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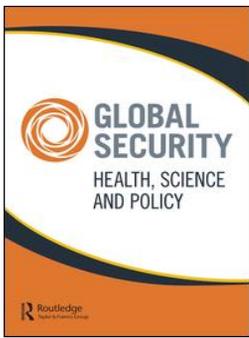


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Air pollution in India: questions of advocacy and ethics

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ABSTRACT

In large cities around the world, the effects of air pollution on human health present a growing problem. In this commentary, we assert that governments alone are not responsible for addressing such issues and health care professionals (HCPs) need to consider whether their duty of care should extend beyond normal clinical boundaries. When considering the ethics around the generation and effects of air pollution, especially in relation to justice and health care, actions taken by HCPs (e.g. in a country such as India) potentially extend beyond treating individual patients one-at-a-time for toxic effects of emissions and include advocating on behalf of others. While these problems are not unique to India, India is particularly badly affected by air pollution, and the situation there is made worse by large sectors of the population having limited access to health care, resulting in poor morbidity and mortality outcomes compared with other SE Asian countries. Using illustrative scenarios, we consider the effects of air pollution on present and future generations, recognising, however, that cause and effect are sometimes disconnected, with human behaviour in one place having far-reaching consequences in another place or at another time. Furthermore, the consequences of air pollution do not fall evenly across populations, and an injustice arises if economically challenged, vulnerable sectors of the population pay a price (in this case impaired health) for the actions of others. From a moral perspective, HCPs should be willing to look beyond their traditional role as 'healers' and advocate on behalf of others to help limit harms caused by this often invisible yet life-limiting and life-threatening form of pollution. This may require cultural change to existing models of health care, including the role of the HCP, to improve health security in India and elsewhere.

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Introduction

It is easy to say that we live in an interconnected, globalised world, but it is much harder to assess the moral implications of what this means. In this commentary, we argue that from an ethical standpoint, the role of health care professionals (HCPs) today ought to include advocacy, taking *health care professional* to mean medical doctors, nursing and midwifery professionals (including those working in public health), dentists and pharmacists (World Health Organization [WHO], 2004). HCPs can go beyond treating individual patients by using their influence to advocate on behalf of vulnerable members of society, such as those being significantly harmed by exposure to polluted air (Ramanathan & Haines, 2016).

We focus on India because urban air pollution problems are especially serious and because the infrastructure needed to address this pollution is poorly developed (e.g. in relation to public health) (Watts et al., 2016). Furthermore, two of the authors have personal ties and/

or a special interest in the country. ND was born and raised in India and worked as a clinical pathologist in both the public and private health care sectors. She has first-hand experience of the consequences of air pollution and the vulnerability of low-income households, especially regarding the lack of access to health care. RW has had a lifelong interest in Indian culture and philosophy, with a special interest in Indian medical education and health policy. He guest-lectures in India (and elsewhere) on ethics and professionalism.

We acknowledge that for various reasons the concept of health care advocacy is not straightforward, and with air pollution, complex local causes and effects combine with wider historical and current global factors to impact on human health. Many factors affect the current state of air pollution in India, such as weather patterns that are being significantly disrupted by climate change. In addition, some pollution sources are far removed from the place where the effects of toxic air are at their most potent.

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The worst effects of air pollution are likely to be experienced closest to the source of those emissions, but the health effects of air pollution can be felt by people living miles away from the pollution source, with contaminants transported across large distances by air currents (Ashfold et al., 2015). Furthermore, it is important to acknowledge another layer of complexity in that the consequences of air pollution do not affect individuals equally, and it is generally the vulnerable and poor who are most at risk of harm (Caney, 2015; Gardiner & Hartzell-Nichols, 2012; Pettengell, 2010).

