Institute of Public Health

IPH response to the Consultation on the draft Clean Air Strategy for Ireland

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Introduction

The Institute of Public Health informs public policy to support healthier populations in the Republic of Ireland and Northern Ireland. Our key priorities are promoting health and wellbeing, improving health equity, and reducing health inequalities through evidence, policy, and partnership.

Air pollution and health are inextricably linked, and therefore these considerations are paramount in the development of the Clean Air Strategy and any cross-cutting policies.

The Institute has provided guidance and evidence on a range of policy matters relevant to air quality, the environment and public health in both Ireland and Northern Ireland which may be of interest to the Department:

1. **Briefing Paper on Climate Change (No.2) Bill Northern Ireland** for the Committee for Agriculture, Environment and Rural Affairs 19th January 2022
2. **Health Impact Assessment guidance**, including Strategic Environmental Assessment (SEA) or Environmental Impact Assessment (EIA) Health Impact Assessment - Institute of Public Health
3. **Response to the Climate Change Bill (No. 2) Call for Evidence**: InBrief: The heat is on for Northern Ireland to tackle climate change - Institute of Public Health
4. **Consultation response on the proposed content of the new Road Safety Strategy for Northern Ireland to 2030**, launched by the Department for Infrastructure IPH-NI-Road-Strategy-Consultation-Response-Jan-2022_Web.pdf (publichealth.ie)
5. **Consultation response to the Northern Ireland Food Strategy Framework** launched by the Department of Agriculture, Environment and Rural Affairs (DAERA) IPH-NI-Food-Strategy-Consultation-Response-2021_Web.pdf (publichealth.ie)

6. **Consultation response to the Environmental Plans, Principles and Governance** for Northern Ireland IPH-NI-Environmental-Planning-Consultation-Response-2021_Web.pdf (publichealth.ie)

7. **Response to Dublin City Council's Speed Limit Review** Microsoft Word - IPH Consultation Response DCC Speed Review_submitted.docx (publichealth.ie)

8. **Response to Introduction of 20mph speed restrictions** on smaller residential streets in Northern Ireland Microsoft Word - 20 mph Consultation Response_Institute of Public Health in Ireland_10 Jul 2012.doc

9. **Response to the Framework for Sustainable Development in Ireland** Microsoft Word - 14-12-11 FSDI Draft for public consultation.doc (publichealth.ie)

Key points

1. World Health Organization global air quality guidelines (2021) must be adopted in Ireland as a matter of priority and be legally enforceable under a new Clean Air Act.

2. A Strategic Environmental Assessment (SEA), which includes a broad interpretation of health, should be conducted to consider the public health impacts of the proposed policy and maximise alignment with complementary policies and legislation such as the Climate Action Bill 2021.

3. A Health in All Policies approach should be incorporated into meetings of the Clean Air Strategic Implementation Group. A membership which includes public health professionals and policy officials who are responsible for the health needs of those who are more vulnerable to the negative impacts of air pollution- such as children- will help towards better outcomes for health and wellbeing.

4. Tobacco smoke is a key source of indoor air pollution, yet it is not included in the draft strategy. Protection against second-hand smoke (SHS) must be enshrined within any revised Clean Air Act and reducing exposure to SHS must be considered a fundamental aspect of indoor air pollution control.

5. We support the proposed Solid Fuel Regulations and a population-wide transition to clean, carbon-neutral fuel to protect human health. We suggest that any use of smokeless fuels is time-limited to allow for longer term work to take place, such as retrofitting, as these fuels still emit substantial levels of particulate matter (PM). A

dedicated workstream to address fuel poverty and support to those who rely solely on solid fuels will be key throughout this transition.

6. Collaboration with Northern Ireland is vital to address this transboundary public health challenge. We would welcome a formal reporting mechanism on air pollution into the North South Ministerial Council and would encourage the development of a Memorandum of Understanding to bolster cooperation. Data sharing with NI would allow for larger research studies with greater statistical power, which means that findings would be interpreted with a higher level of certainty and be more useful to inform policy.

7. The Clean Air Strategy must make explicit reference to the specific actions that will be implemented to reduce greenhouse gas emissions as part of climate change mitigation and adaptation. At present this is only captured in reference to the Climate Action Plan 2021, whereas the Institute would consider the Clean Air Strategy to have a leading role in efforts to reach net zero before 2050.

8. Transformation is needed of infrastructure, transport and food systems in Ireland for health promotion and sustainability, and this should be made explicit as a strategic priority in the strategy and supported where possible by legislation; for example, by an Active Travel Act.

9. Pollutant emissions data is essential to understand the source-pathway-receptor model for air pollution and to effectively mitigate health harms. A comprehensive, accessible data system needs to be created to link emissions data with health outcomes to address the 'environmental health gap', and be easily accessible to the public, healthcare professionals and Directors of Public Health.

10. The establishment of an independent advisory committee on the health impacts of air pollution would be welcomed to provide government departments with the necessary scientific evidence to inform public awareness campaigns. A population-wide survey could gather intelligence on public understanding of air pollution and the health impacts.

IPH Response / Submission

1. Do you agree with the five strategic priorities outlined in the draft strategy?

The Institute welcome the five strategic priorities outlined in the consultation document and see them as important steppingstones in improving air quality, safeguarding health and reducing health inequalities. We have provided some comments and suggestions for each strategic priority and related actions which we believe will bolster the strategy with regards to safeguarding population health and reducing health inequalities.

1.1 'To ensure continuous improvements in air quality across the country'

1.1.1 There is no safe level of particulate matter (PM) for health (1). While we understand from the consultation document that Ireland's ambient air quality standards are dictated by EU legislation, we would strongly encourage the Department to advocate for the adoption of WHO recommended emission standards when these are revised as part of the European Green Deal.

While the Institute recognise that consideration is being made in this consultation to the new World Health Organization (WHO) guideline limits and the intent to work towards interim targets, we believe that 'consideration' of WHO guidelines alone is inadequate to address the serious health consequences experienced in Ireland and worldwide from poor air quality. In Ireland, air pollution is attributable to 1,410 premature deaths per year and 17, 560 years of life lost (YLL) (2). Complacency must be avoided; there is no safe level of PM and evidence suggests that health effects can still occur well below the legal limits put in place to protect health (1). For many pollutants, including fine particulates, EU standards are not sufficiently stringent and do not reflect the urgency of action required to reduce the impact of air pollution on health.

Whilst we appreciate that Ireland's ambient quality standards are established through the Clean Air for Europe (CAFÉ) Directive, we would encourage the Department to advocate strongly for adoption of WHO standards as EU targets are

revised through the European Green Deal, and that this position and commitment is made clear in the Clean Air Strategy. WHO guidelines are evidence-informed, health-orientated, and serve as the best possible source of evidence on which to direct the new strategy and subsequent legislation. Revision of EU targets may take several years to conclude, and we would welcome any action that can be taken to expedite the adoption of WHO standards in Ireland to prevent further premature deaths from air pollution.

1.1.2 A detailed roadmap for implementation and evaluation is needed with SMART goals to help illustrate how the Clean Air Strategy will progress environmental, social and health goals in Ireland over its lifetime

Once air quality standards are established and the Clean Air Strategy is published, there is a need for a dedicated implementation plan with SMART actions to ensure that strategic priorities are progressed during the lifetime of the document. The Clean Air Strategy is an immense opportunity for gains in population health, if actioned with ambition and with public health considerations at front and centre. An Environmental Research Group at Imperial College London found that, should policies from the UK Clean Air Strategy 2019 be implemented successfully, the majority of the UK would reach the WHO interim target of 10 µg/m3 for $PM_{2.5}$ - commonly known as 'WHO -10' - by 2030. This illustrates the potential that this strategy can have, as modelling showed that reaching WHO-10 by 2030 could lead to 20 fewer infant deaths, 388,000 fewer asthma symptom days in children, and 6,300 fewer respiratory and cardiovascular hospital admissions annually (3). This would lead to a gain of 98,000 life years annually due to people living longer and in better health, which would in turn reduce pressures on the NHS and lead to substantial cost savings (3). The Institute recommend the use of SMART goals in the development of the action plan; specific, measurable, attainable, relevant and time-bound goals to enhance the implementation process and evaluation.

1.1.3 The Institute would encourage the Department to harness learning from tobacco control legislation by introducing robust regulations to reduce sources of and exposure to air pollutants and attributable mortality and morbidity in Ireland.

Air pollution contributes substantially to the global burden of disease and is on a par with unhealthy diets and smoking as a major risk factor for morbidity and mortality. The Global Burden of Diseases, Injuries and Risk Factors Study 2019 demonstrated that while there has been a decline in exposure to some risk factors, such as tobacco smoking, exposure to other risk factors has increased substantially - including ambient PM pollution (4). Ambient particulate matter pollution was found to be associated with one of the largest increases in risk exposure, with age-standardised summary exposure values (SEVs) increasing by more than 1% per year (4). Alongside high fasting plasma glucose and high body mass index (BMI), ambient PM pollution accounted for more than 1% of Disability Adjusted Life Years (DALYs) which are the loss of years of full health considering premature mortality and years lived with a disability (4). Strong evidence exists demonstrating the relationship between air pollution exposure and health harms, therefore it is prudent that we reduce ambient air quality standards as low as possible- particularly for $PM_{2.5}$ and PM_{10}. There is strong evidence to support a relationship between $PM_{2.5}$ air pollution exposure and all-cause mortality, as well as with acute lower respiratory infections, chronic obstructive pulmonary disease (COPD), ischaemic heart disease (IHD), lung cancer and stroke (5).

