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High radon areas and lung cancer prevalence in Ireland[1]

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INTRODUCTION

Exposure to radon gas is thought to be the second most important cause of lung cancer worldwide after smoking. This naturally-occurring radioactive gas can seep into houses from beneath the ground or from particular building materials. Ireland has relatively high indoor radon concentrations, estimated to be the eighth highest level among OECD countries.

This research examines data on a large sample of people aged 50+ in Ireland to see whether living in areas with greater risk of radon exposure is associated with higher odds of a lung cancer diagnosis. It takes into account other risk factors such as smoking and age in order to isolate the possible effect of radon.

DATA AND METHODS

It can be difficult to disentangle the effects of an environmental threat like radon from other factors that increase cancer risk. We might notice that cancer is more common in some places than others, but perhaps smoking is also more prevalent in those places or there are a greater number of older residents in the area. Either of these factors would increase cancer risk compared to other areas, and if we do not take them into account we could mistake their effects for the impact of radon. In this research, we use data from The Irish Longitudinal Study on Ageing (TILDA), which is a nationally representative study of people aged 50 and over in Ireland. It contains health information from over 5,000 individuals – including whether they have had a diagnosis of lung cancer – as well as many other details on each respondent.

Crucially, the TILDA data can be linked to local environmental information, and in this case we use data on the radon exposure risk in the area where each

[1] This Bulletin summarises the findings from: Dempsey, S., S. Lyons and A. Nolan, 2018, High Radon Areas and Lung Cancer Prevalence: Evidence from Ireland, *Journal of Environmental Radioactivity* 182, 12-19. Available online: http://dx.doi.org/10.1016/j.jenvrad.2017.11.014

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respondent lives. The Environmental Protection Agency has published a radon risk map dividing Ireland into five zones with increasing levels of risk, from places where <1% of houses are expected to have more indoor radon than a set reference level, to others where >20% of houses might be above this level.

We use statistical methods to see how the odds of a lung cancer diagnosis vary among areas with higher or lower radon risk, controlling for an individual's smoking history, age, gender, level of education and the population density in their locality.

RESULTS

In TILDA, 13 per cent of respondents were living in areas in which more than 20% of households were above the national radon reference level of 200 Bq/m^3. We find that those living in areas where 10%-20% of households are above the national reference level for radon exposure are also about three times more likely to report a lung cancer diagnosis than those who live in areas with fewer than 1% of households above the national reference level. However, we do not find increased odds of cancer in the zone where radon risk is highest (more than 20% of households above the reference level).

In common with previous research, we also find that smoking is the greatest risk factor for lung cancer and that risk rises with age. However, we cannot prove any particular factor *causes* another using these data alone, as it may be possible that there are other factors that are associated with both living in a high radon risk area and lung cancer that we cannot observe in the data.

POLICY IMPLICATIONS

These results are consistent with the view that radon exposures pose a risk to many Irish households. For those living in areas with a higher risk of indoor radon, there is guidance available on how to reduce radon exposure in homes.

A question remains as to why living in the zone with the highest radon risk does not seem to confer higher odds of lung cancer. This could indicate that campaigns by public authorities to get households to protect their dwellings in areas with the most radon have had some success. To know this for sure, one would need to study where and how these campaigns have been conducted. Another possibility is that statistical "noise" led us to miss an effect that is actually still there. A final possibility is 'survivor bias', whereby those who have already died from lung cancer are not in our sample.

A variety of policy measures could help to further reduce radon exposure. Public authorities have previously undertaken awareness campaigns, but perhaps these could be made more effective at influencing behaviour. There are also regulatory policy options that could be considered such as requiring testing prior to sale or rental of dwellings (akin to the Building Energy Rating scheme) or economic measures such as providing incentives to radon-proof buildings in areas that are at risk. To design the best mix of policies, it will be important to understand why many people in high risk areas do not invest in radon protection measures.

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