While governments can intervene at the local level, policy interventions are unlikely to succeed unless (a) they are multi-faceted and (b) the full extent of health problems arising from exposure to polluted air are acknowledged. Governments have a responsibility to mitigate harms caused to citizens by poor air quality, but we accept that it is naïve to suppose that simple solutions exist for complex problems, or that HCPs can rectify these problems. HCPs can, however, work effectively in conjunction with NGOs and social welfare organisations, and they can advocate in a variety of ways, such as providing expert testimony to scientific inquiries or intervening directly with local, regional or national governmental bodies. While HCPs may feel powerless to ameliorate situations of such magnitude, we propose that it is possible for their services and/or goodwill to extend beyond treating individual patients and the traditional public health preventative role (Premkumar, Haddad, & Dworkis, 2013; Verma, Flynn, & Seguin, 2005). Engaged HCP citizen-advocates can act on behalf of patients who are most at risk and least able to protect themselves against something as insidious as air pollution (Carlisle, 2000; Geiger, 2017; Gruen, Pearson, & Brennan, 2004; Shah & Garg, 2011).

Two examples where HCP advocacy is well documented are in the UK and Australia. A General Medical Council (UK) position paper states that a doctor's involvement in global health should be part of normal, routine medical practice (Marmot, 2011), and in Australia, a Royal Australasian College of Physicians' position paper states that physicians should 'bring medical expertise and a focus on human health and justice to the centre of all public policy as it relates to climate change' and 'advocate for mitigation that will reduce the risk of dangerous climate change and maximise health benefits' (Laking et al., 2016).

We make the case that the time is right to reappraise the traditional role of HCPs, bearing in mind that in a country such as India, problems are compounded when those exposed to harm may not have ready access to health care, which, as we discuss later, is all too often the case. In situations such as these, where high levels of $PM_{2.5}$ (fine particulate matter) are found in Indian cities (and

elsewhere), the injustice arising from the consequences of long-term exposure becomes difficult to defend.

Fine particulate matter or $PM_{2.5}$ (as opposed to PM_{10} or coarse particulate matter) is considered particularly harmful to human health (Cohen et al., 2017; Yang, Hoffmann, & Scheffran, 2017). Clinical treatment is necessary but not sufficient if all it does is stave off the short-term effects of exposure to polluted air. By acknowledging the need to respect the rights of all humans and by actively debating policies on pollution and human health, HCPs can become catalysts for change, thereby contributing to the protection of vulnerable sectors of society. Recognising that political dimensions to the wider problems of pollution lie outside the scope of our analysis, we argue that globally, HCPs can adopt a moral standpoint and advocate and provide a supportive voice for disadvantaged, disenfranchised and vulnerable members of society.

Because of their expertise and position of respect within society, HCPs are well placed to assume the role of advocate, and their interventions may therefore need to extend beyond routine clinical activity. If victims of air pollution in a country such as India have limited access to health care, this places them in a position of double jeopardy, which is the antithesis of most reasonable notions of justice. As Sen (2009) asserts, 'The identification of redressable injustice is not only what animates us to think about justice and injustice, it is also central ... to the theory of justice [itself]' (p. vii). HCP interventions such as advocacy could help to identify redressable cases of injustice (i.e. ones for which a workable solution can be found), acting with professional integrity and out of humanitarian concern in support of those who feel powerless or disenfranchised.

HCPs, advocacy and ethics

In 1986, the WHO recognised *advocacy* as one of three major strategies for achieving health promotion. The other two were *enablement* and *mediation*, with advocacy for health defined as a 'combination of individual and social actions designed to gain political commitment, policy support, social acceptance and systems support for a particular healthy goal or programme' (WHO, 2004). Two main goals thus underpin advocacy: Protecting the vulnerable and those who experience discrimination and empowering individuals and communities who need a stronger voice to enable them to express their needs and make their own decisions.

Hubinette and colleagues (2016) describe advocacy as 'both a mind-set and a multi-faceted set of skills that includes ensuring access to care, navigating the health care system, mobilising resources, addressing health inequalities, influencing health policy, and creating system change'

(p. 132). This summary amply demonstrates the breadth and scope of the challenge, and while clearly no one HCP can tackle all these areas, HCPs can, however, apply their skills towards addressing some of these goals.