Tobacco is a group 1 carcinogen and a major cause of air pollution. Globally, while tobacco exposure has reduced due to stringent legislation and policy measures, exposure to air pollution has increased. There is an opportunity to reverse this trend through stringent legislation, regulatory measures and policies designed to reduce emissions as well as exposure to poor air quality. International evidence exists which supports regulatory measures as a tool to control ambient particulate matter pollution (4). Evidence has shown that megacities can be less polluted than smaller cities, and this has been attributed to impact of regulations (6). In Ireland, research carried out as part of the SAPPHIRE Project by researchers from University College Cork found that average $PM_{2.5}$ concentrations in Killarney and Enniscorthy were higher than those in our large cities, even though these towns have a fraction of their populations (7, 8).

Legislation and regulation have a crucial role to play in the Clean Air Strategy, and the Institute supports the swift progression of the Solid Fuel Regulations by the

Department this year, which we will expand on later in this response. It is essential that WHO emissions standards are not only adopted in Ireland but that they are enshrined in legislation through the development of a new Clean Air Act.

1.2 'To guarantee the integration of clean air considerations into policy development across Government'

1.2.1 A Health in All Policies (HiAP) approach must form part of cross-government policy development on air pollution. The Institute recommends having a mechanism to ensure that HiAP is actively considered at meetings of the Clean Air Strategic Implementation Group (SIG), and public health representation on the SIG may help to facilitate this.

The Institute recognises the challenge inherent in ensuring that air pollution is incorporated into national policy agendas across sectors. We agree with the approach taken in the consultation document which recognises the need for enhanced coordination and monitoring of cross-sectoral policies as part of the overall governance and enforcement structures. The establishment of a Clean Air SIG will be an important part of the overall governance structure. Crucially, there is an opportunity at these meetings to ensure that public health and health inequalities relating to air pollution are an integral part of the discussion, plans and policies that ensue.

In our view the Department of Health and the Department of Children, Equality, Disability, Integration and Youth must be included in the SIG membership to ensure that policies adequately protect those who are most vulnerable to the impacts of poor air quality. The SIG would be an ideal opportunity to incorporate a HiAP approach, which is understood as 'a collaborative approach to improving the health of all people by incorporating health considerations into decision-making across sectors, policy and service areas, and addressing the wider determinants of health' (9). A HiAP approach considers that many sectors- including health, transport, housing, economy, industry - have a responsibility to ensure that all people have equal opportunities to live in good health. Effective collaboration between sectors - including housing, urban planning, transport, waste management and health- is

essential for progress to be made in addressing the health impacts of air pollution (10).

For context, individual and population health are a product of a range of determinants including the social and economic environment, the physical environment- including air quality and temperature- and individual factors such as genetics, age and gender. These determinants impact a person throughout their life, and so public health professionals would recommend the application of a 'life-course approach' when integrating health considerations into policymaking- particularly with regard to air pollution which has been shown to impact health even prior to conception. The life-course approach '*aims at increasing the effectiveness of interventions throughout a person's life. It focuses on a healthy start to life and targets the needs of people at critical periods throughout their lifetime. It promotes timely investments with a high rate of return for public health and the economy by addressing the causes, not the consequences, of ill health*' (11).

The Institute recommends senior public health representation is included in membership of the SIG in order to support the integration of HiAP. This input would support the work of the SIG by providing expertise on how policies across sectors can support the prevention of ill-health through the application of the life-course approach in air pollution policy- for example through health promoting active school travel interventions. Public health professionals and epidemiologists can provide insight into the changing demographic and health status of the Irish population, which may impact vulnerability to air pollution and sensitivity to population-wide policies. This expertise may also provide expert input on reducing health inequalities associated with air pollution across groups who- by virtue of their age, existing health conditions or socioeconomic status- may need extra consideration in policy development. This in turn may support strengthening relationships and coordination between lead departments towards strategic objectives and overall enhancing both the environment and human health. Having public health input at this level may in turn assist by setting the precedent for a health-focused approach from national to local levels.

1.2.2 We recommend that the Department include Health Impact Assessment (HIA) as a key methodology to protect health and health equity as the Clean Air Strategy is implemented. The inclusion of a supportive statement to this regard within the current strategy would be welcomed. A Strategic Environmental Assessment (SEA), which includes a broad interpretation of health, should be conducted to consider the public health impacts of the proposed policy and maximise alignment with complementary policies and legislation such as the Climate Action Bill 2021.

Good practice in SEA should integrate assessment of human health taking a population health perspective and tracing effects through to relevant health outcomes. A broad interpretation of health provides decision-makers with information on how health is affected by environmental change and the secondary effects on health in relation to social and economic consequences of environmental change (12). The United Nations Economic Committee for Europe (UNECE) has developed draft guidance to address human health within SEA (T58) (13).

HIA is a structured approach of assessing and responding to the impact of cross-departmental policies on health and health inequalities and would help to ensure that strategic actions brought to the SIG are maximising the benefits for both environmental and health agendas. It is a useful tool that systematically considers health impacts in the policy development process. A HIA considers proposals, such as legislation, policy, plans, programmes or projects, while they are being planned and examines the potential or realised positive and negative impacts on human health. Proposals can then be developed to address tensions between environmental, social and economic objectives that influence the health and well-being of citizens.

The Institute considers the implementation of a HIA as good practice to identify the broad range of factors that influence population health, including an early consideration of how health is affected directly by environmental factors, and indirectly by the social and economic consequences of environmental changes. Such a public health viewpoint is central to identifying the win-win approaches needed for Irish communities and their environment as set out as we aim to recover from the COVID-19 pandemic and address climate change. Environmental and health issues

ranging from ecological conditions to human disease form an interdependent web and therefore require careful consideration (14). Including a policy or statement of support on the application of HIA in the strategy would help support continuing sensitivity to changing circumstances.

HIA can be voluntary, but it can also be required by policy. Environmental assessment, which in most cases is a statutory process, is required to consider human health. Environmental assessment is an umbrella term for a Strategic Environmental Assessment (SEA) and an Environmental Impact Assessment (EIA). The Institute has published guidance on health in environmental assessment within overall Health Impact Assessment guidance, which the Department may find of use. This guidance supports consistency between environmental assessment and standalone forms of health assessment. Standalone HIA provides flexibility in exploring issues outside of the statutory remit of an SEA or EIA, such as health effects arising from smaller development projects below the thresholds for an EIA. If an SEA or EIA scopes the wider determinants of health and considers inequalities, there should be no need for a standalone HIA report. This HIA guidance reflects the Institute's view that it is good practice to adopt a wider determinants of health approach when addressing human health within an EIA and that this should be proportionate (12). This is consistent with the consensus of international impact assessment professional bodies and European public health (T1) discussion in the academic literature (T104).

We would recommend that the Department consider conducting a Strategic Environmental Assessment to ensure that there is close alignment between environmental and health objectives. Application of SEA at the policy level is a feature of the Protocol on SEA to the Convention on Environmental Impact Assessment in a Transboundary Context (the SEA Protocol).

1.2.3 The Department may also wish to consider the establishment of a Health Impact Assessment Advisory Committee to report into the SIG as an addition to the governance structures outlined.

The Institute invite early consideration of further governance structures which may enhance co-ordination of public health and environmental strategies and processes. Alongside public health representation on the SIG, this might manifest as a health

and environment advisory committee and/or a Health Impact Assessment subgroup who would be responsible for reporting into the SIG.

1.2.4 Consider shifting the responsibility for publishing the annual report to the SIG rather than UTRAP to avoid disproportionate attention being given to the transport agenda over other agendas

We understand from the consultation document that the Urban Transport-Related Air Pollution (UTRAP) group will be responsible for publishing the overall final report on behalf of the SIG as well as acting as a forum for engagement with transport stakeholders. While we recognise that this is an established group chaired by DECC and the Department of Transport, consideration could be given to whether the SIG itself would be better placed to publish the report to avoid a disproportionate focus on transport as a source of air pollution. While transport is an extremely important policy area to engage with for strategic action on air pollution, air pollution sources span many other areas; both outdoor (agricultural emissions, industrial fossil fuel combustion) and indoor (tobacco, radon, domestic burning of fossil fuels for cooking/heating, mould/damp).

1.3 'To increase the evidence base that will help us to continue to evolve our understanding of the sources of pollution in order to address them more effectively'

1.3.1 A commitment to contribute to the international evidence base on air pollution, particularly on under-researched pollutants, is needed. A starting point would be the development of an all-island research forum on air pollution.

There would be value in extending the Clean Air Research Forum to cover both jurisdictions on the island of Ireland. Not only would this open up research and funding opportunities, but the collaboration and sharing of data would increase the statistical power of study findings and contribute to improving the quality of the international evidence base, particularly across under-research pollutants which are of concern to health.

1.3.2 An action must be included to improve data and intelligence relating to the health impacts of air pollution in Ireland, across the whole population and vulnerable groups.

This is covered in more detail in our response to Question 7.

1.4 'To enhance regulation and improve the effectiveness of our enforcement systems'

1.4.1 We welcome the commitment made to review the Air Pollution Act 1987 and ask that this is progressed as a matter of priority in the new strategy. The development of a new Clean Air Act is needed to reflect the considerable developments in social, economic and environmental conditions, as well as population demographics and case-mix, since the original legislation was created.

The Institute agrees with the need for stringent legal air quality limits to support the proposed strategy. Legislation and regulatory measures are a crucial means of supporting government policy and protecting environmental and public health agendas. To use tobacco as an example, there is a large body of international research to show that smoke-free legislation has substantially impacted indoor air quality and health (15). In Scotland, a study examining indoor air quality in a random selection of 41 pubs found that two months after the Scottish legislation to prohibit smoking in enclosed public spaces came into effect, $PM_{2.5}$ levels decreased by 86% (16). In terms of health outcomes, evidence has shown that indoor smoking bans led to a substantial decrease in acute coronary events, decreases in hospital admissions for childhood asthma and decreases in stroke incidence as well as evidence of behaviour change, with evidence of people with children stopping smoking at home (17-20).

