Coal mining, social injustice and health: A universal conflict of power and priorities

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Abstract

Given the current insatiable demand for coal to build and fuel the world's burgeoning cities the debate about mining-related social, environmental and health injustices remains eminently salient. Furthermore, the core issues appear universally consistent. This paper combines the theoretical base for defining these injustices with reports in the international health literature about the impact of coal mining on local communities. It explores and analyses mechanisms of coal mining related injustice, conflicting priorities and power asymmetries between political and industry interests versus inhabitants of mining communities, and asks what would be required for considerations of health to take precedence over wealth.

Keywords: Coal, Mining, Health, Social injustice, Environmental injustice

1. Introduction

Throughout modern history coal has played a key role in human development, powering the industrial revolution and, more recently, globalisation. Although coal is increasingly being replaced by alternate energy sources such as natural gas, nuclear, wind and hydroelectric power, the perceived low cost of coal has resulted in it remaining a dominant source of power. It has contributed to the development and ongoing advancement of an astonishing array of technologies that shape the way we live, work and play. These technologies exert extensive influence over many aspects of our lives: what we eat, the manner and speed with which we access information and communicate, and the way we move from one location to another. Even the steady increases in human longevity over the past century or so are largely attributable to advances enabled by coal power. But, inevitably, there is a downside. The negative effects of our use of coal are primarily manifested in environmental damage and detriments to health and well-being, not only for those who work in the industry but also for people living in proximity to coal mines and/or coal combustion facilities.

With the surge in demand for coal in recent years, the mining-related health and well-being of local communities in many countries has become increasingly politicised and contested. This is due to the competing priorities between health and social justice versus a profitable mining sector and robust economic growth. However the surge in demand for coal has been predicted to have peaked, and recent reports have forecast an end to the coal mining boom within two years for some countries such as Australia (Heinberg and Fridley, 2010; Mohr and Evans, 2009). Despite these predictions, the current scale of coal mining activity makes the expansion of research into its health and social impacts critical regardless of whether or not the trend is towards a boom or a decline. Even in countries with no local mining industry, the perceived need for coal to power escalating urbanisation and technologies ensures that few nations are immune to the negative environmental, health and social impacts of coal extraction, combustion, and their by-products. Hence, given the demand for coal to build and fuel the world’s burgeoning urbanisation, and our increasingly automated labour practices and lifestyles, the age old debate about social injustices and health harms associated with mining is as relevant, or even more so, than ever. Further, despite marked differences in national resources and political systems, the core issues appear universally consistent.

These issues include environmental impacts, such as permanent scarring of landscapes, soil degradation and the depletion of habitat and biodiversity, and the less direct but nonetheless serious harms such as the excessive generation of greenhouse gases from coal combustion. For example, in 2005 coal contributed 25% of global energy consumption, but 41% of carbon dioxide emissions (Epstein et al., 2011). Epstein and colleagues propose that all stages of the life cycle of coal pose potential risks to human health and well-being, and this is well supported by other researchers and analysts. For example, with regard to air pollution...
Oder and Vigil (2009) claim that all major open-cast mining operations produce dust from blasting, drilling, loading/unloading and transporting. Coal washeries can create further dust exposure and the heavy machinery required in mining generally uses industrial diesel fuels and may contribute to noise pollution in addition to producing harmful fumes. Coal burning generates a variety of pollutants; depending on the composition of the coal and the precautions taken to control emissions. Emissions include heavy metals, potential carcinogens such as poly-aromatic hydrocarbons, sulphur dioxide and nitrous oxides which can cause respiratory illnesses. These and other pollutants may migrate considerable distances, which is evidenced by the identification of coal burning in Europe and North America from 1860 onwards as likely sources of heavy metal deposits of thallium, cadmium and lead from a Greenland ice core (McConnel and Edwards, 2008).

Stored coal combustion waste products (fly ash) can pose serious health hazards if leakages occur. Additional health risks may accrue from the use of coal combustion by-products in building materials and Castleden et al. (2011) report serious secondary health impacts such as death and injury associated with coal transport vehicles.

