

Systematic literature review and assessment
of the potential psycho-social and mental health impacts
of the proposed reopening of the Rocky Hill Coal Mine
on residents of Gloucester and surrounding areas

Submission prepared by

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Rocky Hill Coal Project - SSD 5156

Declaration of Interests

As the author of this submission, I declare that I have no conflict of interest with the Rocky Hill Mine Project – SSD 5156 and will not be directly affected financially or otherwise should it proceed or be refused. I offer my expertise voluntarily with no financial gain.

I acknowledge input from Ms Rosemary Elkins, postgraduate student at the Crawford School of Public Policy, Australian National University, and Dr Catherine Baldwin, Health Impact Assessment Specialist from the United Kingdom.

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1 Background to this Submission

Gloucester, NSW, is predominantly an agricultural community that has had multiple experiences with the rise and decline of resource extraction industries throughout its history. This started with large-scale forestry, and was followed by the development, operation and wind-down of three coalmining operations. For the past decade, residents of Gloucester and surrounding communities experienced planning and preparations for a significant coal seam gas mining (CSG) initiative. Community members viewed each wave of extractive industry differently; some in strong support, some in fierce opposition.

The current project proposal, Rocky Hill Coal Project SSD5156, was initially submitted in 2012-2013 and resurfaced in 2016, with the aim of commencing coal mining operations at Rocky Hill. During 2012-2013, the proponent, Gloucester Resources Limited (GRL), commissioned a Community Perception Survey that was carried out by Key Insights Pty Ltd, and forms part of the initial submission.

It is important to note that between 2012 and 2016, community life in Gloucester was highly impacted by differing views and activities around support versus opposition to the recent, prolonged CSG mining preparation activities. This proposal involved the planning, preparation and finally exploratory drilling for coal seam gas by the large energy supplier, AGL. Seismic testing followed by exploration drilling and hydraulic fracturing occurred up to 2015, causing significant distress among some directly affected residents and heightening broader opposition. Some community members both in favour of and against the proposal expressed sadness at the perceived division across Gloucester community and valley.

In February 2016, a final decision was made by AGL **not** to proceed with CSG production; reportedly this decision was based solely on the lack of commercial viability of the extractable deposits in the identified areas. The psycho-social and mental health impacts of this decision on those who had supported the proposal and those who actively participated in efforts to stop it has not been independently documented.

Only months after this decision, Gloucester residents were informed that Gloucester Resources Limited submitted a revised EIS and response to submissions from 2012 in effort to revive the previously dormant, Rocky Hill Coal Project proposal. The proposed mine, should it go ahead, would be located within 900meters to 2 kms of the Forbesdale Estate, and within 2.5km of Thunderbolt and Avon River Estates and some homes along Buckets Way, and 3.5 to 7 kms southeast of the main township of Gloucester.

The author of this review has many years of experience in conducting research on psychosocial and mental health and wellbeing, including a small qualitative study on CSG mining in Gloucester in 2015. Some concerns identified in the CSG study are also relevant to the Rocky Hill Coal Project proposal. The author was therefore requested by some Gloucester residents to prepare a submission focusing on potential impacts of the proposed Rocky Hill Mine on psycho-social wellbeing and mental health in the community.

Because of time and resource limitations, this submission is limited to providing a broader background perspective based on peer-reviewed publications from research on the mental

and social health impacts of coal mining that may be relevant to the proposal and Environmental Impact Statement submitted by GRL. Particularly relevant is the Community Perceptions survey report by Key Insights Pty Ltd on behalf of GRL in 2012.

This report summarises and synthesises this information into a critical assessment of the likelihood and intensity of impact that the proposed mine may have on the social fabric of Gloucester and surrounding communities, and subsequently, on the mental health and psycho-social wellbeing of resident populations should it be allowed to proceed.

To reduce the potential for bias in the selection of literature in either direction of favouring or opposing the mine, a systematic literature searching process using a set of identified keywords was adopted.

As there is a serious absence of rigorously conducted quantitative research reported in this literature, a synthesis of the mostly qualitative research was performed using the secondary (already published) data. The synthesis process, like a quantitative meta-analysis, seeks to produce evidence-based generalized understandings that emerge consistently across settings, and also to understand the nuances arising in specific settings and with different study objectives and methodologies.