Adopting similarly stringent legislation to protect people from exposure to air pollutants is needed to safeguard public health and the integrity of the environment. Care will need to be taken to avoid weakening of any legislation by those who may oppose and lobby against such regulations to pursue commercial interests. The Institute welcomes the development of a new Clean Air Act and would be happy to

support to the Department by providing support and evidence from a public health perspective. We ask that a review of the existing legislation and formulation of a new Act is progressed as a matter of priority.

1.4.2 We note that tobacco, a major source of air pollution, is not mentioned in the draft Clean Air Strategy. This is an omission and tobacco control must be a feature of the final strategy. Tobacco legislation and the new Clean Air Act should be mutually reinforcing and integration of the Clean Air Strategy with tobacco policies under the 'Tobacco Free Ireland' strategy is optimal.

Tobacco smoke is the single most important component of indoor air pollution and the strategy at present does not make any reference to it, which is of concern and should be addressed as the final strategy is developed. Tobacco use is the leading cause of preventable death in Ireland (21). Tobacco smoke contains over 4,000 chemicals including 200 known toxic chemicals and 69 human carcinogens (22) Consequently, direct or indirect exposure to tobacco smoke is a serious health risk and is responsible for approximately 6 million annual deaths worldwide (23). The HSE published a report in 2018 summarising the current state of tobacco control in Ireland as part of the Tobacco Free Ireland programme (24). 5899 deaths and 55,001 hospital cases were attributed to smoking and SHS (24). The health harms associated with tobacco do not only impact the smoker; research has found that the smoker only inhales approximately 15% of the smoke from a cigarette and the other 85% is absorbed into the atmosphere or inhaled by others (25). SHS is harmful to everyone. In Ireland, 16% of the population reported having been exposed to SHS on a daily basis. In the non-smoker population, SHS exposure has been shown to be highest amongst children, young people (15-24 years) and in deprived areas. Disadvantaged children were also more likely to live in households with adults who smoked (26). Despite decreases in smoking prevalence, most recent mortality rates from smoking-related diseases in Ireland are continuing to rise (27, 28).

Reducing the exposure of the population to SHS is a core element of the World Health Organization Framework Convention on Tobacco Control 2003 (29). Children are especially vulnerable to harms associated with exposure as they are often unable to remove themselves from a smoking environment (30). A large European study examining burden of disease from SHS exposure at home amongst adults

found that, in 2017, 526,000 DALYs (0.36% of total DALYs) and 24,000 deaths (0.46% of total deaths) were attributable to home SHS exposure in the 28-EU countries, mainly from Chronic Obstructive Pulmonary Disease (COPD) and Ischaemic Heart Disease (IHD) (31). The frequency, intensity and duration of exposure to SHS are significant in determining health outcomes for infants and children. Babies exposed to SHS are at greater risk of Sudden Infant Death Syndrome and children who regularly breathe SHS are more likely to experience asthma, ear infections and respiratory tract infections. While some data are available on school-age children and teens, very little is known about exposure of pregnant women, infants and pre-school children to SHS across the island of Ireland. Further research is needed in this area to determine the extent of exposure and the effects on health in the early years. A large European study, 'TackSHS', is being conducted which aims to quantify the impact that exposure to SHS from cigarettes and second-hand aerosols (SHA) from electronic cigarettes have on the respiratory health of the European population- including Ireland. The Institute recommends that a watching brief is kept on the results of this study and the findings used to inform actions to protect health under the Clean Air Strategy.

Tobacco Free Ireland is a strategy that was developed by the Department of Health in 2013. It seeks to support the continued development of a tobacco free society where people can live longer and healthier lives free from the detrimental effects of tobacco, aims to de-normalise tobacco use, reduce initiation rates, assist smokers to quit and protect non-smokers- especially children- from the effects of SHS by building on a stable policy and legislative framework (32). The strategy recommends a range of measures to protect people from SHS exposure, including tobacco-free campuses for government, health, education, sport and recreation facilities. Ireland was the first country in the world to introduce legislation banning smoking in the workplace under provisions in the Public Health (Tobacco) (Amendment) Act 2004 (33). The Protection of Children's Health (Tobacco Smoke in Mechanically Propelled Vehicles) Act 2014 which came into effect on 1 January 2016 prohibits smoking tobacco products in a mechanically propelled vehicle in which a child is present (34). The primary aim of these legislative measures is to protect third parties from exposure to the harmful effects of SHS. The first smoke-free playground was introduced in Donegal in 2009 (35). Since then, 82% of local authorities in Ireland

have either implemented or agreed to implement a smoke-free playground policy (Department of Health, 2014).

Further legislation is needed to address SHS exposure in Ireland, and there is an opportunity in the development of the new Clean Air Act for this legislation to support Tobacco Free Ireland policy goals and existing tobacco legislation. For example, we would welcome an extension of current tobacco legislation to ban smoking in outdoor areas where children would be exposed to SHS. For example, a large European study examined SHS smoke exposure and signs of tobacco consumption outside the entrances of primary schools and found that there was substantial evidence of detectable nicotine in the outdoor entrances (36). Another study that examined SHS exposure in outdoor hospitality venues across eleven European countries found nicotine to be present in 93.6% of sites explored and concluded that current restrictions in outdoor hospitality venues across Europe have a limited protective effect and justify the adoption of total smoking bans in outdoor areas of hospitality venues (37). Legislation must protect children from SHS exposure and could achieve this by including banning smoking in areas such as schools, outdoor hospitality areas, playgrounds, beaches and other recreational areas. Tobacco is a major source of indoor and outdoor air pollution and must be treated as such in the Clean Air Strategy.

1.4.3 The development of legislation needs to consider health and health equity as well as take a rights-based approach

We would encourage the Department to consider WHO recommendations of air quality legislation in the development of any legislative instrument to support this strategy. These include:

- the identification and selection of the pollutants to which the legislative instrument will apply;
- the numerical value of the standards for the various pollutants or the process for making decisions about the appropriate standards, applicable detection methods and monitoring methodology;
- actions to be taken to implement the standard, such as the definition of the time frame needed/allowed for achievement of compliance with the standard;
- considering emission control measures and necessary abatement strategies;

and identification of the responsible enforcement authorities

Furthermore, stringent legal limits must reflect access to clean air and health as a human right. A rights-based approach should be taken in the development of legislation to support the objectives of this strategy.

1.4.4 We support the introduction of new Solid Fuel Regulations and welcome these as part of a suite of policy measures to ensure efficient emission reduction whilst minimising fuel poverty. However careful considerations are needed with regards to implementation given policy differences on the island of Ireland.

The Institute are fully supportive of the Solid Fuel Regulations. The evidence of the health impacts of solid fuel combustion are well established, and we have already seen the strong evidence of the regulation of solid fuels on population health. The Air Pollution (Marketing, Sale and Distribution of Fuel) Regulations (S.1. No. 123 of 1990123) introduced in Dublin in September 1990- also known as the 'Smoky Coal Ban'- prohibited the marketing, sale and distribution of bituminous (smoky) coal. This led to a reduction in pollution, with average black smoke concentrations declining by 35·6 µg/m3 (70%) after the ban on coal sales (38). A significant and sustained reduction in respiratory and cardiovascular mortality was documented with adjusted non-trauma death rates decreasing by 5·7% (95% CI 4–7, $p<0·0001$), respiratory deaths by 15·5% (12–19, $p<0·0001$), and cardiovascular deaths by 10-3% (8–13, $p<0·0001$). This translated into approximately 116 fewer respiratory deaths and 243 fewer cardiovascular deaths per year in Dublin.

Monitoring and evaluation of the impact of these regulations on population health and health inequalities will be crucial. An all-island study on residential solid fuel and air pollution was commissioned in 2013 by the North South Ministerial Council which included an assessment of policy options based on academic evidence and a consultation with a broad range of stakeholders. It concluded that a range of policy measures is likely to be most effective in improving public health; for example, the implementation of solid fuel regulations alongside policies on energy efficiency, fiscal measures to promote the uptake of low emission fuels as well as the dissemination of evidence-based public communications on the issue (39). Expansion of the smoky

coal bans was considered an attractive policy measure by virtue of the public already being aware of and used to this measure to some degree, as well as the availability of pre-existing systems for regulation and enforcement.

Overall, the Institute support the proposed Solid Fuel Regulations and a population-wide transition to clean, carbon-neutral fuel to protect human health. We suggest that any use of smokeless fuels is time-limited to allow for longer term structural work to take place, such as retrofitting, as these fuels still emit substantial levels of PM (40). Fuel poverty will need to be a key consideration throughout this transition, which we have referred to under section 2.7.

In terms of regulation of this legislation, we welcome the plans to establish Air Quality Enforcement Regional Support Structures however we would ask that these structures seek to support individuals who may experience barriers to the legislation-for example, by considering the use of price incentives to encourage a switch to low emission, cleaner fuels. Regulation must be joined up and consider the different responses that may be required to regulate industry versus regulating small town shop keepers and individuals.

IPH are also conscious that the lack of consistency in the regulations between Northern Ireland and Ireland could create difficulty with compliance in border areas. On the island of Ireland, both jurisdictions have had long-established but different legislative instruments to mitigate public health impacts from use of solid fuels, with smoky coal ban areas in Ireland and smoke control areas in Northern Ireland. We understand that a new Clean Air Strategy is under development in Northern Ireland however it is not clear whether this will include similar regulatory developments to those in Ireland or other UK regions. The NSMC study referred to above found that stakeholders in both jurisdictions supported the harmonisation of regulations across the island (39). The Environmental Health Association of Ireland- an all-island body whose function includes provision of education and advice on environmental health issues to the public and professionals- could be used as a means of improving all-island collaboration on air pollution policies and exchange information to support legislation implementation and regulation. Furthermore, we would welcome the introduction of measures specifically designed to support compliance on an interim basis until such a time as the Northern Ireland policy position becomes apparent.

