



Enhancing *Local Air Quality Management* to maximise public health integration, collaboration and impact in Wales, UK: A Delphi study



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ABSTRACT

Background: Outdoor air pollution is a significant public health problem. The UK Local Air Quality Management (LAQM) regime is intended to protect public health through a prescribed process of assessment and collaborative action. Despite its intention and underpinning principles, public health bodies and specialists do not interact with or support LAQM as much as they could or should. This study aimed to explore and understand this disconnect, to inform action that can resolve problems and maximise public health integration, collaboration and impact in this important public health work.

Methods: The Delphi technique was used to elicit multiple viewpoints from a range of experts on this complex problem in Wales, UK. Over three iterative feedback-interspersed survey rounds, 86 expert panellists generated opinions and formed consensus on the role of public health bodies and specialists in LAQM and the added value that might be achieved as a result of increased integration and collaboration. Linked opportunities, barriers and solutions were also described. Qualitative data were subject to thematic analysis; quantitative data were analysed using descriptive statistics to assess consensus, and the Wilcoxon matched-pairs signed-ranks test to assess response stability.

Results: Consensus opinion confirmed the public health role in LAQM should support both broader mainstream risk assessment and management, and also enabling functions such as communications, research and evidence appraisal, advocacy and leadership. Linked opportunities, barriers and solutions were described so as to facilitate change. Panellists suggested that the added value of increasing integration and collaboration would be more efficient, creative and productive collaboration, meaningful risk assessments and effective action.

Conclusions: The significant role of public health in LAQM is rarely recognised or realised. The findings of this study present a convincing evidence-based case for directing and supporting much-needed change to LAQM so as to increase public health integration, collaboration and impact.

Not only has this study generated new evidence to enhance LAQM policy and practice, it has also confirmed the applicability of the Delphi method in investigating complex environmental public health problems. While some opinions generated relate to Wales' unique circumstances, most were general in context and will have relevance and importance across the UK and in countries beyond where air quality management and public health policy and practice are disconnected.

1. Background

Outdoor air pollution poses significant public health risks. Exposure to pollutants such as particulate matter and nitrogen dioxide increases mortality and morbidity from heart disease and strokes, respiratory diseases, lung cancer and other effects (World Health Organization, 2013). The associated health and financial burdens are substantial; in the UK, the equivalent of around 40,000 annual deaths are attributed to exposure to these pollutants (Royal Colleges of Physicians and

Paediatrics and Child Health, 2016) and life expectancy is reduced by 7–8 months on average for everyone (Department for Environment, Food and Rural Affairs, 2007). Through health service costs and reduced productivity from lost work-days, air pollution costs the UK about £20 billion per year (Royal Colleges of Physicians and Paediatrics and Child Health, 2016).

With air pollution regarded as the most significant environmental determinant of health (Lim et al., 2012), having in place an effective air quality management framework—to assess and reduce air pollution,

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health risks and inequalities—must be a priority. In the UK, the approach to air quality management is set out in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Department for Environment, Food and Rural Affairs, 2007). This commits to ensure access to good quality outdoor air for all UK citizens through the implementation of two complementary approaches: i) national policy measures that drive tighter standards, technology advances and cleaner transport and industry, and ii) a statutory effects-based Local Air Quality Management process [as required by Part IV of the Environment Act 1995 (HM Government, 1995)] to support local-level collaborative action to assess and reduce air pollution to protect population health.

