideration should be given to policies which incentivise uptake of the best available stoves (avoiding the terminology 'clean stoves' in public communications) and the critical importance of burning dry wood – including policy alignment with the UK Clean Air Strategy.(10)	Thank you for your comment. The committee provided recommendations to cover cookers and open fires in the home (recommendation 1.4.3). they also recommended that architects and designers should design or specify heating systems that minimise indoor exposure to particulate matter (recommendation 1.7.2).
University of Birmingham	Guideline	9	1-3	Indoor air quality advice and information for the general population should also include education about the health harms associated with second-hand and third-hand environmental tobacco smoke and how to effectively clean household materials to remove such residue.	Thank you for your comment. Environmental tobacco smoke (passive smoking) is outside the scope of this guideline. The committee have signposted to other NICE guidance on smoking.
University of	Guideline	12	1	An example of improving heat efficiency and reducing penetration of outdoor air pollution	Thank you for your comment.

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Birmingham				indoors is the installation of double glazed windows during building renovation.	
University of Birmingham	Guideline	13	4	Additional research evidence regarding CO exposure and health impacts in the UK would help inform these measures.	Thank you for your comment. The committee have expanded the supporting text for the research recommendation to cover this point.
University of Birmingham	Guideline	17	2 - 14	We note there is no reference in the guideline to the enforcement of smoke control areas, or of implementation of these as outlined in the Clean Air Strategy. In a smoke control area residents may only burn authorised fuels ( <a href="https://smokecontrol.defra.gov.uk/fuels.php">https://smokecontrol.defra.gov.uk/fuels.php</a> ) or 'smokeless' fuels (anthracite, semi-anthracite,, gas, low volatile steam coal) unless using an exempt appliance. Regional anecdotal evidence suggests limited awareness and compliance with smoke control zone legislation, and reactive enforcement by local authority environmental health services. Recommendations to improve understanding and increase compliance with existing measures could be considered within the awareness recommendations.	Thank you for your comment. Enforcement of smoke control areas is outside the scope of this guideline.
University of Birmingham	Guideline	18	7-9	It is important to consider the role of policy recommendations which may reduce exposure to ambient air pollutant sources other than main roads – e.g. open fires, bonfire and firework events, industrial sources, railway	Thank you for your comment. The committee agreed and have edited this section. The committee have referred to the Clean air strategy 2019 as background context in the guideline.

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				lines, agricultural emissions, as outlined in the UK Clean Air Strategy.(10)	
University of Birmingham	Guideline	19	3-6	Widespread deployment of low-cost sensors for indoor air quality monitoring by local authority staff will require capacity building and skills training to perform calibration, validate, data analyses and interpretation, supported by academic community. Opportunities to integrate technology with heat and smoke sensors should be explored for future potential.	Thank you for your comment. The committee agreed and have replaced sensors with monitoring. Visual inspections, checklists and the monitoring of pollutant levels are examples of how home visits could be used to identify sources of poor indoor air quality.
University of Birmingham	Guideline	21	17-18	Additional public service staff who will come into regular contact with vulnerable individuals in their homes include Fire and Rescue service professionals, General Practitioners (home visits), ambulance service staff and health visitors. All healthcare professionals will need consistent training on how poor air quality affects health, how to identify poor indoor air quality and how to take steps to mitigate its effects, as recommended by the Royal College of Physicians.(11) This could be incorporated within existing training pathways, including professional training and accreditation examinations.	Thank you for your comment. We agree and have discussed the inclusion of training in recommendation 1.2.1, 1.2.2 and 1.3.2.
University of Birmingham	Guideline	28	15-18	Although there are no national regulations or guidelines to determine 'safe' levels of indoor air pollutants, WHO guidelines provide an existing scientific basis for enforceable	Thank you for your comment.