5. 'To promote and increase awareness of the importance of clean air'

We support this strategic priority in full. From a health perspective, it is important that people can make informed decisions that safeguard their health, the health of their families and contribute to the national effort required to protect against the negative health impacts from unclean air. This will require evidence-based public health messaging across active travel, diet, home heating and waste in a way that will resound with the public, and for this to be effective an understanding of current public attitudes and understanding of air pollution in Ireland is necessary. The EPA recently conducted a survey in Ireland which found that climate change and pollution ranked in the top three most pressing environmental issues facing Ireland, however a more detailed survey specifically based on air pollution and the impact on health is needed (41). This will be covered in more detail under questions 5 and 6.

2. Do you feel there are additional strategic priorities which should be included?

2.1 It is notable that improving population health and reducing health inequalities is not included as a strategic priority or key action. A strategic focus is needed on reducing health inequalities associated with air pollution in Ireland and must be included as a strategic priority in the final strategy.

This is a major omission, and we would urge the Department to include safeguarding health and reducing health inequalities through action on air pollution, global warming and climate change as arguably the most vital strategic priority. Evidence shows that certain population groups are more susceptible to the health impacts of air pollution, including pregnant women, children, individuals with existing cardiovascular disease (CVD) or respiratory disease, older people, communities who live in areas of higher pollution (e.g. close to busy roads), low-income communities and outdoor workers (42, 43). Ireland has particular vulnerabilities in relation to these risk factors, as detailed below:

Pregnant women and children

Children are uniquely vulnerable to the damaging health effects of air pollution. Air pollution exposure experienced by the mother prior to conception has been shown to have latent negative health effects on the foetus (44). Air pollution exposure is associated with adverse birth outcomes including low birth weight and premature birth (43). Children are at higher risk than adults because they have a longer life expectancy, bodies are still developing, and they have a higher respiratory rate which means that they inhale more pollutants. They are also often powerless to change their environments or exposure to SHS. The evidence of the health impact of air pollution on children is compelling; exposure to air pollution is associated with infant mortality, negatively impacts on neurodevelopment, childhood obesity, respiratory disease including acute lower respiratory tract infection, otitis media and childhood cancers including leukaemia (44).

Older people

The population of Ireland is growing across all regions and age groups; however, the most significant growth can be seen in older age groups. The number of people aged

65+ in Ireland has increased by 35% since 2012, which is substantially higher than the EU average increase of 15.7% (45). Lung function in adulthood slowly declines with age, and there is emerging evidence that air pollution accelerates this decline. Minimising this is important to maximise reserve, especially if lung disease develops in later life (43).

Chronic disease including cardiovascular disease (CVD) and respiratory disease

There is strong evidence that suggests exposure to air pollution (short and long-term) can both contribute to the development of CVD and respiratory diseases such as asthma and lung cancer, as well as exacerbating symptoms for people with existing conditions (43). Outdoor air pollution such as PM is considered carcinogenic to humans and is linked to the development of lung cancer. Strong evidence for this exists in adults, and research is starting to indicate that exposure during childhood can contribute to the development of cancers in adulthood (43). Circulatory disease is a leading cause of death in Ireland, accounting for 30.1% of all deaths, with cancer a close second at 29.9%. Respiratory disease inequalities persist in Ireland and a proxy measure that can be used to understand the extent of these inequalities is comparing age-standardised mortality rates from respiratory system diseases between Ireland and the European Union. Statistics published by the Department of Health in 2021 found that age-standardised death rates per 100,000 population from respiratory system diseases (incl. cancer of trachea, bronchus and lung) in Ireland were estimated to be 66.5% higher than the EU-27 average (45).

Deprivation

There is unambiguous evidence that people with a low income are disproportionately impacted by air pollution through a series of mechanisms; they are more likely to have pre-existing conditions, live in areas that are subject to higher pollution through close proximity to busy roads and poorer access to good quality housing or green spaces, which all contribute to poor health and vulnerability to the health impacts of air pollution (43). The vast majority of health inequalities can be explained by five key conditions- quality of health care, financial insecurity, poor quality housing and neighbourhood environment, social exclusion, lack of decent work and poor working conditions (46, 47).

In Ireland, there has been a decline in poverty risk, with a reduction in the proportion of population in poverty falling from 16.2% in 2016 to 12.8% in 2019 (48). However, child poverty remains a substantial issue, with 26.1% of those in poverty being children under the age of 16. Furthermore, those who are unemployed and ill/disabled have a higher risk of poverty at 35.4% and 37.5% respectively (48). Furthermore, perpetuating health inequity in Ireland is the lack of universal healthcare coverage. The percentage of people reporting unmet medical needs in Ireland is higher than the EU average, and these barriers are disproportionately felt by people on a low income (4.9% reporting unmet needs) in comparison to those on a high income (1% reporting unmet needs) (49).

2.2 All-island collaboration needs to be included as a key strategic priority

The Institute would welcome a transboundary approach to air pollution in Ireland, and the creation of strong partnerships with climate change experts and policymakers in Northern Ireland, Great Britain, the European Union and further afield. Air pollution, like climate change and COVID-19, is a transboundary public health challenge. On the island of Ireland, the environment is an agreed area of cooperation under the Belfast/Good Friday Agreement, which provides a firm foundation on which to build cooperation on air pollution. The Institute would welcome an agreed formal reporting system on air pollution into the North South Ministerial Council (NSMC) to inform ministerial oversight. The development of a five nations forum could assist with knowledge and research sharing, learning and communication as well as implementation and evaluation of air pollution policies. A Memorandum of Understanding (MOU) was developed for public health cooperation on an all-Ireland basis in response to the pandemic and could be considered as another mechanism to bolster all-island collaboration on air pollution. A collaborative approach may simplify and strengthen mitigation and adaptation measures, and better support public bodies and businesses, particularly in border areas, with emission and carbon budget reporting. Environmental issues cross land borders, and therefore require harmonious and consistent cross-border policies and cross-border collaboration.

2.3 Pandemic preparedness needs to be included in the Clean Air Strategy

Another key area of concern is the relationship between air quality and COVID-19 transmission and disease. COVID-19 outbreaks are more commonly associated with crowded indoor spaces, and poor ventilation can increase the risk of transmission in such settings. Improved ventilation can help reduce the risk of transmission of COVID-19 as well as other viruses such as flu (50).

Current evidence suggests that poor air quality can increase population vulnerability to COVID-19 disease, providing an additional imperative to proactively reduce air pollution through comprehensive policy measures. It has been estimated that long-term exposure to air pollution from $PM_{2.5}$ contributed to approximately 19% of COVID-19 mortality in Europe, although wide confidence levels reduce statistical certainty (51). Evidence is also suggesting that air pollution may act as a vehicle spreading the virus, but more research is needed (51).

There is learning on how ventilation systems in communal settings such as schools, nursing homes and hospitals, particularly those attended or resided in by more vulnerable groups, need to be enhanced (52). Monitoring of indoor air quality is needed, and where natural ventilation through opening doors and windows is not possible or where there are concerns about outdoor air pollution, the use of air purifiers or controlled mechanical ventilation devices could be considered (52). It is important to harness the learnings from the COVID-19 pandemic in this strategy and use them to better manage further COVID-19 outbreaks, as well as any other future pandemics.

2.4 The draft Clean Air Strategy does not provide any explicit detail on actions needed in this policy to reduce greenhouse gas emissions outside of referring the reader to the Climate Action Plan 2021.

There is a strong relationship between air pollution and climate change, and so failure to tackle these in tandem results in a lost opportunity; specifically, an opportunity to gain the multiple benefits to health, the environment, and the economy that are achievable through more efficient system planning (53). The Sustainable Development Goals (SDGs) are central to uniting all aspects of policy across the natural, social and economic environment. SDG 3 is dedicated to health and well-being and success in this goal is highly contingent upon success in the other SDGs,

for example 'sustainable cities and communities', 'climate action', 'clean water and sanitation', 'life on land', 'life below water' and 'reducing inequalities.

Greenhouse gas (GHG) emissions are the most important of all air pollutants and should be reflected in the narrative of the Clean Air Strategy and in its recommended actions. The Clean Air Strategy in its present form does not detail how it specifically intends to contribute to climate change mitigation and adaptation. In the widely publicised '6th Assessment Report', the Intergovernmental Panel on Climate Change (IPCC) outlines the urgent need to limit global warming by 'reaching at least net zero CO2 emissions, along with strong reductions in other greenhouse gas emissions' (54). No temperature rise is considered safe, and the IPCC and WHO have concluded that to avert millions of climate change-related deaths, global temperature must be limited to 1.5°C and net zero greenhouse gas emissions targets must be reached as soon as possible.

Amongst health professionals, climate change is widely considered to be a health emergency, with far-reaching negative impacts on health and health inequalities. High quality studies suggest the health effects of climate change are broad, including dehydration, loss of kidney function, skin cancer, infectious diseases, worsening mental health, complications in pregnancy, cardiovascular disease, pulmonary disease, and death (55). An analysis of deaths and hospital admissions in England and Wales by the UK Office for National Statistics (ONS) confirms the health effects of rising temperatures (56). The ONS analysis found a net increase in hospital admissions linked to warmer weather- particularly due to injuries- and an increase in cardiovascular and respiratory deaths on the warmest days. Research has also demonstrated a striking impact on mental health, with every 1°C increase in temperature leading to an approximately 5% increased risk of death for patients with mental illness (57). Social consequences of climate change such as destruction of homes and communities from extreme weather events leading to forced migration is only likely to worsen the impact on mental health. Health harms caused by climate change also disproportionately affect those who are more vulnerable, including women, children, older people, ethnic minority groups and those with underlying health problems, and so contribute to health inequalities.

It must be made explicit in the Clean Air Strategy that greenhouse gas emissions are a substantial component of air pollution and hold devastating impacts on human health and the environment through the acceleration of global warming and climate change. Whilst we understand from the draft strategy that GHG emissions and climate change sit under the auspices of the Climate Action Plan 2021, the Clean Air Strategy is arguably the most relevant and vital policy to lead the way in the actions required to reduce GHG emissions, reach net zero before 2050 and protect human health from the devastating impacts of climate change. At present this is not adequately communicated in the draft and only describes the Climate Action Plan 2021 with no reference to how the Clean Air Strategy will contribute to it.