This paper focuses on the second of these—the Local Air Quality Management (LAQM) regime—which recognises that pollution sources are best managed at the lowest administrative level through proportionate, joined-up action that takes account of the local context (Department for Environment, Food and Rural Affairs, 2007). To tackle multi-faceted air pollution problems, LAQM relies on multi-discipline commitment and action from all relevant sectors, including transport, planning, regulation and health. Despite its public health intentions and underpinning principles, previous research has highlighted that public health bodies and specialists do not interact with or support LAQM as much as they could or should (Brunt et al., 2016a). Identified LAQM ‘structure’ and ‘process’ weaknesses may help explain why this is so. For example, because the public health role in LAQM has been poorly defined, public health engagement in and commitment to LAQM are limited. This has led to a growing disconnect between air quality management and wider public health policy and practice which is doing little to tackle known interactions across public health problems and solutions e.g. promoting and facilitating active travel in a population to reduce physical inactivity and achieving co-benefits of reducing vehicle use and cutting transport-related air pollution emissions. Problems are compounded by the prescribed LAQM risk assessment and action planning processes being narrow in scope; they fail to encourage the consideration of air pollution problems and solutions in a broad public health context (aligned with tackling linked wider determinants of health). Addressing these shortfalls such that LAQM becomes more public health driven and supported could, in turn, increase its effectiveness, reach and impact (Brunt et al., 2016a).

This paper presents a Delphi study to explore, understand and generate new evidence to help resolve these problems. Its objectives were to form expert consensus to: clarify the role of public health bodies and specialists in LAQM, describe opportunities for, and added value resulting from, improved integration and collaboration, and highlight linked barriers and solutions. The study setting was Wales – a UK country with a population of approximately 3.1 million people. Wales was selected because: LAQM and ‘health’ responsibilities are devolved from UK Government and so there is autonomy and opportunity to bring about change tailored to the country’s needs; the primary public health body and its specialists form part of the National Health Service (NHS); and local government bodies—which co-ordinate LAQM implementation on behalf of stakeholders—all hold equal status. Finally, and perhaps most importantly, the Welsh Government has recently passed in Wales the pioneering Wellbeing of Future Generations (Wales) Act 2015 (“WFG Act”) which calls for sustainable action, based on principles of collaboration, integration, involvement, long-term and prevention, to improve the economic, social, environmental and cultural well-being of Wales through achieving seven well-being goals (Fig. 1) (Welsh Government, 2015). The WFG Act places responsibilities on all public bodies in Wales to work in these new ways through multi-agency local Public Services Boards to act to ensure the needs of the present are met without compromising the ability of future generations to meet their own needs.

Given that reducing air pollution, health risks and inequalities can help make a contribution to most if not all well-being goals, the WFG Act presents unique and significant opportunities to support LAQM



Fig. 1. Wellbeing of Future Generations (Wales) Act 2015—well-being goals.

enhancement and bring about necessary policy and practice change.

While this study considered the LAQM and public health context in Wales, the methods and findings presented will likely have relevance and importance to other parts of the UK and in countries beyond.

2. Methods

This study used the Delphi technique because, of all methods to generate, develop consensus of, and understand group opinion, it is asserted to be the most reliable (Moynihan et al., 2015; Keeney et al., 2011). Delphi is a mixed-methods multi-stage systematic research method that solicits real-world opinions from a panel of experts to generate, understand and form consensus on group opinion around a complex issue (Dalkey and Helmer, 1963). It is multi-stage insofar as it involves iterative survey rounds interspersed with controlled feedback; each stage builds on the preceding one and the whole process is guided by principles of democratic participation and anonymity (Day and Bobeva, 2005). It assumes that group opinion – especially of experts – is more valid and reliable than individual opinion(s) (Keeney et al., 2011). In this study, to strike an appropriate balance between forming consensus and risking expert attrition, the number of survey rounds was restricted to three (Fig. 2) (Bloor et al., 2015; Radestad et al., 2013; Boulkedid et al., 2011).

It is accepted that there rarely exists just one definable community as a source of expertise, knowledge and opinion for complex problems, and that Delphi participants need not be representative of the target population nor have specialist knowledge of the entire issue under review (Devenish et al., 2012; De Meyrick, 2003). As such, in this study, ‘information-rich’ participants were purposefully selected using a *knowledge resource nomination* process which helped identify and categorise possible participants and ensured no source of expertise was overlooked (see Okali and Pawlowski, 2004). This identified a heterogeneous and geographically dispersed group of 167 possible participants from different disciplines, in an attempt to achieve a broad spectrum of opinion on the subject under investigation (Keeney et al., 2011). Each potential participant was e-mailed an invitation, information pack and consent form, in line with recommended best practice

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