

Counting the cost of indoor air pollution

*New research reveals the economic and health impacts of indoor air pollution. **Sefi Roth** and **Edward Pinchbeck** outline the significance of the findings and discuss how policymakers can devise effective and just policies to mitigate its adverse effects on society.*

In recent years, the adverse effects of outdoor air pollution on health and well-being have become a major focus of scientific research and public policy. However, the impacts of indoor pollution have largely been overlooked. This is concerning because most people spend approximately 80-90 per cent of their time indoors, and exposure to indoor pollutants is responsible for millions of deaths each year globally [according to the World Health Organisation](#). As such, focusing policy attention only on outdoor pollution without addressing indoor environments will fail to provide the public with an adequate level of protection against overall pollution exposure.

Evaluating the costs of indoor pollution has proved to be extremely challenging.

Good environmental policymaking requires credible information on the costs and benefits of the environmental hazard and the proposed policy. Unfortunately, evaluating the costs of indoor pollution has proved to be extremely challenging. First, we don't know much about how exposed people are to indoor air pollutants because large data samples are rarely collected. Second, it is hard to isolate the true effects of indoor pollution because exposure is likely to be associated with other factors that impact human health and well-being, such as income, diet and smoking. Third, monetising the total cost of indoor pollution is complex, as exposure can result in a wide range of health and well-being costs. These challenges do not mean that we should ignore this critical environmental issue. Rather, academics can and should do more to assist policymakers to credibly identify these costs (and benefits) and also provide them with various policy options to tackle this issue.

Mapping effects on the housing market

In our recent [published paper](#), we took a first step towards this objective by exploring the

costs of one indoor air pollutant, radon – an odourless, colourless and tasteless air pollutant formed by the natural decay of uranium from rocks and soil which is known to cause lung cancer. Our analysis aimed us to understand how much people are willing to pay to avoid radon (that is, it's costs), and to examine which socio-economic groups are most affected by it. To do so, we utilise a unique dataset combining information on residential property transactions in England with detailed pollution risk maps provided by Public Health England. Our study leverages a change to the risk maps in 2007 that meant some properties were reclassified to higher or lower levels of radon riskiness while others were not.

The results of our analysis reveals that there is a highly significant negative relationship between greater radon risk and house prices, in other words people do value lower radon risk. In terms of magnitude, the effect size places the value of no rather than low radon risk at around 0.8 per cent of property price. This is economically significant and comparable to the impact of other environmental risks such as flooding or earthquake risk.

We also find that radon risk induces sorting, with higher educated, home-owning, and higher social status residents moving away from areas with increased radon risk. This disproportionate impact on lower socio-economic groups highlights a source of environmental injustice in our society, which is something that policymakers should take into account when formulating future policies.

Exposing the economics of indoor air pollution

This study provides several important contributions to policymaking. First, it provides one of the first estimates of the economic impact of indoor air pollution, overcoming limitations related to data availability and information disclosure. Second, our findings underline the importance of information availability in allowing markets to price environmental risks accurately. Third, our study contributes to the understanding of environmental justice and reveals the complexities of household sorting in response to pollution risks. Finally, the substantial economic implications demonstrated by our research emphasise the significance of addressing indoor air pollution.

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The good news is that radon, the indoor pollutant that is the subject of our study, can be measured easily and at low cost and high levels of radon inside homes and workplaces can be reduced by taking remedial measures, for example by improving ventilation or installing a radon sump. To reduce the adverse effects of radon, we would encourage those living and working in radon-affected areas to follow the advice on the [UK radon website](#) to check, measure, and then act accordingly.

The less good news is that radon is only one of many indoor air pollutants that can have damaging effects on our health. Other pollutants such as particulate matter in dust and dirt, as well as gases such as carbon monoxide and sulphur dioxide can be generated inside our homes from activities such as cooking, and can also penetrate from outdoors.

Research on the health effects of ambient air pollution suggests that exposure to these other forms of pollution in homes and workplaces will have adverse effects through respiratory and cardiovascular conditions such as asthma and heart attacks, impair our brain functioning, and by causing irritation of the eyes, nose and throat, headaches, dizziness, and fatigue. The lack of evidence and data on these other forms of indoor pollution means that we are still largely in the dark about the extent and scale of these costs. As such, the overarching message of our study is that policymakers should recognise the substantial risks posed by indoor pollution and take effective measures to protect the public and promote environmental justice.

As a first step, more information regarding indoor air pollution must be collected and analysed and possible interventions should be examined as pilots. Following this crucial step, academics and policymakers should formulate evidence-based policies to protect the public from this environmental risk.

This blog post draws on the [article](#) “The Price of Indoor Air Pollution: Evidence from Risk Maps and the Housing Market” (Journal of the Association of Environmental and Resource Economists, forthcoming)

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