This paper considers fundamental social injustices associated with mining, their implications for the health of local communities, and the tension between health and economic gain that resonate across resource and political contexts regardless of national culture, geographical location or stage of economic development. To achieve this, it draws on (i) the theoretical base for defining and understanding these injustices and their linkages, and (ii) published reports in the international social and health literature about the impact of coal mining on local communities. It explores the mechanisms of coal mining related injustice, conflicting priorities and power asymmetries between political and industry interests versus inhabitants of mining communities, and asks what would be required for considerations of health to take precedence over wealth.

The impetus for the paper came from a commissioned report developed by the authors and colleagues entitled ‘Health and Social Harms of Coal Mining in Local Communities: Spotlight on the Hunter Valley’ (Colaghiuri et al., in press). In the course of preparing the report and this paper, we noted the surprisingly small pool of international literature focusing directly on the theory of social injustice and health offer a limited understanding of the actual status of the health of an individual or community (Ruger, 2009). Nonetheless, these perceptions are invaluable and should be taken into account, including in the precautionary principal to avoid and avert harming individuals and communities (Higginsbotham et al., 2010). This approach is similar to the approach Amartya Sen (2009) takes to defining social injustice. By emphasising the role that society's perception of social injustice plays on the experience of social injustice, it is understood that perceptions can be performative and therefore both reflect and shape reality.

There is no single definition of social injustice. Political philosopher John Rawls offered the foundation for a contemporary understanding of social justice with the notion of ‘justice as fairness’ (Rawls, 1999). This concept provides the building blocks for society to determine the principles of justice. Rawl’s system for building social justice is extended by Sen with the assertion that social justice not only has to take place according to the principals of justice, but it also needs to be ‘seen’ to take place (Sen, 2009). This approach emphasises the role of public perception in determining social justice, and offers a platform from which to reconcile perceived injustices and objectively determined injustice. The role of perceiving an injustice is similar to how perceived health problems are ‘real’ in a performative sense. That is, the anxiety of fearing health implications can create ill health.

There is ample literature about social justice, and social justice and health have been approached together by Gostin (2007) with discussions of how distributive and participatory just should be key values of public health. However, as noted by Bufacchi (2012), there has been surprising little research undertaken on the concept of social injustice. Rather, social justice is commonly the focus of study and has ‘attracted more attention than any other single concept in moral and political philosophy over the past 50 years’ (Bufacchi, 2012). This implies that social injustice is simply understood as the opposite of social justice, which offers a limited understanding of precisely what constitutes an injustice in the societal context. Although the two concepts are inextricably linked, the focus on social justice leads to abstract discussions of what constitutes the ‘best’ society, in which there is very little consensus, whereas social injustice is a tool with which to achieve social justice through the elimination of a real world phenomenon. Social justice can then be approached as the ‘absence of social injustice’ (Bufacchi, 2012). This paper perceives social injustice as ‘the unequal or unfair social distribution of rewards, burdens, and opportunities for optimising life chances and outcomes’ (Colaghiuri et al., in press). It echoes Bufacchi’s understanding of social injustice and is mindful of the precautionary principle i.e. that social injustice is not necessarily inflicted solely by abusive actors, but also by complacent authorities who fail to act when they are in a position to avert or prevent harm (Venkatapuram et al., 2010).

2. Defining health and social injustice

In the constitution of the World Health Organisation (WHO) health is defined as ‘a state of complete physical, mental, and social well-being and not merely the absence of disease’. This definition conceptualises health as a positive combination of physical, mental and spiritual health. As noted by Rapport and Mergler (2004), traditionally human health is viewed in terms of the individual without evaluating the social and environmental context around it. This understanding of health is limited in its ability to explore the interrelationships between the natural environment and human health. A different paradigm for understanding health, called ‘ecosystem health’, has emerged to re-imagine the approach to human health by expanding the focus of health beyond the individual. The beginnings of this approach were in the early 1960s, when researchers such as Rachael Carson and Murray Bookchin started to explore the connections between toxic chemicals and the health of humans and the environment (Albrecht et al., 2008). Insights arising from the ecosystem health approach are important for understanding the health impacts of coal mining activity on local communities because they emphasise the adverse impacts that even small changes to the natural environment can have on human health. Ecosystem health also focuses on establishing a healthy environment in order to prevent ill health, rather than focusing on disease states in isolation.

