



Public Consultation on the development of new Solid Fuel Regulations for Ireland - A submission prepared by the Irish College of General Practitioners Sustainability Working Group*

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The Irish College of General Practitioners Sustainability Working Group recognises the scientific evidence that air pollution puts our patients at higher risk of developing serious health problems, including respiratory & cardiovascular disease and cancer. We believe it is vital that in the best interests of our patients' long-term health and wellbeing, action is taken to improve air quality right across our country. We support the Government's commitment to a national application of the regulations currently applied to bituminous ('smoky') coal, as well as the development of appropriate regulatory controls for other residential solid fuels to improve air quality in Ireland.¹

Introduction.

It is estimated that over 29.1 million consultations take place in Irish general practice every year.² There are some 2,500 general practitioners in Ireland,³ the majority of whom are members of the Irish College of General Practitioners (ICGP).⁴ Chronic obstructive pulmonary disease (COPD) & asthma, cardiac problems and oncology & palliative care are listed among the ten most common conditions seen by general practitioners.⁵ These conditions which are directly & indirectly associated with air pollution, comprise a significant workload for general practice and place an economic burden on the health services in Ireland.

The objectives of the ICGP Sustainability Working are summarised in the following infographic (Figure 1).⁶

Figure 1 Infographic - the Irish College of General Practitioners Sustainability Working Group⁶



In this proposal, we will reiterate what is already well known about the risks that air pollution poses to the health of our patients, the extent to which air pollution is a problem in this country and we will suggest some practical steps we believe that can be taken to improve this situation.

Air quality and health

"No sooner had I left behind the oppressive atmosphere of the city [Rome] and that reek of smoking cookers which pour out, along with clouds of ashes, all the poisonous fumes they've accumulated in their interiors whenever they're started up, than I noticed the change in my condition," - Lucius Annaeus Seneca the Younger, 61 A.D.

Air quality is a major concern at a global level and is considered one of the most significant environmental risks to human health.¹ Since the 1990s, medical research has demonstrated links between air pollution and both short- and long-term health impacts, including headache, breathing difficulty, eye irritation, and exacerbation of respiratory conditions and increased levels of strokes, cancer, and respiratory and cardiovascular disease.⁷ The European Environment Agency report, *Air Quality in Europe 2020*, indicates that in 2018, there were 1,300 premature mortalities linked to pollution from fine particulate matter (PM_{2.5}) in Ireland.⁸ The same report specifies 16,200 years of life lost, showing significantly earlier mortality for those deaths.

Particulate matter (also called particle pollution) is the term for a mixture of solid particles and liquid droplets found in the air.⁹ PM₁₀ refers to inhalable particles, with diameters that are generally 10 micrometres and smaller; and PM_{2.5} to fine inhalable particles, with diameters that are generally 2.5 micrometres and smaller. The average human hair is about 70 micrometres in diameter – making it 28 times larger than a PM_{2.5} particle. The size of particles is directly linked to their potential for causing health problems with PM_{2.5} posing the greatest problems, because they can penetrate deep into the lungs and even enter the bloodstream.¹⁰ Exposure has been linked to:

- premature death in patients with heart or lung disease
- nonfatal heart attacks
- cardiac arrhythmias
- aggravated asthma
- decreased lung function
- irritation of the airways, coughing or difficulty breathing.

Patients with heart or lung diseases, children, and older adults are also the most likely to be affected by PM_{2.5} exposure.

Much scientific research has been carried out on the health impacts of air pollution, and in particular that of fine particulate matter.¹¹ While we are all familiar with more visible forms of air pollution, such as smoke from coal fires, evidence suggests that invisible forms of pollution, such as fine particulate matter, are at least as harmful to our health, as the more visible forms of air pollution. Inhaled particulate matter may increase the production of antigen-specific immunoglobulins, alter airway reactivity to antigens or affect the ability of the lungs to handle bacteria, suggesting that exposure may result in enhanced susceptibility to infection.¹²