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				standards. For the majority of criteria pollutants, epidemiological studies do not identify any threshold or safe level.	
University of Birmingham	Guideline	35	4-9	Policies aimed at reducing ambient pollutant levels would also reduce concentrations indoors and consequently total exposure to air pollution – it is important to recognise this is most relevant for those pollutants where personal exposure is driven by air pollutants of outdoor origin with exposure occurring both indoors and outdoors.(12) In some specific instances the indoor environment is the predominant source of outdoor pollution – for example certain flame retardants in the UK.	Thank you for your comment. Outdoor air pollution is covered in the NICE guideline on outdoor air quality (Air pollution: outdoor air quality and health). The committee were mindful of the balance between indoor and outdoor pollution and have made recommendations for the need to rapidly dilute indoor air pollutants by either opening windows when safe to do or using mechanical ventilation.
University of Birmingham	Evidence review: General			Evidence Gaps A better understanding of how current and emerging building infrastructure design, construction, and materials may affect health in the context of climate change and mitigation and adaptation measures is needed in the UK and other high income countries. Long-term, energy efficient building design interventions, ensuring adequate ventilation, need to be promoted. With regard to the evidence concerning cost-effectiveness of intervention measures, we note that there are few studies (including only one UK study) and the majority of existing	Thank you for your support regarding the approach we have taken to the economic analysis.

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				studies have limited applicability or limitations. However, the approach applied and rationale for not applying a cost per QALY calculation was justified and the methods were clearly described.	
University of Birmingham	Equality Impact Assessment			<p>Equality Impact Assessment</p> <p>We agree with the assessment that air pollution affects some specific vulnerable groups. Specific equality issues are considered for young children, pregnant and women and those on a low income or living in fuel poverty. However, elderly people are also recognised to have increased susceptibility to the effects of air pollution and due to frailty and impaired mobility are recognised to spend a greater proportion of times indoors, on average, than younger adult persons. Therefore those with older conditions and with pre-existing chronic conditions, should also be specifically considered within the equality impact statement.</p> <p>Equity of access to equity of access to stop smoking services for populations with a higher prevalence of smoking (such as routine and manual workforce, teenage pregnant women, people with mental health problems, prison populations and lesbian, gay, bisexual and</p>	Thank you for your comment. The committee noted that these examples were already included in the equality impact assessment.

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				transgender (LGBT) people) should be considered, as per existing PHE guidance.(13)	
University of Birmingham	General Questions			<p>Which areas will have the biggest impact on practice and be challenging to implement? Please say for whom and why.</p> <p>Given the high proportion of people's lives spent indoors, interventions should be aimed at improving indoor air quality in the home</p> <p>Implementing policies to remove indoor sources of pollution (for those pollutants where most personal exposure in indoors) and reducing outdoor air pollution that can penetrate indoors, for those with predominant outdoor sources (e.g. by traffic emissions control measures) are likely to have most impact upon overall personal pollutant exposure. Policies to reduce ambient pollution will reduce concentrations indoors and consequently total exposure to air pollution.(13)</p> <p>Raising awareness of indoor sources and sharing best practices to reduce indoor sources in housing assessments is likely to be most effective from a public health perspective, in the context of this guidance.</p> <p>Would implementation of any of the draft recommendations have significant cost</p>	Thank you for your comment. The committee were mindful of the risk posed by outdoor air pollution and have recommended the use of purge ventilation when safe to do so

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				<p>implications?                      It is essential that policies related to implementation of these recommendations, consider the impacts that a shift towards net zero UK carbon emissions will have. This will require a major alteration in heating and cooling systems and this will be disruptive change in the UK. This provide an opportunity embed other alterations, but it is also critical to ensure that all alterations enhance indoor air quality. The respective timeframes also require consideration – a time horizon of 2050 (for net zero carbon emissions) may be too long to deliver short-medium term improvements in indoor air quality.</p> <p>What would help users overcome any challenges? (For example, existing practical resources or national initiatives, or examples of good practice.)                      Embedding indoor air quality and health training within existing health professional educational and assessment pathways (e.g. RCGP, FPH)                      An integrated approach is required to ensure that all policies that regulate domestic housing units are compliant in terms of understanding indoor air quality at home. This will help to</p>	