Despite recent developments in understanding health in relation to place, health systems around the globe, often wryly referred to as ‘sick systems’, tend to focus almost exclusively on quantifiable pathological states which are mostly of physical manifestation and, to a much lesser extent, mental ill health. In doing so, ‘sick systems’ fail to acknowledge the full spectrum of threats and harms to health as defined by the WHO. Furthermore, health harms may be (i) real and perceived, (ii) real but not perceived or (iii) perceived but not real. Certainly, perceptions of health offer a limited understanding of the actual status of the health of an individual or community (Ruger, 2009). Nonetheless, these perceptions are invaluable and should be taken into account, including in the precautionary principal to avoid and avert harming individuals and communities (Higginsbotham et al., 2010). This approach is similar to the approach Amartya Sen (2009) takes to defining social injustice. By emphasising the role that society's perception of social injustice plays on the experience of social injustice, it is understood that perceptions can be performative and therefore both reflect and shape reality.

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3. The nature of coal-mining related injustices

Mining companies and their advocates have been quick to point out that they are sensitive and responsive to their impacts on local communities, and that corporate social responsibility has become an integral aspect of their business model (Brereton and Forbes, 2004). Furthermore, they claim an implicit ‘social licence to operate’ that is unofficially granted by local communities and serves as a ‘checks and balance’ system to ensure a good relationship between the mining industry and local communities. This rhetoric belies (i) the deep sense of community frustration articulated in anecdotal reports about the impacts of coal mining and (ii) published scholarly opinion and the research evidence about coal mining and social injustices. Examples of these injustices include water quality and human occupations, health harms and air pollution, asymmetries of power and control, cost inequalities, and socio-demographic effects.

3.1. Water quality and human occupations

In this context, Blakeney and Marshall (2009) define ‘occupation’ as all human activities not just employment. From their qualitative study in a mining community in Kentucky, USA, these authors proposed three key themes of (i) occupational injustice/occupational deprivation, (ii) occupational imbalance and (iii) occupational alienation. This indicates that local residents experienced occupational injustice in a multifaceted way. Their findings included:

- garden produce rendered unsafe for human consumption due to irrigation with contaminated water,
- reduced ability to gain income by growing and selling local produce,
- restrictions on outdoor activities including loss of recreational options such as swimming,
- unpleasant odour and dingy appearance of clothes washed in the local water supply occasioning discomfort, inconvenience and embarrassment,
- the need to plan water use e.g. visit relatives/friends with a cleaner water supply for cooking water,
- the imperative to use water filters and the time and effort required to maintain these,
- the imperative to buy bottled water and the associated additional costs and
- restrictions to facilities and everyday habits that most Americans take for granted.

Aspects of these findings are reflected in a study of two mining communities in Russia by Walker et al. (2006) who reported residents concerns about water contamination from mining and the restrictions this imposed on activities such as swimming and fishing.

3.2. Health harms and air pollution

Health harms associated with coal mining from an occupational perspective have long been recognised. However, there is also a body of evidence in the peer-reviewed health literature that deals with the health repercussions of coal mining and combustion in coal-fired power stations for people living in communities adjacent to coal mining. The majority of these studies revolve around particulate matter and toxins contained in air pollution. They provide evidence from a wide geographical and economic spectrum ranging from high income countries such as the USA, Canada, the UK and Australia to emerging economies such as China, Russia and India. Additionally, there are several studies from Israel, Poland, Croatia, Thailand and Turkey detailing the health impacts of mining.

A selection of the available literature has been reviewed and collated by Colagiuri et al. (in press) as part of a broader report on the health and social harms attributable to coal mining and combusting activity. A paper on the same topic is also currently in preparation for submission to a peer-reviewed health journal. These reports detail a litany of negative health effects from minor respiratory complaints through to birth defects and miscarriages, cancers, heart and kidney diseases and excess deaths. For example, among other impacts, some studies found elevated levels of heavy metals in children living near coal mines (Yapici et al., 2006), and people living near coal fired power stations were shown to have increased rates of non-melanoma skin cancers (Pesch et al., 2002). The nature and intensity of these impacts may vary according to national differences in mining methods and/or volume of coal extracted. Research undertaken on the Appalachian coal mining region of Kentucky, USA, indicates that mountain-top mining has a worse effect on the health of local communities than of non-mountain top mining (Esch and Hendryx, 2011). It is also possible that local/national regulation, or lack thereof, around the operation of coal mines and coal-fired power stations may play a significant role in mitigating or worsening potential health harms.