Previously, Carlisle (2000) defined advocacy in terms of the activities it encompasses. To this end, *representation advocacy* can be (1) case advocacy, i.e. the representation of underprivileged groups such as the disadvantaged or sick to promote their right and/or to redress power imbalance, and, (2) cause advocacy, i.e. lobbying within the arena of public policy and health, seeking to change the worlds and challenge injustice to improve the lives of the least well-off members of society. *Structural advocacy* relates to social determinants of health and the extended role that clinicians may choose to play (Carlisle, 2000; Geiger, 2017). Activities here might include liaising with non-governmental organisations (NGOs), government planning departments, environmental health departments and/or regulatory bodies to help inform policy. Making a constructive input into policy formulation and development could potentially help bring about necessary change at either local or national levels. HCP advocacy thus translates into contributing professionally to the task in hand, which in this case means making an effort towards reducing the harm caused by air pollution. Such effort could include contributing to environmental health and public health policy formulation.

In the case illustrations provided later, we consider how advocacy can work in practice. First, to help elaborate on the links between advocacy, ethics and air pollution and the role of HCPs in promoting environmental and public health in general, the following points may need to be considered:

- (1) *Inter-generational justice* recognises that historical and current greenhouse gas and particulate matter emissions will not only affect the health of individuals and communities today but impact on the well-being of future generations.
- (2) Air pollution disproportionately affects poor and vulnerable members of society. *In-country justice* translates into the collective responsibility of national and local governments, public health and regulatory bodies, and, as we suggest, HCPs, to act on behalf of those most in need (while at the same time seeking to empower them).
- (3) *Global justice* calls for an equitable approach to social and environmental accountability and policy to limit the harm caused by exposure to polluted air. Those most responsible for the emissions may not suffer the consequences of exposure; thus, high-income countries need to support low- and middle-income countries

when trying to address these issues (e.g. through innovation, technology applications, knowledge sharing and transfer).

- (4) As *advocates* for human rights, which include access to a healthy environment, HCPs can represent and empower individuals and populations most at risk from air pollution by actively engaging in the drafting or amending of public policies and/or by working with relevant local, national and international authorities and regulatory agencies.

The levels and types of (in)justice highlighted in Points 1–3 above lead one to conclude that Point 4 is an ethically appropriate response (Geiger, 2017; Ramanathan & Haines, 2016; WHO, 2016a). At the practical level of providing individual patient care, treatment for the health-related consequences of exposure to polluted air is constrained by several factors, including lack of access to care, the natural limits of medical care and the absence of meaningful clinical alternatives. Advocacy does not circumvent these limitations, but it does offer an additional course of action that benefits not only currently affected individuals and communities, but it should also help to protect future generations.

It could be argued that repeated failure to intervene contradicts well established ethical norms of minimising harm to others (Schöne-Seifert, 2014). This does not imply direct causation on the part of HCPs, who are no more responsible for causing air pollution than anybody else. Lack of willingness to intervene, on the other hand, could be viewed as indirectly contributing to these harms since clinical intervention alone is insufficient to redress air pollution-related health problems. HCPs may therefore wish to consider advocating on behalf of those who, for whatever reason, are unable to enact their own individual human right to access health care (Arneson, 2015).

In several countries there is documented evidence of instances in which HCPs have been able to influence public health and safety policies and practices. Examples include the wearing of car seat-belts, motorcyclists wearing helmets and the banning of smoking in public places (Chapman & Wakefield, 2001; Earnest, Wong, & Federico, 2010). Other public health campaigns are currently underway, such as the need to ban diesel and even petrol-powered vehicles from city centres (McGarth, 2016). While the political impetus may ultimately rest with elected governmental officials, the evidence to support the introduction of new measures is likely to be provided by researchers and HCPs. Building on precedent, HCPs can contribute to protecting the health of the public, thereby reducing the harm caused by this and other forms of pollution.