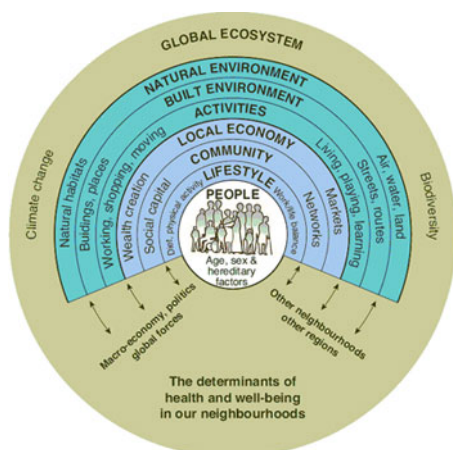
In all qualitative work, the researcher/author becomes engaged in the material seeking an understanding, or theory, that is most consistent with the data and applicable to answering related questions. This interpretation process inevitably brings in the perspectives and worldviews of the author. In this case, the author's standpoint comes from a deep commitment to principles of public and environmental health which include recognition:

- That, as adopted by the World Health Organisation, 'health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity'¹ and deserves primacy in local and state development decisions.
- That good health depends on a living and working environment that enables people to meet their basic needs for physical, mental and social wellbeing across their lifespan, including a sense of justice, fairness, future security and equity for those who are disadvantaged.
- That responsible planning decisions must facilitate community voice and aspirations and deliver health protection and environmental justice, protecting equitable access to healthy and secure environment².

These concepts are illustrated in Figure 1.

1. World Health Organisation (WHO), 1946, **Constitution of the WHO**, Reprinted in: Basic documents, 41st
2. Environmental Defenders Office (Victoria) Ltd. Environmental Justice Project Final Report, 2012, https://envirojustice.org.au/downloads/files/law_reform/edo_vic_environmental_justice_report.pdf

Figure 1.



Basic Human Needs for Good Health include:

- *Clean air, protected from harmful pollutants*
- *Secure supply of safe and sufficient water*
- *Secure supply of nutritious, safe & affordable food*
- *Stable and safe climate*
- *Meaningful livelihood/activities contributing to positive futures*
- *Resilient and cohesive communities*
- *Health and social services with resources and staff capable of responding effectively to arising need.*

2 Methodology

2.1 Systematic Literature Review

While time did not permit a fully comprehensive literature review, direct fieldwork or exploration of all potential social and mental health impacts associated with coal mining, a systematic process was used to obtain a representative set of peer reviewed publications on the topic. Emphasis was placed on social impacts that are known to influence psycho-social and emotional wellbeing and mental health. While previous literature reviews were carefully considered, emphasis was given to publications reporting research findings (rather than review and commentary) on coal mining, particularly in Queensland and NSW, and in rural rather than remote areas. Papers describing socio-economic influences were not examined unless other aspects of wellbeing, e.g. equity, were considered. Furthermore, publications, reports and books in the ‘grey’ literature rather than academic journals, were also excluded.

2.2 Databases, search words and identification of papers for inclusion

In October 2016, the databases Scopus and PubMed were used to search the published literature because they are the broadest and most sensitive electronic databases for identifying papers related to public and environmental health. Two primary search terms, coal and coal min* (which identified both coal mining and coal mines) were used in title, abstract and keyword searches of published articles in journals included in the Scopus database. Secondary search words included human health, mental health, social health, then wellbeing, psycho-social and empowerment. Coal (and then coal min*) AND each of these terms individually:

- health (Scopus 7,390 papers; Pubmed 1,346)
- human health (Scopus 3,533 papers; Pubmed 1,099)
- mental health (Scopus 103 papers; Pubmed 35)

Each title of the 103 papers on coal and mental health was examined to determine their relevance to community mental health in the coal mining context. Of these, 32 papers were entirely irrelevant, 56 papers were excluded because they focused in occupational issues, e.g. mental health among coal miners, and/or mining disasters. A small number of publications set in cultural contexts very different from Gloucester (i.e. China, Inuit communities) and two papers published prior to 2000 were also excluded. This resulted in 14 papers for inclusion in this review.

Further searches were performed with keywords coal min* (which prevented identification of papers that used 'coal' in a non-literal context) AND individually:

- social health (490 papers; 364 from 2000 to present)

Of the 364, 25 were considered relevant from a title and/or abstract review. Of these 25, 14 were duplicates with coal min* and mental health, and 11 were unique. None of the following searches added further to the collection:

- wellbeing (25 papers; one new identification)
- psychosocial (19 papers; no new identifications)
- empowerment (26 papers, no new identifications)

A total of 35 papers (14 arising with mental health as a secondary search word plus an additional 11 uniquely arising with social health as a secondary search word) appeared to specifically address social and mental health impacts of coal mining, either directly or indirectly.