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				<p>overcome potentially conflicting policy recommendations – for example mitigation of flame retardants and abrasion as a contributor to air quality.</p> <p>References K. L. Abdullahi, J. M. Delgado-Saborit and R. M. Harrison, Atmos.Environ., 2013, 71, 260–294</p> <p>Assad NA, Balmes J, Mehta S, Cheema U, Sood A. Chronic obstructive pulmonary disease secondary to household air pollution. Semin Respir Crit Care Med. 2015;36(3):408-21</p> <p>J. A. Leech, W. C. Nelson, R. T. Burnett, S. Aaron and M. E. Raizenne, J. Exposure Anal. Environ. Epidemiol., 2002, 12, 427–432.</p> <p>P. L. Leung and R. M. Harrison, Occup. Environ. Med., 1998, 55,249–257.</p>	<p>K. L. Abdullahi, J. M. Delgado-Saborit and R. M. Harrison, Atmos.Environ., 2013, 71, 260–294: This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a an overview</p> <p>Assad NA, Balmes J, Mehta S, Cheema U, Sood A. Chronic obstructive pulmonary disease secondary to household air pollution. Semin Respir Crit Care Med. 2015;36(3):408-21: This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a narrative review</p> <p>J. A. Leech, W. C. Nelson, R. T. Burnett, S. Aaron and M. E. Raizenne, J. Exposure Anal. Environ. Epidemiol., 2002, 12, 427–432.: This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a cross-sectional study</p> <p>P. L. Leung and R. M. Harrison, Occup. Environ. Med., 1998, 55,249–257. This is a sampling study of exposure to indoor and outdoor air monoaromatic hydrocarbons</p>

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				<p>R. M. Harrison, J. M. Delgado-Saborit, S. Baker, N. Aquilina, C. Meddings, S. Harrad, I. Matthews, S. Vardoulakis and R. Anderson, Measurement and Modeling of Exposure to Selected Air Toxics for Health Effects Studies and Verification by Biomarkers, Health Effects Institute, 2009.</p> <p>Vardoulakis et al. Impact of climate change on the domestic indoor environment and associated health risks in the UK. Environ Int. 2015;85:299-313</p> <p>PHE &amp; NHS England. Principles for a 'Safe and Well' visit by a Fire and Rescue service. Available at: <a href="https://www.england.nhs.uk/wp-content/uploads/2015/09/safe-well-visit-principles.pdf">https://www.england.nhs.uk/wp-content/uploads/2015/09/safe-well-visit-principles.pdf</a> (accessed 30 July 2019).</p>	<p>R. M. Harrison, J. M. Delgado-Saborit, S. Baker, N. Aquilina, C. Meddings, S. Harrad, I. Matthews, S. Vardoulakis and R. Anderson, Measurement and Modeling of Exposure to Selected Air Toxics for Health Effects Studies and Verification by Biomarkers, Health Effects Institute, 2009: This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a sampling study of exposure to both indoor and outdoor air pollutants</p> <p>Vardoulakis et al. Impact of climate change on the domestic indoor environment and associated health risks in the UK. Environ Int. 2015;85:299-313 This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is concerned with the climate change the health benefits and risks of interventions to mitigate against climate change</p> <p>PHE &amp; NHS England. Principles for a 'Safe and Well' visit by a Fire and Rescue service. Available at: <a href="https://www.england.nhs.uk/wp-content/uploads/2015/09/safe-well-visit-principles.pdf">https://www.england.nhs.uk/wp-content/uploads/2015/09/safe-well-visit-principles.pdf</a> (accessed 30 July 2019): This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a overview</p>

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				<p>Galea KS, Hurley JF, Cowie H, Shafrir AL, Sanchez Jimenez A, Semple S, Ayres JG, Coggins M. Using PM2.5 concentrations to estimate the health burden from solid fuel combustion, with application to Irish and Scottish homes. Environ Health. 2013;12:50.</p>	<p>Galea KS, Hurley JF, Cowie H, Shafrir AL, Sanchez Jimenez A, Semple S, Ayres JG, Coggins M. Using PM2.5 concentrations to estimate the health burden from solid fuel combustion, with application to Irish and Scottish homes. Environ Health. 2013;12:50. This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a health burden modelling study for exposure to particulate matter.</p>
				<p>Noonan, C.W., Navidi, W., Sheppard, L. Palmer, C.P., Bergauff, M., Hooper, K and Ward, T.J. (2012) Residential indoor PM2.5 in wood stove homes: follow-up of the Libby changout program, Indoor air, 22: 6: 492-500</p>	<p>Noonan, C.W., Navidi, W., Sheppard, L. Palmer, C.P., Bergauff, M., Hooper, K and Ward, T.J. (2012) Residential indoor PM2.5 in wood stove homes: follow-up of the Libby changout program, Indoor air, 22: 6: 492-500 This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a secondary publication of an included study</p>
				<p>Defra. UK Clean Air Strategy, Jan 2019 Royal College of Physicians. Every breath we take; the lifelong impact of air pollution. Feb 2016.</p>	<p>Defra. UK Clean Air Strategy, Jan 2019. This report was used as background context in the guideline.</p>
				<p>Delgado-Saborit. Indoor Air as a Contributor to Ari Pollution Exposure. Issues in Environmental Science and Technology No., 48. Indoor Air Pollution. Eds R.M.Harrison and R.E.Hester</p>	<p>Delgado-Saborit. Indoor Air as a Contributor to Ari Pollution Exposure. Issues in Environmental Science and Technology No., 48. Indoor Air Pollution. Eds R.M.Harrison and R.E.Hester : This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it</p>