Aside from two studies reporting reduced quality of life (Zullig and Hendryx, 2011,2010), the literature on the health harms of coal mining and combusting reviewed by Colagiuri et al. (in press) concentrated almost exclusively on manifestations of physical rather than mental ill health. However, the connection between the environment and human mental health has long been acknowledged. More recently, psychological distress associated with adverse environmental change has been encapsulated by Albrecht (2005), in the term ‘solastalgia’. Albrecht uses this concept to describe the feelings of powerlessness and homesickness that can result from damage, destruction or loss of ‘place’. This phenomenon has been reported in mining communities by Higginbotham et al. (2006) and Connor et al. (2004).

A few studies cited in the review by Colagiuri and colleagues showed no difference in respiratory symptoms in children living in coal mining communities versus non-mining areas (Pless-Mulloli et al., 2001,2000). Despite this and certain methodological difficulties – particularly in relation to measuring exposure to air pollutants – coal mining and coal-fired power station have been shown to cause serious health harms for people living in surrounding communities. This evidence comes largely from cross sectional and retrospective research and there is a pressing need for rigorous prospective studies to precisely quantify the health effects of coal mining and processing in local communities. This is especially important because some of the available studies show a ‘dose response’ i.e. the negative health effect is amplified in those community members living closest to the mines or coal fired power stations (see for example Liao et al., 2010; García-Pérez et al., 2009). However, such prospective studies are uncommon and their absence, of itself, can be seen to represent health injustice.

3.3. Asymmetries of power and control

The concept of environmental injustice is important for understanding the connections between the environment, social injustice, and health and related asymmetries of power and control. Environmental injustice refers to the phenomenon of the poor and most disadvantaged in society disproportionately suffering the negative health consequences of hazardous environments (Brulle and Pellow, 2006). For example, a study by Pastor et al. (2001) argued that toxic sites were systematically put into disadvantaged communities, thus
demonstrating the role of socio-political powerlessness as a determinant of health disparities in a population.

In analysing the power relationships between local communities and the coal mining industry, Connor and colleagues invoke sociologist Bourdieu’s concepts of ‘capital’ to explain the relationships of power between local communities and the mining industry (Connor et al., 2009). They illustrate the structural disadvantage of local communities compared to mining companies in the ability to possess and utilise political capital, pointing out that the coal mining industry’s control over knowledge and access to resources gives it greater political capital. These authors remind us that local communities are meant to exercise institutional control over local government, yet this power is overridden by the disproportionately high political capital obtained by the mining industry (Connor et al., 2009). For example, in at least one state in Australia, changes to state planning laws have removed local government representation from the planning and approval processes for coal mining proposals thereby giving greater authority to the state government (Higginbotham et al., 2010). This has distanced local communities from mining approval processes and effectively removed the primary institutional avenue for local communities to oppose new coal-mining projects. Furthermore, it calls to question mining proponents’ argument that the mining industry has an implicit social licence to operate.

There have also been anecdotal reports of academic institutions having conflicts of interest with regard to the mining industry, with anecdotal claims that this has resulted in research being skewed in favour of the mining industry (Cleary, 2012; Downie, 2006). The extent and verity of these claims of a link between the funding of academic institutions and/or their research projects and mining industry interests is unclear and requires systematic and objective appraisal before conclusions can be drawn.

3.4. Cost inequities

Instances of financial injustice abound in the international literature about coal mining. For example, Blakeney and Marshall (2009) noted that in one mining area of Kentucky, USA, a number of coal slurry spills have occasioned loss of life and homes. In the year 2000 one such spill released 300 million gallons of slurry, causing the contamination of 27,000 homes and the local water supply. The outcome of the spill was a USD 5,500 fine for the party responsible for the damage. The disproportionate outcome of the spill, with large scale environmental damage resulting in an insignificant fine for the perpetrator, is a clear indication of both environmental and economic injustice. In another example, this time from England, Riva et al. (2011) reported that some areas in which they studied coalfield effects and socio-demographics had undergone specific environmental regeneration programmes. These were mainly funded by government and delivered through both public and private schemes, illustrating the issue of additional public costs resulting from but not borne by the coal industry.