Inflammation, which is considered central to producing many of the health effects attributed to particulate matter, can be produced by oxidative stress via redox-sensitive transcription factors such as NF- κ B, and studies have demonstrated the ability of particulate matter and surrogates to cause oxidative stress.¹³ In addition, a neurogenic mechanism has been suggested that might be mediated by C-reactive fibres and histamine.^{14,15} The expected cascade of molecular events has been demonstrated with particulate matter exposure, including antioxidant depletion, NF- κ B and AP-1 activation, Ca⁺⁺ flux, kinase activation, phosphorylation of signalling molecules, gene expression and translation into protein of pro-inflammatory cytokines and chemokines such as IL-8 and TNF α .^{13,16} In addition, genotoxic events underlie the carcinogenic effects of particles and both direct, particle-mediated genotoxicity^{17,18} and indirect genotoxic effects of inflammatory cells from particle-exposed animals have been described.¹⁹ Finally, as to cardiovascular outcomes, endothelial cells exposed to PM₁₀ have been reported to show changes indicative of enhancement of the potential for the endothelium to cause thrombosis.²⁰

Ever expanding research is demonstrating the links between air quality and even wider impacts on human health, such as on cognitive development²¹ and mental health.²² Recent research has shown that living in an area in Ireland with higher nitrogen dioxide concentrations was associated with an increase in the probability of reporting an asthma diagnosis and/or using asthma medication in those aged 50 and over.²³ Another study, using routinely gathered data, suggested that in Dublin city, where the air quality is predominantly good, that change in ambient air quality appeared to impact admissions with cardiovascular and respiratory diseases.²⁴ Finally, short-term air pollution in winter was also found to be associated with hospitalisation for all strokes in

Dublin.²⁵ These negative health impacts come at a cost, both personally and economically. In addition to premature deaths, air pollution causes absence from work, reduced productivity, higher spending on medicines, and increased hospital admissions.

Air quality in Ireland

The Environmental Protection Agency (EPA), in its most recent annual Air Quality Report, published in September 2020, provides an assessment of air quality in Ireland for 2019.²⁶ While air quality in Ireland is generally good, there are localised issues in some of our cities, towns and villages. In particular, Ireland breached the recommended World Health Organization air quality guidelines at 33 monitoring sites across the country –mostly due to the burning of solid fuel in our cities, towns and villages. Moreover, Ireland breached the European Environment Agency reference level for polycyclic aromatic hydrocarbons (PAH- a group of toxic chemicals), at 4 monitoring sites due to the burning of solid fuel. The EPA Report recommended that we move away from burning solid fuel (coal, wood, turf) towards cleaner ways of heating our homes like gas or electrified heating, that we implement a national smoky coal ban and we determine the feasibility of a wider smoky fuel ban for our towns and cities.

In a recent EPA report on the SAPPHIRE project, source apportionment of particulate matter in urban and rural residential areas of Ireland was studied during wintertime field measurement campaigns in Killarney, Enniscorthy and Birr.²⁷ Levels of PM_{2.5} during evening hours were often an order of magnitude higher than those measured during the day, and huge spikes in pollution were regularly observed when wind speeds were low. Particulate pollution was highest in Enniscorthy, where PM_{2.5} levels averaged 29.2µg/m³ and a high of 236.6µg/m³ was recorded. Furthermore, the WHO 24-hour mean guideline value of 25µg/m³ was exceeded on 42% of the days (16 out of 38), and on every one of these days the highest hourly average PM_{2.5} was >50µg/m³. The same pattern was observed at the other sites, although the pollution levels were lower. Killarney experienced a mean PM_{2.5} value of 15.3µg/m³ and four exceedances of the WHO 24-hour mean guideline value in 40 days. Birr was the least polluted site, with a mean PM_{2.5} value of 7.9µg/m³ and no exceedances of the WHO 24-hour mean guideline value in 43 days.

Real-time monitoring of the chemical composition of PM_{2.5} in the SAPPHIRE project showed that residential solid fuel burning was the dominant source category at all three locations, accounting for 72%, 82% and 60% of PM_{2.5} measured in Killarney, Enniscorthy and Birr, respectively. A key element of this

project was the use of sophisticated single particle mass spectrometry techniques to differentiate combustion particles produced from the main solid fuels – coal, peat and wood. The results show that peat burning was the main contributor, accounting for 31%, 27% and 26% of the PM_{2.5} mass in Killarney, Enniscorthy and Birr, respectively. Wood was the second most dominant combustion source (17%, 21% and 23%, respectively), followed by coal (16%, 17% and 5%, respectively).