Illustrative case examples from India

In South-East Asia, the incidence of morbidity and mortality in India through long-term exposure to PM_{2.5} is particularly high. The 2015 Global Burden of Diseases study on the 25-year trends of the global burden of disease attributable to ambient air pollution ranks ambient PM_{2.5} as the fifth mortality risk factor, causing 4.2 million deaths and 103.1 million disability-adjusted life-years (DALYs). To put this in perspective, in terms of highest estimated population-weighted mean concentrations of PM_{2.5} in 2015, India ranked eight with 74.3 µg/m³ (Cohen et al., 2017).

To support our premise around advocacy, we provide two hypothetical scenarios describing common situations in India, focused on the current and ongoing impact of air pollution on health. Cases are fictionalised, based on similar, real-life scenarios. The first scenario depicts a family reliant on the public health care system, while the second scenario involves a young boy and his family with access to private health care.

Case scenario 1

'A' and her husband, who is a street vendor, live with their five children on a patch of concrete in the middle of a multi-lane highway on the outskirts of New Delhi. Motor vehicles of every description roar past on either side day and night. Overhead, heavy traffic on a concrete fly-over incessantly spews out a toxic mix of pollutants. Fumes from a nearby coal-burning power plant and municipal garbage fires burn around the clock.

At dusk, over a fire made from wood remnants, dried cow dung and plastic bottles collected by her children, A cooks the family dinner of rice with a handful of vegetables that her husband picked up from a waste depot at the local market. A has a thick, productive, hacking cough, and her sputum is streaked with blood. She has been losing weight for several months after recently being diagnosed with lung cancer, following years of exposure to exhaust and other fumes. She is an important wage-earner, which means that as a road-side construction helper, she has had long-term exposure to exhaust fumes, as well as exposure to fumes from burning bio-mass. Neither A nor her children has any means of escaping from these hazards. She worries about the future of her children and does not know what will happen when she becomes too sick to look after the family, or how well her husband would cope on his own.

When A needs to visit the public hospital for diagnosis or treatment, she must take a day off work (unpaid) and wait in line for hours to be seen by a doctor for just a few minutes. Due to the fear of wasting a day's wages, and because

A temporarily stops coughing up blood, she puts off the idea of visiting the local public hospital doctor.

This scenario is not uncommon and reflects a situation faced by many thousands of poor families in India, with New Delhi having one of the highest outdoor PM_{2.5} concentrations in the world (Cohen et al., 2017; Watts et al., 2016). Prospects for this family are bleak, and A could die within weeks because of her advanced medical condition. Furthermore, her children are unlikely to live into old age because of prolonged exposure to unremitting ambient and household air pollution. Potential solutions to this *inter-generational* problem lie with the State Government in New Delhi, as well as with national and international agencies working in conjunction with HCPs. Collectively, they need to seek solutions to curb the worst sources of pollution (Barik & Thorat, 2015), with actions and interventions aimed at addressing the issues collaboratively relating to *in-country*, *global* and ultimately *inter-generational* justice.

Importantly, this case highlights three other pressing issues: Unmet housing needs (a critical social problem impacting human health), household air pollution and the lack of ready access to a family doctor. With early intervention, A's eventual prognosis might well have been different, and of all the pollutants to which she is exposed, home cooking is perhaps the only one that is directly under her control (Kankaria, Nongkynrih, & Gupta, 2014). Even in this situation, considering her socio-economic status, A may have little option other than to burn waste materials that she and her children have collected if alternatives, such as modified cooking stoves have not been made available (Massachusetts Institute of Technology, 2017). The scale of the problem of domestic air pollution is immense, with almost 3 billion people, mostly in low to middle-income countries, still relying on solid fuels, such as wood, animal dung, charcoal, crop waste and coal being burnt inefficiently, in conjunction with highly polluting stoves for cooking and heating. In 2012 alone, 4.3 million children and adults in India died prematurely from illnesses caused by such household air pollution, according to WHO estimates (Naz, Page, & Kingsley, 2016).