A small number of additional resources, including a recent systematic review (**McTaggart et al., 2016; Reference 41**), were included as evidence in this report because they addressed important aspects potentially related to psycho-social and mental health impacts of coal mining but not generated directly through identified search words. These were identified through recommendations during searches or publication references lists. Reasons for this included non-coal specific mining or topics of investigation not perceived by the author to be related to wellbeing or mental health. Abstracts of all papers used are found in Appendix 1.

These papers were analysed and their findings reported here as a narrative exploration of how different research across community settings have contributed knowledge to our understanding of the impacts of coal mines on community life. A pre-identified three-layered structure, modified as the review progressed, is used to structure the narrative and is based on:

- Potential impact on mental health and psycho-social wellbeing of individuals and families directly affected by the operations;
- Potential impact on social capital and community resilience and the meaning of resistance within communities; and
- Potential impacts on wellbeing associated with changes in socioeconomic status, environmental justice and equity.

As the net and long-term economic benefits of coal mining at local, state and national level are contested, studies specifically reporting on economic gains or losses alone are excluded. These may not inform long-term outcomes, or even medium-term outcomes if net losses to externalities are not fully included. These externalities include health and mental health impacts, perceived environmental injustice as well as opportunity costs to continuing agriculture, tourism and other industries (**Epstein et al., 2011; Reference 15; Morrice and Colagiuri, 2013; Reference 9; see also Chen and Randall, 2013; Reference 37** in the CSG context).

Finally, assessment of the relevance and likelihood of Gloucester residents experiencing negative mental health impacts was conducted, distilling the findings of the three lines of evidence in relation to local circumstances. Some evidence regarding causal pathways of anxiety and depression in light of these are briefly mentioned.

2.3 Limitations of this Review

This review has a number of limitations: the use of code words to represent complex, multifactorial phenomena such as social health and mental health limits retrieval of publications addressing some important issues; the scope did not include references solely examining socio-economic impacts without considering the social health consequences; only two databases were searched; and issues impacting specifically on Aboriginal people were not discussed as no publications were generated from the search terms used. Finally the literature itself is lacking in studies using direct empirical measurements of mental and social health impacts of coal mining.

3. Literature Findings

3.1 Overview of the state of evidence on the mental and social health impacts of coal mining

Mactaggart et al. (2016; Reference 41) recently published a systematic review of 16 selected publications from the broader literature on mining activity in rural communities of high income countries. It covers both direct and indirect health and wellbeing outcomes and all types of mining and identifies similar outcomes of concern. Because this is of significant benefit to the assessment of the Rocky Hill Project proposal, it is strongly advised that this paper is directly scrutinised alongside this report and other submissions in assessing community risks.

The literature search for this review suggested that, despite a larger body of research and publications addressing health and coal mining/coal mines (on the order of several thousand papers), only a small number focus directly on social and/or mental health of affected communities.

Interestingly, 32 of 103 papers identified with secondary code word 'mental health' used the word 'coal' in other ways such as 'at the coal face' (a common term used by those working directly with people experiencing mental health challenges); 'canary in the coal mine' and 'the coal mine of social adversity'³. This may be taken to suggest a long history of negative health and social experiences of coal mining among service providers.

Of those addressing mental health, only 35 papers focused on community residents of a coal mining area, compared to 56 addressing occupational health and safety aspects of coal mining, including the consequences of mining disasters.

Among these 35, a small but growing evidence base on the potential social and health impacts of coal mining to communities has accumulated as a result of research studies, particularly in the Hunter Valley in NSW and in some parts of Queensland. Most of these studies are relatively recent and may be highly relevant to Gloucester's situation. However, among those identified, only a small number directly investigate potential mental health impacts of a coal mine proceeding and none provide quantitative assessments. One very recent study in a coal seam gas mining and farming context (**Morgan et al., 2016; Reference 38**) offers methods that could be adapted to directly quantify levels of stress associated with coal mining and estimate their contribution to the overall burden of mental health.

³ Halfon N. (2016). More precisely targeting the coal mine of social adversity. *JAMA Pediatr.* Published online September 06, 2016e162523. doi:10.1001/jamapediatrics.2016.2523

3.2 Potential impact on mental health and emotional wellbeing of individuals and families directly affected by coal mines

3.2.1 Rising evidence of direct impacts of pollutants on mental health and burden of worry about health impacts

It is notable that, although not focused on in this submission, there has been a rapid rise in published studies examining the impacts of coal mining on health via air-borne emissions (**Castleden et al., 2011; Reference 14**). Fine particulate matter, PM2.5 is probably the most important of the many emissions of concern for residents living near coalmines. Evidence of links between PM2.5 exposures and cardiovascular disease⁴, anxiety⁵, intrauterine inflammation⁶ and low birth weight, etc., has been recently revealed through research.