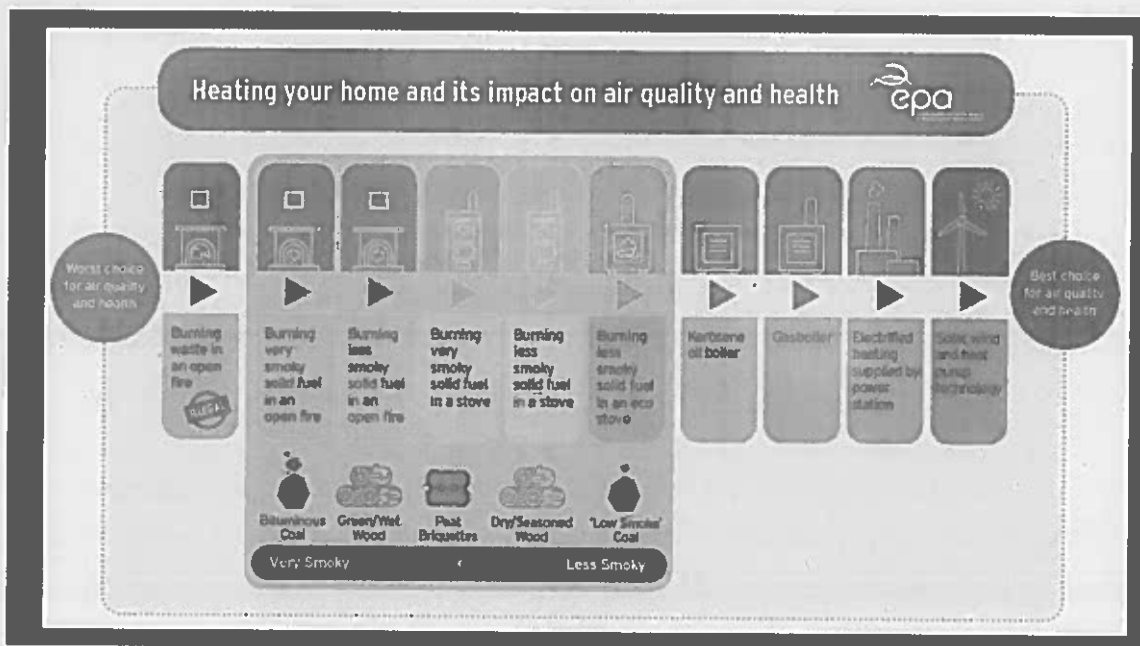
As there was not one dominant solid fuel type that contributed to particulate pollution, measures such as a smoky coal ban in these areas may be only partly successful in reducing PM_{2.5} concentrations. The authors of the SAPPHIRE project recommended that that future efforts to improve air quality in these and other similar towns, will need to address how domestic residences are heated in general, rather than attempting to discourage the use of one specific fuel.²⁷

How can we improve air quality?

“Níl aon tinteán mar do thinteán féin.” -Probably the most famous of all Irish proverbs, literally meaning 'there's no fireside like your own fireside.'

The EPA recommends that we move away from burning solid fuel (coal, wood, turf) towards cleaner ways of heating our homes like gas or electrified heating (Figure 2).²⁸

Figure 2 Infographic - Better ways to heat your home²⁸



Although well-designed retrofitting and insulation projects are usually in excess of €30,000,²⁹ loans³⁰ and grants covering up to 35% of the eligible costs are available through the Sustainable Energy Authority of Ireland's (SEAI) National Home Retrofit Scheme.³¹

In summary, the ICGP Sustainability Working Group recommends;

- broadening the existing regulation of specified fuels in designated areas, to regulations that apply across the entire state;
- increasing the range of specified fuels to be regulated (including, but not limited to, green/wet wood and peat/peat products), to ensure that only the cleanest products are available for sale;
- that incentives be given to encourage home owners to use cleaner ways of heating their homes like gas or electrified heating;
- a just transition for those who work in the coal, wood and peat industries.

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