2.5 Immediate action is needed to invest in active travel infrastructure to address air pollution, climate change, sustainable development and health, and this needs to be included in the forefront of the strategic action plan.

Good access to safe public transport and active travel infrastructure is essential as part of the strategic effort to reduce air pollution in Ireland. The Institute welcome the overall ambition articulated in the strategy to move away from polluting vehicles, transitioning to cleaner vehicles and improving the accessibility of public transport and encouraging active travel. However, 'a greater focus' on this ambition 'over the coming decade' is insufficient. The degree of change required- to transport policies, infrastructure and public behaviour- is colossal and so should be a strategic priority in its own right, with ring-fenced funded and a joined up cross-departmental action plan.

More detail is needed on plans to phase out polluting vehicles

We note there is no mentioned of a target for ending the sales of fossil-fuel powered vehicles in the draft Clean Air Strategy, and a lack of detail on how the shift away from polluting vehicles will be implemented. A formal commitment to end the sale of petrol, diesel and some hybrid cars and vans by 2025 or 2030 at the latest is needed. This would put Ireland in line with other countries including the UK, which has pledged to end the sale of new petrol or diesel vehicles by 2030, and Norway who are even more ambitious and aim to ban the sale of all fossil fuel powered vehicles by 2025 (58, 59).

Population health in Ireland depends on speedy and well-resourced actions to improve active travel infrastructure and accessibility of public transport. Investment in this area will bring health, environmental and economic benefits to the population.

We recommend the integration of allied strategic initiatives on promoting sustainable and healthy urban design and transport systems as a key strategic action to combat air pollution, morbidity and mortality associated with sedentary behaviour and road safety. There is a strong relationship between the physical environment, infrastructure, climate change and health. Poorly planned urban settings with unsustainable transport systems and a lack of access to blue and green spaces increases air pollution, noise, and heat islands, reducing the opportunity for physical activity and can have a negative impact on physical and mental health. For example, roads around schools are often congested, leading to concerns regarding road safety and environmental health. A UNICEF UK report found children were most exposed to dangerous air pollution on the school run and while in the playground (60). As a result, some schools in the UK and Ireland have started introducing bans on idling cars outside the school gates, with a Sustrans survey finding that 63% of teachers support car-free streets outside of schools (61). There has been positive movement on this in Ireland, with a private members Bill has been put forward by Social Democrats TD Jennifer Whitmore to ban parents and guardians from idling car engines outside schools (62).

UK and international evidence demonstrate significant economic benefits of active travel across government sectors. A journal article published in The Lancet outlined how switching to active travel for short motor vehicle trips could save £17bn in NHS costs over a 20-year period, with the largest cost savings from a reduction in the expected number of cases of type 2 diabetes (63). Research conducted by the UK Department for Transport found that the mean benefit to cost ratio for all schemes identified was 6.28:1, with a UK average figure of 5.62:1 (64). To put this into context, the UK Department of Transport values 'very highly' any scheme which returns more than £4 for every £1 invested (64). The benefits of promoting walking and cycling have also been demonstrated across improved educational performance in young people, reducing absenteeism and improved performance at work (64). Consequently, environmental, and other interventions which aim to facilitate increased population physical activity through cycling and walking are likely to be

amongst the 'best buys' across many areas of public policy i.e., public health benefits, cost savings for health services and for transport planning.

Public Health England (now UK Health Security Agency) contributed to the development of NICE quality standard on outdoor air quality and health, published in February 2019. This quality standard covers road-traffic-related air pollution and its impact on health and describes high-quality actions in priority areas for improvement, including advice for people with chronic respiratory or cardiovascular conditions (65). We would encourage the Department consider this guidance in the development of the Clean Air Strategy, which covers strategies, policies and plans to encourage and enable people to be more physically active including those of people with limited mobility including (66):

• Identification and prioritisation of local areas where there is a high potential to increase travel on foot, by bicycle, or by other forms of active travel;

• Improvement of infrastructure and connectivity to make it as easy as possible for people to engage in active travel over using a private car;

• Ensure pedestrians, cyclists, and users of other modes of transport that involve physical activity are given the highest priority when developing or maintaining streets and roads. Practical interventions include widening footways, introducing cycle lanes, restricting motor vehicle access, traffic calming measures, improving cycling infrastructure and improving routes to schools by introducing pedestrian crossings, and measures to reduce vehicle speed.

We would welcome a commitment to the implementation of an Active Travel Act

Legislation to bolster active travel could also be considered in Ireland. The Welsh government introduced the Active Travel Act in 2013 to respond to the global climate crisis and improve the mental and physical health of the population. This Act has resulted in an obligation to improve active transport measures in Wales and has seen an increase in dedicated budgets for active travel infrastructure from under £5 per head of population in 2013 to over £20 in 2021 (67). Insight into the evaluation of this legislation would be useful to inform consideration of similar legislation in Ireland.

Safety and accessibility of public transport needs improved, particularly for women, those with a disability and those who are economically inactive

Taking public transport can allow for health benefits, as walking or cycling to and from bus stops or train stations contributes to increased levels of physical activity. Using data from the United Kingdom Household Longitudinal Study, researchers from the London School of Hygiene & Tropical Medicine and University College London found that commuting by public and active modes significantly and independently predicted lower BMI and healthier body composition for both men and women when compared to those who used private transport (68).

To encourage the use of public transport above private vehicle use, individual safety must be considered in the policy framework. A national survey in Ireland found that 58% of women often or sometimes feel unsafe taking the bus, almost three quarters said they jog or walk faster as a safety precaution at night and nearly half (47%) say they take a different route or will even walk longer distances in order to feel safer (69). A survey carried out in 2013 on public perception of public transport safety in Northern Ireland showed that the proportion of people who used public transport was low (45%) (70). Most respondents indicated that they felt safe using public transport at any time of day (63%), however this view was not equitably distributed across respondents. Females (52%) and those with a disability (50%) were less likely than men (75%) or those without a disability (67%) to feel safe. People with a disability and those who were economically inactive were more likely to never feel safe using public transport. The main reasons given for feeling unsafe were 'noisy, drunk or disruptive passengers' (68%), 'people (not using public transport) loitering at train or bus stops, shelters, and stations' (35%) and 'inadequate lighting at train or bus stops, shelters, and stations' (33%).

The Institute would welcome a dedicated workstream in the strategy- in collaboration with the Department of Transport- to provide an enabling environment for all people to share safe, secure, accessible, reliable, and sustainable mobility, and non-discriminatory participation in transport. A population-wide survey could support this and be used to inform the strategy. As there is a sizeable rural community in Ireland, it is important that there are sufficient and reliable public transport services to these areas. Public transport should be inclusive and accessible to those with physical impairments and improve access to blue and green spaces for everyone. Modelled results from a study carried out in Melbourne, Australia, showed small but important health benefits and healthcare cost-savings from relatively conservative

improvements to public transport accessibility, with larger health benefits and healthcare cost-savings from the development of fully integrated, multimodal public transport networks allowing for significantly improved accessibility (71). These results suggest that improving accessibility to public transport will likely reduce transport-related mortality and morbidity and the burden of diseases associated with physical inactivity and obesity.

2.6 A firm statement needs to be included in the Clean Air Strategy in support of a societal shift towards a more sustainable food system as part of our national response to air pollution, the climate crisis and population health threats such as obesity.

The Institute shares the Department's concerns regarding Ireland's continued exceedances of ammonia emissions and does not underestimate the complexities that exist in balancing the agendas of the agricultural sector with those of health and the environment. However, there is little mention of the overall impact that agricultural sector and food industry has on health or the environment in the consultation document. Whilst we recognise that the Department may not hold responsibility for food policy, the agricultural sector and food industry have a huge role to play when it comes to air pollution and so the Institute has provided some t points of consideration when embarking on cross-sectoral working across these policy areas.

Agriculture, with a large contribution from livestock production, is responsible for up to 25% of anthropogenic greenhouse gas emissions (72). There is an urgent need for transformation of the food system at all levels- from structures to the individual- to address major challenges to public health such as climate change, health inequality and diet related disease such as obesity. The Lancet Commission consider obesity, malnutrition and climate change to be the three gravest threats to human health and have constituted them as a 'Global Syndemic' due to their epidemiological similarities and common large-scale societal drivers and determinants (73). The UK Health Alliance- an alliance that advocates for responses to climate change that protects public health and includes members such as the Academy of Medical Royal Colleges, the British Medical Association, and the Lancet, among others,- launched a report on the impacts of climate change on public health (74). It recommended that

an increase in the consumption of fruit and vegetables and a shift away from diets high in meat and dairy would bring health benefits and reduce greenhouse gas emissions. It quantifies this, stating that '*if average UK diets met nutritional guidelines set out by the World Health Organization (including less meat and more fruits and vegetables) dietary GHG emissions could be reduced by around 17% and almost 7 million years of life lost prematurely would be saved over 30 years*' (74).

For context, there is 1.7 times more food being produced per person than in 1960, and this food has become more processed, cheaper and more calorie dense. Ultra-processed and high fat, salt, sugar foods (HFSS) are currently over-produced and heavily promoted by the food industry. Foods are increasingly formulated with excessive sugar, fat, and salt, along with flavour enhancers and additives (75, 76). There is a large market for unhealthy foods- coined 'high in fat, sugar and salt' (HFSS)- which has driven up the price of healthier food to be more expensive per calorie and therefore less accessible across the socioeconomic gradient (76). This has a disproportionate impact on lower income households, who are more likely to be impacted by fluctuations in food prices and as such at higher risk of food insecurity (76). This has been compounded by the modern food retail environment which typically prioritises shelf space and in-store promotions for HFSS foods (77).