Scarcity of funds and inequalities in spending on public health within Indian States need to be urgently addressed, but because reliable data collection and statistics are often not available in India, it is difficult to make detailed analyses (WHO, 2016b; Worthington, 2015). No-one will deny that clinical staff in New Delhi's public hospitals, such as the All India Institute of Medical Science, work hard, but because of resource limitations, they have very little time to spend with patients such as A. If HCPs were to lobby local and national governments and other agencies to take appropriate steps to curb pollution and improve

social housing, interventions requiring major expenditure of resources and political will might be one step closer to becoming a practical reality. It could be some time before remedial actions yield results, which may be too late for A, but such actions could benefit her children.

Case scenario 2

On 6 November 2016, two days after the Paris Agreement (arising from the 2015 COP21 Climate Change Conference) became international law, 10-year-old 'B' arrived at school in New Delhi with a handkerchief covering his nose and mouth only to find that his school was closed for three days because of severe smog caused by air pollution. The next day, the local newspaper reports that the level of $PM_{2.5}$ is $900 \mu\text{g}/\text{m}^3$, 90 times higher than the World Health Organization's safe level and 15 times higher than the Indian Government's norm. Over the past few years, B has experienced several bouts of wheezing, the most recent bout resulting in him being hospitalised for an infective exacerbation of his asthma. He is fortunate in that his family is wealthy enough to be able to take him to a nearby private hospital, where he receives immediate treatment and follow-up. Despite having access to health care, it is nonetheless likely that B will suffer exacerbations of his respiratory symptoms, especially if the smog remains. The high levels of air pollution could also affect other members of his family.

As with the first scenario, the causes of air pollution are multiple and sustained, with B's ill-health becoming increasingly serious. In terms of justice, it is probably *inter-generational justice* that is the main issue here because it the younger generations that are especially badly affected by this form of pollution. Occasionally, air pollution is severe enough to trigger the authorities to take action and temporarily close schools in an attempt to limit exposure (WHO, 2016c; Zhong & Pokharel, 2016). There are, however, no quick fixes, and in this scenario, although B's education could be interrupted in the short-term, he might well be safer temporarily staying indoors at home to avoid a recurrence of his respiratory problem.

Without urgent attempts to find solutions to pressing pollution issues, children and other vulnerable members of society could suffer long-term harm and even premature death from continued exposure to high levels of $PM_{2.5}$ (Cohen, 2017; Kassebaum et al., 2016; Naz et al., 2016). Escalating urban pollution creates an ethical imperative for government agencies, public health and regulatory bodies and HCPs to work effectively and collaborate in the best interest of individuals and communities, both now and in the future. HCPs can treat B's symptoms in the short-term, but one way to reduce the long-term adverse health effects of both ambient and household air pollution is for HCPs to advocate on behalf of 10-year-old B and others similarly affected.

Since children are especially vulnerable to air pollution (Grigg, 2016), and as the cause of B's health issues could extend to before he was born, the long-term effects of smog (as in New Delhi) are likely to affect generations to come (Yang et al., 2017). For young B, doctors and HCPs should do more than simply treat his respiratory distress when it recurs, for example, by alerting lawmakers and other HCPs to health implications of exposure to $PM_{2.5}$ above acceptable levels. Although B is from a wealthy family that has access to private health care, the damage sustained by B as an infant is already manifesting, and with continued exposure, in later life it could culminate in chronic obstructive lung disease.

Effective interventions need to be coordinated at all levels – local, regional, national and international, and HCPs are an integral to this process. Shah and Garg's (2011) article points to the need and opportunity in India for patient advocacy groups, regulatory bodies, ethics committees, NGOs and lawyers to work towards improving patient rights and protections. Where possible, this type of advocacy or 'activism' should be inter-professional and coordinated, with a common understanding of what needs to be accomplished (Geiger, 2017; Peluso, Seavey, Gonsalves, & Friedland, 2013). To illustrate this further, Table 1 expands on the categories of justice outlined in the section on HCPs, Advocacy and Ethics.

Table 1. The role of HCP advocacy in addressing various forms of justice and the health impact of air pollution.