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				Public Health England. Tobacco commissioning support 2019 to 2020: principles and indicators. Updated 4 October 2018. Available at: <a href="https://www.gov.uk/government/publications/alcohol-drugs-and-tobacco-commissioning-support-pack/tobacco-commissioning-support-pack-2019-to-2020-principles-and-indicators">https://www.gov.uk/government/publications/alcohol-drugs-and-tobacco-commissioning-support-pack/tobacco-commissioning-support-pack-2019-to-2020-principles-and-indicators</a> (accessed 30 July 2019)	is concerned with factors associated with exposure to air pollution  Public Health England. Tobacco commissioning support 2019 to 2020: principles and indicators. Updated 4 October 2018. Available at: <a href="https://www.gov.uk/government/publications/alcohol-drugs-and-tobacco-commissioning-support-pack/tobacco-commissioning-support-pack-2019-to-2020-principles-and-indicators">https://www.gov.uk/government/publications/alcohol-drugs-and-tobacco-commissioning-support-pack/tobacco-commissioning-support-pack-2019-to-2020-principles-and-indicators</a> (accessed 30 July 2019) : This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a report on commissioning local tobacco control plans
Wood Panel Industries Federation	Guideline	8 11 12 14 general	23-25 10-11 15 14-16	Whilst there is no evidence about the effect of low emission products (see pg 13 lines 26, 27 & 29 of the '[3.1] evidence review for material and structural interventions' and pg 29 of the guideline lines 13-14) the Guideline still makes recommendations for selecting 'low' emission/VOC products from specific groups of products e.g. furniture, without evidence that those products are indeed causing the problem or solving the problem by selecting lower emission products. We therefore believe one of the recommendations for research in the Guideline should be to define what would be considered 'low' and therefore 'high' levels of VOC emissions in indoor air from a scientific	Thank you for your comment. The committee agree and have expanded the research recommendation to cover all sources of indoor air pollutants.

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				<p>point of view but also look into the effects of common products (individual and mixtures) with known VOC emissions on indoor air and on health. The issue with generalised statements is that different product groups could have different starting points for their emissions which could mean that 'low' from one product group could be 'high' for another product group therefore it is important to quantify this so as to target the products that can make the biggest influence through improvement and by not disadvantaging other products that have already made advances or targeting products emitting VOCs that are not harmful to occupants.</p> <p>For formaldehyde however we believe there is already enough evidence to be able to quantify the effect of low emission products on indoor air concentrations. The European Chemicals Agency's (ECHA's) recent restriction proposal of a of less than 0.124 mg/m3 concentration when tested to EN 717-1 (which corresponds to EN 13986 formaldehyde classification E1) <a href="https://echa.europa.eu/documents/10162/ee418b46-92cc-8db2-de97-5c7599df763c">https://echa.europa.eu/documents/10162/ee418b46-92cc-8db2-de97-5c7599df763c</a> for products used indoors, that supports the WHO indoor air recommendations for formaldehyde (0.1mg/m3), by looking at the effects of</p>	<p>This technical standard (EN 13986) was not included in the evidence reviews as the committee prioritised studies that reported health related outcomes over exposure levels. The scope and review protocols (Appendix A of the evidence reviews) set out what will and won't be covered in the guidance, within the time and resources available.</p> <p>We will pass your comment to the NICE surveillance team which monitors guidelines to ensure that they are up to date so this prioritisation can be revisited when the guideline is updated.</p>