Nor is the financial toll of the negative health effects of coal mining to society borne by the industry or usually included in assessments of the cost of coal mining and combustion. This is because health effects are negative ‘externalities’ of coal mining, and are excluded from the market price of coal generated electricity. However, there have been attempts by researchers to put a monetary figure on these negative externalities. One such estimate states that the health cost of using coal as an energy source is AUD 2.6 billion per year (ATSE, 2009). Further analysis by these authors puts the combined environmental and health costs of black coal, as an energy source, at AUD 42 per megawatt-hour. These figures were based on the European Union’s ExternE and New Energy Externalities Development for Sustainability (NEEDS) projects’ estimations of the cost of externalities in Europe.

Further, despite industry claims of huge national economic gain accruing from the mining industry, it appears that around 80% of the profits from Australian mining do not remain in Australia (Richardson and Denniss, 2011). The authors, a group of economists, estimate that over the next 10 years mining will produce pre-tax profits of around AUD 600 billion. However the majority, approximately AUD 500 billion, of this will go to foreign owners and investors. They also point out that that the corporate taxes paid by the mining industry in the 2008–2009 financial period averaged 13.9%, which is far less than the national 30% personal tax burden carried by the average Australian worker. The same authors further note that the Australian government allocates substantial taxpayer-funded subsidies to the mining industry. This effect has been echoed by Rosewarne and Connor (2012), who claim that direct subsidies to the coal mining industry in Australia include an AUD 2 billion per year tax rebate on diesel fuel used in mining processes. This particular subsidy equates to AUD 87 per Australian per year. These figures reflect the often hidden monetary costs of coal mining, over and above the social and health costs incurred. Rosewarne and Connor (2012) also point to the fact that the coal mining industry contributes approximately 1.8% of GDP. These estimates serve to illustrate that the cost burden of coal mining falls disproportionately on society, while the bulk of the benefits accrue largely to the industry owners, executives, and investors.

3.5. Socio-demographic effects

The vast majority of mining industry-sponsored reports on coal mining over-emphasise perceived economic benefits and ignore negative social consequences. In one exception to this, Lockie et al. (2009) undertook two social impact assessments which were funded by a mining company, and were approximately five and nine years following the start of coal mining in a community in central Queensland, Australia. The issues examined included demographic changes, housing, social integration, traffic and fatigue, business opportunities and constraints, cultural heritage, and opportunities for indigenous people.

The first analysis in 2003 found that many of the mining-related social impacts revolved around failure by the community to capture positive benefits, in particular economic benefits. Compounding this, rapid demographic and social changes occurred which undermined the ability of the community to generate alternative economic and cultural capital to assist in enduring future mining sector downturns. The cumulative impact of multiple mine expansions and developments from 2003 to 2006 saw the magnification of these issues and the emergence of several acute social impacts. These impacts included severe shortages of skilled labour in other industries, reduced access to affordable accommodation, increased road traffic and fatigue-related road accidents, increased pressure on emergency services (particularly those provided by volunteers), and increases in criminal and other anti-social behaviours. The increase in anti-social behaviour between the two studies appeared to be linked to the declining density of acquaintanceship and informal surveillance associated with population growth. The most apparent effect was the exponential growth in the temporary resident population between 2003 and 2006. The report also noted the progressive masculinisation of the permanent resident population and that a large and demographically unbalanced mobile population diminished attractiveness of the area as a residential location for women and families (Lockie et al., 2009).
4. Mechanisms of social injustice

The strongest themes arising from the literature we reviewed were (i) the unequal hold on political and institutional power of mining companies compared with coal mining affected communities, (ii) mining industry’s control over natural and financial resources, and (iii) the mining industry’s superior resources and capacity to control and broker information compared with the resources and capacity of local mining-affected communities. These three elements are each capable of generating social injustices in their own right but their greatest strength lies in their ability to reinforce one another thus making power and priority the central mechanism underpinning coal mining related social injustice.