Justice	HCP advocacy and ethical practice
<i>Intergenerational justice</i>	Improved access to health care needed in order to address long-term problems faced by poor families in India, plus environmental sustainability and stronger pollution controls to limit the number of new cases of people with breathing difficulties. Effective action by HCPs, working with government agencies and NGOs to influence policy, could limit the harms from air pollution suffered by future generations.
<i>In-country justice</i>	Working with other HCPs, lawyers, other professionals, plus local and national government agencies, HCPs could help change policy and practice, thereby limiting health problems faced by Indian and other populations, e.g. through introducing universal health coverage and empowering communities through education.
<i>Global justice</i>	By becoming part of the growing international community of concerned, engaged citizens and lobbying high-income countries (e.g. through global health agencies), HCPs can advocate on behalf of populations in countries such as India that suffer disproportionate harm from air pollution, some of which is caused by actions thousands of miles away. Such intervention may be too late for some victims of air pollution but could mitigate harm for others in the future.

Conclusions

The health ramifications of air pollution are a subject of significant global concern, and HCPs with no special interest in global health could find themselves treating patients with illnesses and disease directly linked to breathing polluted air. How best to respond in such instances is important, and while ill-judged advocacy could be worse than making no response at all, skilful advocacy and negotiation could potentially improve health outcomes, especially for disadvantaged patients. The implications of our analysis imply an educational need for HCP training, but these considerations are beyond the scope of this paper.

A medical model of treating one patient-at-a-time does not readily offer a way of dealing with situations that necessitate a broad, socially engaged response, and it may well be that not all HCPs are comfortable straying into territory that is foreign to their way of thinking and practising. Nonetheless, unless some HCPs rise to the challenge, it is difficult to imagine that anything much will change in the lives of patients such as those highlighted in our scenarios. Health promotion at the societal level is different from health promotion at the individual level, and, if advocating on behalf of vulnerable, disenfranchised and affected patients becomes part of established professional practice, there could be real change to the way that life-limiting problems such as air pollution are addressed in the future.

While the illustrative scenarios are based on personal observation and experiences in India, the problems are in no way confined to any one country, city or region, with air pollution affecting major cities all around the world (Griffiths, 2016; Krishna, 2016; McGrath, 2016; Zhong & Pokharel, 2016), including post-industrial cities such as London (Hart, 2016). Globally, city administrators need to demonstrate the political will to take tough action to protect the health and lives of citizens. We argue that HCPs have an important role to play in facilitating this change. Since air pollution can and does lead to premature deaths, doing nothing other than minimising the symptoms of those patients who have access to health care services is no longer sufficient. While broader issues of health security due to climate change merit separate public policy consideration, in the case of limiting the toxic effects of air pollution, HCPs are well-placed to be able to make an effective contribution.

Globally, problems surrounding air pollution present an urgent challenge, and like India, many countries have a long way to go in terms of developing effective policies to mitigate the effects of air pollution. We hope that as the Indian government and public bodies respond to the growing crisis of polluted air, professional bodies will issue guidelines acknowledging the role of HCPs

in advocating on behalf of populations and individuals. Impetus for change does not only need to come from the top. Individual and/or collective action can also be effective in bringing about change in limiting the harms caused by air pollution, and HCPs have a vital role to play in this plan.

Disclosure statement

No potential conflict of interest was reported by the authors.

Notes on contributors

Roger P Worthington works independently as a medical educator and advisor on ethics, professionalism and global health. He lectures internationally in countries such as India, Australia, New Zealand and the USA and is a former Assistant (adjunct) Professor of Medicine at Yale University.

Michelle McLean is a medical educator with the role of Academic Lead for Problem-based Learning at Bond University, Australia. She is also involved in the global health aspects of the undergraduate medical curriculum, including climate change and sustainable health care.

Neelam Doshi is a clinical microbiologist who has been trained in India, U.K and Australia. She is an associate professor in Pathology and constantly looks for innovative ways to deliver clinical pathology. Being born in India has allowed Neelam to provide personal accounts of the detrimental health effects of pollution and lack of access to health care.

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