Furthermore, the mass production of infant formula exacerbates environmental damage and carbon emissions globally (78). Breastfeeding on the other hand is considered a renewable natural resource and produces minimal or zero waste, with recent studies have highlighted that disinvestment in breastfeeding services can lead to environmental costs (78).

2.7 Fuel poverty needs to be featured as a strategic priority. A logic model to prioritise action over the short, medium and long term may assist in considering how best to roll out solid fuel regulations whilst protecting those who are most vulnerable- both from air pollution and fuel poverty

According to the ESRI, 17.5% of households in Ireland 2020 were at risk of energy poverty (79). Research has found residential pollution hot spots in Ireland to be connected with deprived or very deprived areas (39). These areas are likely to have a higher proportion of homes with the lowest energy ratings, and these homes primarily rely on coal or peat for heating (39). This likely exacerbates health

inequalities due to a higher level of exposure to indoor air pollution amongst those who are already more susceptible to the impacts of air pollution by virtue of their socioeconomic status. This is compounded by fuel poverty, as fuel-poor households tend to have inefficient heating systems and poor insulation, with low-income families sensitive to any increase in fuel prices, which is clearly a very live and concerning issue at present. Solid fuels tend to be cheaper to buy upfront but they are also extremely inefficient.

Fuel poverty is associated with direct health impacts on physical and mental health- including respiratory conditions, increased risk of hypertension, heart attacks and stroke- and indirect health impacts stemming from social isolation and reduced nutrition from the 'heat or eat' dilemma (80). Cold homes have been linked to slow weight gain in infants as well as increased risk of asthma and hospital admissions amongst young children. An ESRI study from February 2021 found energy poverty to have a negative impact on the mental health of parents of young children, with the likelihood of maternal and paternal depression being higher in households characterised by energy poverty (81).

Overall, the issues of air pollution and fuel poverty are closely linked, and will require a long-term strategic focus to address with the ultimate aim of combatting environmental injustice and improve living conditions across the nation. There is a lack of current data on housing quality in Ireland, with the last survey on housing quality conducted by the ESRI 20 years ago. A new population-wide survey is urgently needed which could be followed by the inclusion of new questions on housing quality, heating and energy efficiency in the next 2026 census as current questions only relate to the presence or absence of a central heating system. Public health professionals can work with the Department to raise awareness of the health impacts of cold homes, develop/improve local services to address fuel poverty with targeted approaches to vulnerable populations as recommended by NICE and to develop cold weather action plans to safeguard the health of local communities during cold weather snaps (82). The Institute is unclear as to which government department holds overall responsibility for fuel poverty however cross-government action is likely to be required. Integration with Department of Social Protection and the Money Advice and Budgeting Service (MABS) would be useful to support people

to respond to energy poverty in their own homes in ways that protect air quality and the environment.

2.8 Further action is needed to address the high concentrations of radon gas in some indoor environments, including homes and workplaces, in Ireland. We note that this has not been included in the draft Clean Air Strategy.

Radon is a naturally occurring radioactive gas which can seep into indoor environments, such as homes and workplaces, and accumulate to high concentrations (83). Ireland has relatively high indoor radon concentrations and is estimated to have the eighth highest levels among OECD countries (84). It is important to acknowledge and address the impacts of these high concentrations of radon in certain parts of the country, as exposure to it is thought to be the second leading cause of lung cancer after smoking and is directly linked to almost 350 lung cancer cases in Ireland each year (83, 85).

Indoor radon concentration can easily be measured using a small detector, and fortunately, well-tested, durable and cost-efficient methods exist for preventing radon entry into new buildings and reducing radon in existing buildings (83). Indoor radon is therefore a preventable risk factor, and can be managed through effective national policies and regulations (83). The "WHO handbook on indoor radon: A public health perspective" provides policy options for reducing health risks from radon exposure, and includes the recommendation to include radon as a risk factor in national strategies related to indoor air quality (86). The Institute would therefore support the inclusion of radon control in this Clean Air Strategy, which will complement the National Radon Control Strategy, the National Cancer Strategy, the Irish Cancer Society's Lung Cancer Action Plan and the Healthy Ireland initiative (87-89). In line with recommended actions outlined in Phase 2 of the National Radon Control Strategy, the Department may wish to consider the development of a communications campaign to improve public understanding and awareness of radon (87).

3. How can pollutant emissions data be better used to inform actions at local and national levels?

3.1 Pollutant emissions data is essential to understand the source-pathway-receptor model for air pollution and to effectively mitigate health harms. Collaboration between epidemiologists, scientists and health researchers is crucial to link pollutant emissions data to health outcomes. Piloting an Environmental Public Health Tracking system should be considered.

The analysis and interpretation of air pollutant emissions data is a powerful tool to understand the sources of air pollution, pathway to exposure, health outcomes and risk factors. Only with this intelligence can cross-government policy be meaningfully informed and evaluated to ensure that the health of the population is safeguarded, and health inequalities reduced. This will require collaboration between scientists, epidemiologists, clinicians and researchers in public and environmental health, and need to be supported by ring-fenced funding. The Department could consider piloting an Environmental Public Health Tracking system as has been done in England; this system was designed to link data on environmental hazards, exposures and health outcomes to address the 'environmental health gap' by sharing, integrating and analysing data to inform public policy and interventions (90). This system when launched was the first of its kind in Europe and found to support effective data sharing, inform horizon scanning systems and was cost-effective to implement. Horizon scanning could also help to inform health service and emergency preparedness during acute bouts of poor air quality.

3.2 The Institute agrees with the Department that, while the air quality monitoring network has been expanded, there is still a need to develop this further to provide localised air quality information throughout Ireland that considers both spatial and temporal variation of air pollution.

Estimating population exposure to air pollutants is a key step in the quantification of the health impacts and will be a necessary means of evaluating the progress of the Clean Air Strategy. Air Quality Index is included within the Healthy Ireland Outcome Frameworks Indicator Set 2018, which is a national framework for action to improve the health and wellbeing of the people in Ireland (91). The Institute would welcome

the development of a specific reporting system on air quality to feed into the Department of Health; in particular, to policy leads reporting on the Healthy Ireland Strategic Framework and policy leads who hold responsibility for cardiovascular and respiratory disease.

Air quality monitoring data is generally collected from fixed-location monitoring sites, which can be limited by restricted geographical and time coverage including in rural areas (5). This is an important consideration for this strategy, as it is noted in the consultation document that as the monitoring network has been expanded in Ireland there has been an increase in the number of areas with air quality that above WHO guideline values, and these have predominantly been linked to burning of solid fuel in residential properties. Understanding spatial variation of air pollution on a local level can allow for local action to be implemented to reduce exposure in the local community. This might include actions across public communications, transport policies, smoke control areas, environmental permits and planning, and can therefore support other policies that are beneficial to public health such as active travel, community engagement and sustainability (1). It is essential that air quality monitoring systems detect air pollution concentrations across all areas that are inhabited by people, and so these systems should characterise the spatial and temporal variation of air pollution in Ireland, particularly within cities. Evidence is building on the use of land-use regression models to capture within city variability, which is something that the Department may wish to consider when the Ambient Air Quality Monitoring Programme (AAMP) is reviewed this year. However, local action needs to be supplemented by regional action as evidence has shown that pollutants-particularly $PM_{2.5}$- can travel long distances. For example, in densely populated areas typically less than 40% of ambient $PM_{2.5}$ originates from a nearby source, therefore relying on local action only may not significantly reduce ambient $PM_{2.5}$ (42).

3.3 Collaboration with Northern Ireland to facilitate transboundary data sharing and intelligence will improve research quality and power.

The Institute would encourage the Department to make transboundary collaboration a key focus when considering how to utilise pollutant emissions data more effectively. Combining data with other countries allows for larger research studies with greater statistical power, which means that findings can be interpreted with a

higher level of certainty and be more useful to inform policy. We would recommend collaboration with Northern Ireland on shared research projects to understand the impact of emissions on health on the island of Ireland, which also paves the way for joined up working on another transboundary public health challenge. We would also encourage the Department to feed into the international research base by contributing to the WHO Global Ambient Air Quality Database.

3.4 Accessible data on pollutant emissions is needed. The public needs access to this data to make informed decisions to reduce their exposure and protect their health.

Making air pollution data accessible to local communities is an essential component of citizen science. Availability of local intelligence will improve public awareness of the health effects of air pollution and inform risk management and personal decision making. Local air quality monitoring must be supported with a system to translate data into meaningful and accessible intelligence and should be supported with ring-fenced funding. Data outputs need to be made available to support the development of local health profiles by the Healthy Ireland Communities Programme, as well as the Healthy Cities and Counties Network and to inform local city and county development plans for local communities to be sufficiently informed when designing interventions to reduce pollution in their areas. Public engagement and empowerment is considered essential to catalyse change and providing people with clear, transparent and understandable information is crucial for local democracy (92).

Furthermore, health care professionals need access to timely, high-quality data on pollutant emissions in their local setting so they can advise their patients on the health effects of poor air quality and measures they can take to reduce their exposure. We would encourage the Department to proactively work with the Department of Health to ensure that access to local air pollutant emissions data is given to healthcare professionals, and that they are trained on the analysis and interpretation of this intelligence as well as the effective communication of the risks and mitigation options to their patients. We would also encourage the Department to work closely with Directors of Public Health who can provide local communities and health services with guidance and support to implement measures to reduce air pollution in their local area.

4. What do you feel are the most important current and emerging air quality issues in Ireland that require further research?

Firstly, the Institute welcomes the Department's proposal to conduct a research project to create an emissions profile across sectors and expose key social and economic drivers of air pollution in Ireland. We would recommend public health professionals are included in the Clean Air Research Forum. In terms of research gaps, we have outlined those that have been identified by the National Institute for Health and Care Excellence (NICE) as key areas to focus on for both indoor and outdoor air pollution.