The concept of the ‘resource curse’ captures the universality of this contestation. The term ‘resource curse’ describes the negative effect that natural resources can have on societies as exemplified by the low economic growth rates often found in areas that have an abundance of natural resources (Bulte et al., 2005). Although the specific causality is not fully known, the concept signifies that extracting natural resources for economic gain involves a complex process and has surprisingly negative impacts including correlations between natural resource extraction and health issues such as respiratory illnesses and clusters of heart disease (Saha et al., 2011). From the literature we reviewed we also draw a link between resources and inequalities among communities, such a pollution and changes to place, and propose that the ‘resource curse’ is a mechanism that can be extended to capture non-economic repercussions natural resource abundance such as social injustices associated with mining.

5. Discussion

The available literature on coal mining and coal combustion in power stations presents multiple and varied incidences of social injustices from both developed and developing countries, many of which are likely to have intergenerational flow-ons (Higginbotham et al., 2010).

The tension between the repercussions of these injustices versus the economic benefits of coal mining are reflected in the literature from a wide range of countries at virtually all stages on the economic development scale. A universal conflict of power and priorities is evident and is arguably a direct function of contemporary society’s use of coal power as a base for the expansion of economic growth. This conflict includes contestation over fundamentals such as water rights and land use (Connor et al., 2008); the unfair cost burden imposed on local communities and society at large by the mining industry but not borne by it (Blakeney and Marshall, 2009); and the failure of authorities to exercise the precautionary principle (Higginbotham et al., 2010). These and other examples of social, environmental and health injustices cited in the available literature are underpinned by the central mechanism of power, which is manifested in a variety of ways.

Our knowledge of health impacts and social injustices associated with mining is often overshadowed by the politically charged context of competing priorities (Higginbotham et al., 2010). It appears that the available evidence is not being taken into consideration in public debate about the impact of mining on local communities. In order to resolve this issue the heavily polarised ‘pro-mining’ and ‘anti-mining’ debate needs to be transcended. Furthermore, the rising awareness of climate change has led to a greater understanding of the impact that changes to the environment have on human health, but this knowledge has not yet translated into action to curb mining. This disconnect between what we know and what we do at both national and global levels is further fuelled by the lack of systematically derived, objective evidence, from current, well designed prospective studies to describe and quantify the health harms and the cost of the negative externalities of coal mining and combustion to society.

Our findings are consistent with recognition of the immense impact the environment has on human health, which offers a critical access point for determining how mining affects local communities. In particular, our findings fit with the current theoretical base for understanding health and social injustice e.g. with theories of health (Ruger, 2009; Rapport and Mergler, 2004; World Health Organisation, 2012) and social justice (Bufacchi, 2012; Venkatapuram et al., 2010; Sen, 2009; Gostin, 2007; Rawls, 1999). However, given the extent of coal mining in a multitude of countries around the world, the body of literature describing and analysing actual instances of social injustice is relatively small. The literature on the health harms of mining is a little more comprehensive but suffers from inherent difficulties in designing studies capable of clearly attributing cause and effect, and persistent difficulties in measuring exposures accurately and consistently (Colagiuri et al., in press). Further, the health, environmental and social disciplines have traditionally been siloed and have few mechanisms for jointly debating such issues, much less jointly researching them.

The mining industry and its proponents are far more advanced and better equipped in their capacity to develop, document and disseminate their case for continued and expanded mining programs than their counterparts in local communities or the professional and academic health and social sciences community. Consequently, there is pressing need for health, environmental and social researchers to conduct well designed quantitative and qualitative studies, both within and across disciplines, to provide evidence on which rational public debate on the health and social implications of coal mining can be based.

6. Conclusion

The literature leaves little doubt that environmental and social injustice in relation to coal mining and coal combustion in coal fired power stations exist and are closely linked to each other, and to negative health impacts.

Mainstream scientific knowledge of the health impacts and injustices imposed on local communities by changes to physical and social environments is fragmented as a function of differences in the philosophical and methodological boundaries built into the ‘intellectual DNA’ of the social, environmental and health disciplines. This serves to strengthen the ability of mining advocates to pursue their interests since the mechanism for how adverse social and environmental changes impact upon health are not easily captured and recognised.

In order to assess the cumulative impact of coal mining on the physical, mental and social health of surrounding communities it is necessary to overcome the lacuna between these disciplines. Only then can the full costs of the coal industry to society be described and made available to inform public debate and policy about what should take priority: human and environmental health, or economic gain.

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