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				<p>products on indoor air concentrations. The ECHA proposal is very recent and as a consequence draws on many recent research works and can therefore be considered state of the art. We would therefore recommend that the evidence review include this evidence. For wood-based panels and other wooden products there are two formaldehyde emission classes available in Europe, namely E1 (<math>\leq 0.124</math> mg/m<sup>3</sup>) and E2 (<math>&gt; 0.124</math> mg/m<sup>3</sup>). E2 is a class without an upper limit and can therefore lead to high emission levels from products. Wood-based panel producers that are members of the European Panel Federation (approximately 95% of the EU 28 wood-based panel producers) stopped producing E2 products and have only been producing E1 products since 2007, however the availability of E2 products from imports continues without any legal restriction in the UK and could therefore lead to high levels of formaldehyde exposure in indoor air. It is the potential high emitting products that ECHA's proposal is trying to remove by imposing a Europe-wide REACH restriction to products (articles) at the level E1 or lower. We would therefore recommend that the guidelines adopt the same strategy to define 'low' formaldehyde</p>	

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				emitting products at the level of E1 or 0.124 mg/m3 throughout the document where appropriate.	
Wood Panel Industries Federation	evidence review	8	23-25	Line 8 of the '3.1 evidence review for material and structural interventions' states that all outcomes are considered of equal importance, however according to EU Directorate-General for Health & Consumers publication 'promoting actions for healthy indoor air (IAIAQ)' <a href="https://publications.europa.eu/en/publication-detail/-/publication/4beb6973-83f8-49a9-a6c8-d31a6d75a247">https://publications.europa.eu/en/publication-detail/-/publication/4beb6973-83f8-49a9-a6c8-d31a6d75a247</a> VOCs are attributed with the least burden of disease whereas damp buildings, radon, bio-aerosols from outdoors and carbon monoxide poisoning can be accounted for much more than VOCs with combustion particles being attributed to more than all of these combined. It does go on to say that the importance of VOCs might be underestimated however it does also beg the question regarding prioritising tangible benefits to the health and wellbeing of the population for those dangers that are well understood and easily preventable .e.g. carbon monoxide poisoning could be reduced through the mandatory fitting of carbon monoxide alarms or the prevention of damp by insulating and/or ventilating the building properly, whilst the	Thank you for your comment. The committee agreed to give all outcomes equal weight and did not rely on the epidemiological burden of the pollutants in the healthy population.  Promoting actions for healthy indoor air (IAIAQ) This This study does not meet the inclusion criteria as specified in the review protocols (Appendix A of the evidence reviews) as it is a risk modelling tool.

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				evidence and knowledge of the impacts VOCs is still poorly understood and should be one of the key recommendations for research. The local strategy or plan should also adopt a strategy based on priorities of emissions into indoor air so that funding can be streamlined to those buildings and occupants at greatest risk of the indoor air emissions causing harm.	
Wood Panel Industries Federation	Guideline	25 34	9-10 1-2	Flame retardants, VOCs and formaldehyde are not necessarily interlinked and the presence of one does not mean the presence of the other in old or new furniture and flooring. It is our understanding that flame retardant technology has changed over time as has product technology for foams. Formaldehyde emissions from products such as wood-based panels are certainly different (significantly lower and has been on a downward trajectory) to what they were 30-40 years ago. Flame retardants will degrade over time and enter the indoor environment therefore older furniture could be more prone to this, but not all furniture or flooring, it will depend on what it is made from and how old it is. Formaldehyde from wood-based panels will be released to air over time and keep reducing over time, as will VOCs and would argue these are much less likely to be an issue in older furniture and	Thank you for your comment. No evidence on flame retardants was found. The committee were mindful of the different risk posed by new and old materials but agreed that the risk profiles change over time.

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				flooring as they will have had many years of gradual decline in emissions. Simply stating 'older flooring and furniture' does not represent useful guidance because 'older' isn't defined and the types of furniture that could pose risks is not adequately defined either, therefore more work is needed to properly define and address the intention of this guidance.	

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*\*None of the stakeholders who comments on this clinical guideline have declared any links to the tobacco industry.*

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