4.1 Indoor air pollution

Indoor air pollution is under-researched. NICE Guideline NG149 provides recommendations for research on indoor air pollution which we have outlined below and would recommend the Department focus on as a priority to further understanding of the impact of indoor air pollution on health (93):

- 'What is the health impact of exposure to individual air pollutants alone or combined with each other in the home?
- What is the effectiveness and cost effectiveness of interventions to improve indoor air quality at home for people without pre-existing health conditions?
- What is the minimum air exchange rate to minimise the health effects of poor indoor air quality in the home?
- What are the emission profiles of indoor air pollutants released from building materials in a lived-in home environment?
- What interventions are effective and cost effective at raising awareness of the health risks of damp and mould in the home? How can damp and mould in the home be prevented? How is damp and mould in the home best identified and fixed? How can tenants be best made aware of whose responsibility it is to make any changes needed as a result of damp and mould in the home?'

4.2 Outdoor air pollution and health

NICE guideline NG70 provides recommendations for research on outdoor air pollution pertinent to health (65). We would encourage the Department to undertake research as per these recommendations with a focus on the following questions taken from the NICE guideline:

- 'How does altering a person's mode of transport and route affect their personal exposure to air pollution?
- What methods are effective and cost effective at promoting a shift to zero- and low-emission modes of travel, including active travel?
- How can information about driving style gathered from telematics devices and other technologies (such as apps or in-car global positioning systems) be used to reduce individual fuel consumption and vehicle emissions?
- How do different elements of a clean air zone interact to improve air quality and what is the overall effect on people's health?
- What factors influence how vegetation and street trees affect urban air quality?
- What is the effectiveness and cost effectiveness of different methods of awareness raising about air pollution (including air pollution alerts) on people's behaviour and on acute and chronic health outcomes?'

4.3 Research is needed on the impact of air pollution alerts on the population, including on vulnerable groups

NICE guidance NG70 recommends that research is conducted on the impact of air pollution alerts (65). Research is needed on the impact of, for example, air pollution alerts on:

- different groups (such as those vulnerable to air pollution and the general population)
- behaviours related to the production of pollution (such as changes in mode of transport)
- acute and chronic health.

Studies are also needed on:

- the risk of adverse effects (such as making people worry unnecessarily, or increasing the level of motor vehicle travel after an alert)

- the ability of health services to respond to concerns raised by issuing alerts.

4.4 There is a need for primary research to understand how air pollution contributes to health disparities in Ireland.

The Institute welcomes the strategic commitment made to enhancing the evidence base through the establishment of a Clean Air Research Forum and funding to support research. However, this must include a research focus on the impact of air pollution on population health and health inequalities in Ireland to ensure that policies best serve the needs of the whole population and also groups who are more vulnerable. This approach reflects a proportionate universalism approach, which is the universal provision of resources to reduce health harms on a population level, with additional resources distributed based on level of need (47). Senior public health representation on the Clean Air Research Forum would be a welcome measure to ensure that population health and health inequalities are considered a key area of research in the strategy. Close working with the Department of Health, HSE and CSO to improve disaggregated data collection and analysis will also help to inform policy implementation and evaluation. Unfortunately, there is no established health inequalities monitoring system in Ireland which complicates research in this area. As this a vital component of monitoring the impact of the Clean Air Strategy 2022, close working with the Department of Health and CSO may facilitate progress towards a shared goal of developing an overall health inequality monitoring data system which ideally could be linked to air quality emissions data and temperature changes to explore the relationship between health inequalities, air pollution and climate change.

5. How can we better increase awareness of the health impacts of air pollution?

5.1 In order to better understand public awareness and understanding of the health impacts of air pollution, we recommend that the communication strategy group includes public health representation and considers conducting research to gauge public understanding

The Institute welcomes awareness raising as a key strategic objective and the plans to establish a Clean Air Communication Strategy Group. There are many cross-cutting issues associated with air pollution that can be harnessed and acted on by individuals across domestic heating choices, tobacco use, food choices, relevance of active travel and actions to mitigate climate change. Action on air pollution and climate change are widely understood to hold co-benefits for health. However, the relationship between the environment and health, particularly climate change, are not always well understood.

A population-wide survey could help to understand public attitude and understanding of air pollution, the health impacts and the steps individuals can take the reduce their contribution to the problem and reduce their exposure to pollutants. This could assist policy-making by providing evidence to inform upstream policy measures across sectors. Representation from public health communications specialists with experience of population-wide public health campaigns on the Clean Air Communication Strategy Group would be welcomed. Additional qualitative research may assist with reach- particularly for hard-to-reach groups.

IPH assumes that the strategic and operational actions of the OEP will align with the principles outlined in the Aarhus Convention — that is, ensuring that environmental information is disseminated to the public, and that the public are included in environmental decision making (94). This is part of upholding the individual's right to *"live in an environment adequate to his or her health and wellbeing, and the duty … to protect and improve the environment for the benefit of present and future generations"*.

Process and outcome evaluation will also be important to assess the impact of public communications when implemented. Some groups in the population are at higher

risk of the health impacts of air pollution than others, and so it is important that these groups are reached by public communications initiatives. Sensitivity will be required to ensure that those who are at higher risk due to factors outside of their control-such as their living conditions or socioeconomic status - do not feel powerless in protecting their health.

5.2 The establishment of an independent advisory committee on the health impact of air pollution would be welcomed to provide government departments with the necessary scientific evidence to inform public awareness campaigns.

Public health communications must be based on the best available evidence. A committee to provide independent advice to government departments and agencies on the health effects of air pollution would be welcomed similar to that provided in the UK, known as the Committee on the Medical Effects of Air Pollutants. The Terms of Reference of this committee includes advising on the health impacts of indoor and outdoor pollutants, and on when further research is required. The expertise of this group is broad and includes specialists across air quality science, atmospheric chemistry, toxicology, physiology, epidemiology, statistics, paediatrics and cardiology.

5.3 The communication of public health messages regarding air pollution should be considerate of the local population, evidence-based and have sufficient reach to more vulnerable groups

Public communication campaigns can stimulate action in the general population to address public health issues that require a collective societal effort. However, the methodology underpinning public communications is critical to ensure that campaigns are not counterproductive. Qualitative research conducted by the UK Department for Environment, Food and Rural Affairs identified six principles required for effective public communication on the topic of air pollution, which the Institute would encourage the Department to incorporate when planning public awareness campaigns. These principles were as follows:

1. **'Explain what air pollution is**: Use information about what particulate matter, and other air pollutants are made of and where they can go to get air pollution onto the local agenda – not statistics about health consequences.

2. **Help people understand how they can protect themselves**: Don't raise public concern about air pollution unless you can at the same time satisfy people's desire to do something to reduce their exposure.
3. **Explain the health impacts**: Focus on what is known for certain about the health consequences of air pollution.
4. **Make it local**: Talk about air pollution as a problem linked to specific places – and not as a general problem of the atmosphere.
5. **Explain how individuals can make a difference**: Keep the focus on practical improvements – not long-term solutions.
6. **Demonstrate leadership and empower communities,** instead of simply expecting individuals to change their behaviour' (1).

5.4 To inform interventions and policies designed to change behaviour, the Institute would recommend the Department refer to the Behaviour Change Wheel (BCW)

The BCW is a framework for understanding behaviour in its context and developing interventions and policies to change behaviour (95). The BCW was developed from an extensive review of behavioural science frameworks from many disciplines and sectors bringing together their best features. At the heart of the BCW is the 'COM-B model' which has three main elements that need to be in place for behaviour change to occur: capability, opportunity and motivation. Taking active travel as an example, capability means having the physical and mental ability to engage in the behaviour (eg being in good health and physically active), opportunity means being in a physical and social environment that supports the behaviour or makes it possible (e.g. infrastructure that encourages active travel with sufficient greenways, walking paths and cycle lanes) and motivation refers to being more motivated to do the target behaviour than other behaviours we might do instead (eg driving a personal vehicle).

5.5 Risk communication

Before communicating the risk associated with air pollution, information is needed on how the Irish population perceive the risks associated with air pollution to effectively motivate them to act. WHO led an expert consultation to build consensus on the best methods of communicating potential risks of air pollution and how individuals can best mitigate these risks (42). Findings from this consultation were as follows:

- the public should be informed of the relative importance of air pollution sources;
- reliable information that is useful to individuals for modifying their behaviour on the basis of the physical levels at which they begin to experience adverse impacts, symptoms or discomfort should be provided;
- Staying indoors and/or reducing physical activity are classical public health precautions for reducing exposure when air pollution is elevated however unintended risks of interventions, such as reducing the benefits of outdoor physical activity, should be carefully considered;
- Prioritisation of disease categories may include consideration of susceptibility to air pollution, the relative importance of air pollution and other risk factors and the feasibility and likelihood of successfully adopting personal interventions that effectively reduce exposure;
- Consideration of population exposure should be integrated into the planning phase of new facilities, particularly those designed for vulnerable populations (nurseries, schools, care facilities). This can include location, building design, ventilation methods, access routes, exercise areas;
- Personal interventions to reduce exposure to air pollution raise issues of equity, as the need for and access to appropriate interventions might be unequally distributed by individual, society or country (42).

6. What issues might a national clean air awareness campaign encompass and how could its impact be measured?

The public have a key role in reducing air pollution, and can take action by increasing active travel, shifting to a more plant-based diet and reducing exposure to solid fuels used in residential heating, tobacco smoke and radon. An evidence-informed public communications campaign should detail the health benefits that action on reducing air pollution can have. Any campaign can be monitored for effectiveness by considering impact on interim emissions targets, health outcomes, on purchasing behaviour, public attitudes.

6.1 Benefits of investing in active travel and public transport for health

Increasing walking or cycling may increase overall levels of physical activity, leading to associated health benefits. These include:

- Reducing the risk of coronary heart disease, stroke, cancer (including bowel and breast cancer), obesity and type 2 diabetes;
- Musculoskeletal health;
- Promoting wellbeing with benefits for depression as well as dementia, which is particularly relevant in an ageing population. Active travel is also linked to improvements in mental health, with studies citing commuters who engage in active travel as suffering from less stress (96, 97)

From a wider social and environmental perspective, an increase in walking or cycling can also help to:

- Reduce car travel, leading to reductions in air pollution, carbon dioxide emissions and congestion;
- Reduce road danger and noise pollution;
- Increase the number of people of all ages who are outside, and provide opportunities for social interaction;
- Provide an opportunity for everyone, including people with an impairment, to participate in and enjoy the outdoor environment (97).

6.2 Benefits to health and the environment of increasing intake of sustainable, locally sourced plant-based foods and a reduction in the consumption of animal products such as meat and dairy

Sustainable diets are associated with substantial co-benefits for the environment, but also for health. A large study including over 400,000 participants from the European Prospective Investigation into Cancer and Nutrition (EPIC) study estimated the health impacts for all-cause and cause-specific mortality and cancer rates from greenhouse gas emissions and land use using detailed dietary information from more than 11,000 food items and identified the impact on the health and the environment by adopting a sustainable alternative diet- the EAT–Lancet diet. This is defined as '*a universal healthy reference diet, based on an increase in consumption of healthy foods (such as vegetables, fruits, whole grains, legumes, and nuts), and a decrease in consumption of unhealthy foods (such as red meat, sugar, and refined grains) that would provide major health benefits, and also increase the likelihood of attainment of the Sustainable Development Goals*' (98).

The study found that all-cause mortality and cancer rates could be substantially reduced by adopting a sustainable diet like that of 'EAT Lancet,' alongside a potential reduction in greenhouse gas emissions and land use. Another study conducted in the UK found that replacing 50% of meat and dairy consumption with a combination of fruit, vegetables and cereals could reduce dietary greenhouse gas emissions by 19% and avert approximately 37,000 premature deaths from cardiovascular disease per year (99). Qualitative research to gauge public understanding of the relationship between diet, disease, air pollution and climate change would be valuable to inform interventions needed to raise awareness of this relationship, and to empower the public to make informed decisions when purchasing and consuming food. Consumers need to be given sufficient information on the health and environmental impacts of products, and this is not always in the interests of the food industry or require by product labelling regulations. Therefore, it is imperative that any air pollution campaign speaks to these issues so that consumers can make an informed decision, with evidence-based information.

6.3 Indoor air pollution is under researched and poorly understood. We refer the Department to NICE guideline NG149 which provides guidance on how to

improve awareness of indoor air pollution and action that can be taken by local authorities to support their communities.

It is important that people know how to protect themselves from exposure to indoor air pollution, particularly in residential settings. Sources of indoor air pollution can include cooking, space heating, tobacco smoking, radon and its decay products, anthropogenic vitreous fibres, household products and the indoor penetration of outdoor air pollutants particularly in urban areas (5). The main mechanism by which people are exposed to indoor air pollution is via inhalation of pollutants, but pollutants can also be ingested or absorbed through the skin (100). The home is where people- particularly those who are more vulnerable due to age, physical health/mobility issues- spend most of their time, and this has particularly been the case of late with COVID-19 restrictions (5). Poor indoor air quality is associated with low housing standards, conditions that overwhelmingly affect the poorest in our society. Children are spending more time indoors, and there has been evidence of the impact of indoor air pollution on child health such as low birthweight and pre-term delivery, respiratory conditions such as asthma, allergies, wheeze, eczema and atopic dermatitis and reduced cognitive performance and inattention (100).

There is a need for clear and factual guidance on the sources of indoor air pollution. The strategy should aim to support people with information. One option could be to implement an education programme including a labelling scheme for products associated with indoor air pollution that provides an easily understandable measure of the risk and ways to mitigate that risk. The cost of residential heating should also be communicated with transparent packaging to inform people about the true cost- economic, environmental, health- of using different types of fuel (39). Using an open fire for home heating is expensive and inefficient, with approximately 75% of the heat being lost through the chimney. The burning of solid fuels also has substantially more potential for impact on outdoor and indoor air quality when in use than other technologies (39).

The Institute refer the Department to recently published NICE guidelines on 'Indoor air quality at home' which provides guidance on interventions to change the structure, ventilation, and materials used in new and existing homes, as well as interventions to change people's knowledge, attitude and behaviour in relation to a

range of actions to reduce their exposure to indoor air pollution at home (93). There is information in these guidelines on how local authorities can support people with regard to indoor air pollution which could be helpful to inform strategy implementation (93).

6.4 Reach and evaluation

It is important that any communication strategy recognises that there are large numbers of people who do not, or cannot, routinely access online resources and considers alternative methods to reach these groups. Information programmes should be piloted, monitored and evaluated to ensure effectiveness and cost-effectiveness, and to identify and mitigate any unintended consequences.

7. What particular metrics or benchmarks do you think should be considered in tracking the progress of a Clean Air Strategy?

7.1 The Institute strongly recommend that the Department adopts the WHO recommended emission standards and benchmarks against these AQGs to measure progress in air quality. Progress should be measured by sector and by pollutant.

As stated in response to question 1, the Institute would strongly recommend that the Department adopts WHO recommended emission standards and benchmarks air quality in Ireland against the WHO AQGs. From a health perspective, no level of air pollution is considered safe and so WHO emission standards provide a gold standard against which air quality in Ireland should be compared. International comparisons may also inform process evaluation. Capturing learning from other countries as policies are implemented and evaluated will provide additional intelligence to inform and develop the strategy. Emissions profiles for each pollutant are also important as individual pollutants have varying impacts on health. Emission profiles across sectors should also be measured over time to ensure overall progress and identify any sectors that require additional support to meet emission targets. For example, the strategy acknowledges challenges faced in Ireland from rising ammonia emissions primarily from the agricultural sector as well as non-methane volatile organic compounds (NMVOCs).

7.2 Robust mechanisms are needed to monitor and evaluate the impact of the Clean Air Strategy on population health- particularly on morbidity and mortality, years of life lost or disability adjusted life-years, and changes in life expectancy attributable to the total exposure to air pollution or to a change in exposure. This needs to be monitored on a population level but also amongst vulnerable groups to measure the impact on health inequalities.

Assessment of the effectiveness of the overall policy and interventions on health will be needed. WHO refer to two key tools that can be used to monitor and evaluate the impact of air pollution policies on health that may assist in tracking the progress of the Clean Air Strategy: an air pollution health risk assessment and an overall Health

Impact Assessment. The Institute has specialist expertise in HIA, and we have dedicated guidance that the Department may find of use: Health Impact Assessment - Institute of Public Health. While we would not have specialist knowledge of Air Pollution Health Risk Assessment, WHO has included a detailed summary of the methodology in its Global Air Quality Guidelines 2021 (5). In summary, WHO explain that an air pollution health risk assessment provides an overview of how air pollution policies, programmes or projects might impact health in different socioeconomic, environmental and policy circumstances. This risk assessment can be quantitative or qualitative and aims to assess the following in order to inform policymaking:

(i) the amount of air pollution present (i.e. pollutant concentrations);
(ii) the amount of contact (exposure) of the targeted population; and
(iii) how harmful the concentration is to human health (i.e. the resulting health risks to the exposed population) (5).

According to WHO, the main purpose of a Health Risk Assessment is to act as an analytical tool to answer policy questions about the likely health impacts of planned policies, and therefore would likely be appropriate to conduct as part of Clean Air Strategy development. A Health Impact Assessment is essentially an extension of the overall risk assessment and is a combination of tools that can be used to judge the effects that the policy could have on the health of the entire population and the distribution of those effects within a population (5).

Based on WHO guidelines, the Department may wish to consider conducting an Air Pollution Health Risk Assessment to inform the Clean Air Strategy development and to monitor progress on health impacts during strategy implementation. The risk assessment could aim to answer the following questions to inform the Clean Air Strategy:

- What is the public health burden associated with current levels of air pollution in Ireland?
- What are the human health benefits associated with the proposed Clean Air Strategy?

- What are the human health impacts of emissions from specific sources or selected economic sectors, and what are the benefits of policies related to these?
- What are the human health impacts of current policy or implemented actions?

Detailed information on how to conduct a health risk assessment can found in the WHO Global Air Quality Guidelines. In short, a policy question firstly needs to be defined and sources of data to answer the question need to be identified. This is likely to include the level of air pollution, the exposed population and the health effect, and the relationship of risk to exposure. The latter can be quantified by concentration-response function (CRF) which represents the quantitative risk of air pollution to health in a population and is based on a risk estimate from epidemiological studies (5).

Health risk can be quantified by the number of attributable deaths or cases of disease, years of life lost or disability adjusted life-years, or by the change in life expectancy attributable to the total exposure to air pollution or to a change in exposure (5). Policies and interventions used to reduce air pollution are best assessed using life-table methods to estimate years of life gained from the reduction in exposure of the population (1). Tools for health risk assessment calculation are widely available from WHO (AirQ+) (101). This software can be used to consider:

- the effects of short-term changes in air pollution (based on risk estimates from time-series studies);
- the effects of long-term exposures (using life-tables approach and based on risk estimates from cohort studies);
- How much of a particular health effect is attributable to selected air pollutants;
- Compared to the current scenario, what the change in health effects would be if air pollution levels changed in the future (101).

In Ireland, there is a lack of access to local health data and a lack of integration with CSO and data strategies led by other departments. As baseline data such as air quality, population demographics and health outcomes will be required, collaboration with the Department of Health and the Central Statistics Office will be key. There have been many useful proposals in respect of enhancing health information systems in Ireland, but there have been substantial delays in implementation. The

Institute has highlighted this as a key issue to the Department of Health as part of post-pandemic public health reform planning, and would ask the Department to consider collaboration with the Department of Health on ensuring the availability and accessibility of local health data, an essential component of monitoring the success of the Clean Air Strategy.

8.Are there any other comments you have in relation to the draft national Clean Air Strategy?

N/A

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