A study comparing respiratory disease rates across rural NSW (**Merritt et al., 2013; Reference 10**) found no significant increases in the heavily coal mined region of the Hunter Valley in NSW, close to Gloucester, relative to other rural NSW regions. However, unlike all other regions that experienced a decline in respiratory disease rates, the Hunter Region uniquely failed to demonstrate improvement between 1998 to 2010. The reason for this is not clear, but demands investigation.

As the understanding from these studies is only slowly accumulating, people face significant uncertainties about what life near developments, e.g. coal mines, actually means to their own health. Anxiety may increase due to this uncertainty and health insecurity, and possibly through increased exposure risks to PM2.5⁵ from diesel combustion associated with truck movements and heavy machinery, as well as mining activities, stockpiling and processing activities, loading and transport (**Castleden et al., 2011; Reference 14; Mactaggart et al. (2016; Reference 41)**).

Moffatt and Pless-Mullooli (2003; Reference 31) conducted a qualitative study of parental risk perceptions in tandem with an epidemiological study examining impacts of a coalmine on the respiratory health of children. This study found congruence between perceptions of parents and estimated levels of risk exposures. These authors argued the importance of respecting community understandings with recommendations for researchers and environmental managers:

“In spite of this overall lack of an experienced health effect [by individual families involved in their study], the sociological data highlight respondents' recognition of the place-specificity of exposures, hence, the reasons why opencast proposals are likely to continue to be met with opposition. Environmental health studies which incorporate epidemiological and social approaches simultaneously have a better chance of arriving at conclusions meaningful to

⁴ Shah, A.S.V. (2013), Global association of air pollution and heart failure: a systematic review and meta-analysis, The Lancet, Volume 382, Issue 9897, 21–27 September 2013, Pages 1039-1048, (<http://www.sciencedirect.com/science/article/pii/S0140673613608983>)

⁵ Power M.C., et al. (2015). The relation between past exposure to fine particulate air pollution and prevalent anxiety: observational cohort study *BMJ*; 350 :h1111; <http://www.bmj.com/content/350/bmj.h1111>

⁶ Nachman, R.M., et al. (2016). Intrauterine inflammation and maternal exposure to ambient PM2.5 during preconception and specific periods of pregnancy: The Boston Birth Cohort. *Environmental Health Perspectives*, 124 (10), pp. 1608-1615.

affected communities and facilitate greater understanding of environmental disputes” (Moffatt and Pless-Mullooli, 2003; Reference 31, p.437).

Given the rapid advances in capacity to measure and understanding the potency of fine particulate matter (PM2.5), which was largely unknown in 2003, it is important for decision makers to be fully aware of the latest available health evidence. Communities expect that a high level of medical and public health expertise will be engaged when decisions on developments that may pose risks to their health are being made. Furthermore, a lack of attention by authorities to social impacts that cause distress and exacerbate mental health problems can itself be distressing.

3.2.2 Other psycho-social stressors impacting on individual mental health

Mental health risks associated with coal and unconventional gas mining in the Darling Downs were explored by **Hossain et al (2013; Reference 7)** through a series of workshops with local service and community organisations. While some benefits to some were recognised for some residents, the authors reported a wide array of significant challenges impacting on mental health. These were particularly attributed to changes in community structure associated with incoming workforce and cultural shifts from the transformation of rural agricultural towns into mining towns. Issues causing stress included tensions associated with transient workers, rising rents due to settling workers, increased pressures on local services causing longer waiting times, “them and us” situations, workplace arrangements in the mine for local residents (long shifts impacting negatively on family and community involvement), competition with local businesses for workers, pressure and closure of small and traditional businesses, perceptions of higher crime and violence and concerns about soil and water impacts and long term prospects of property sale.

Social and mental health consequences raised and discussed in the workshop included relationship breakdown as a result of the stressors, ongoing stigma of mental illness, feelings of “disempowerment, pessimism and a pervasive attitude of stoicism” (**Hossain et al (2013; Reference 7; p 35)**), perceptions of increased alcohol and drug use and anxiety and depression.

A number of suggestions were made by participants on how to better manage the rising numbers with mental health problems.

In a related study in a coal seam gas mining context, **Huth et al. (2014; Reference 39)** reported that farmers dealing with companies that did not understand their relationship with their land experienced frustration to

“We found that farmers believed that place identity was not well understood by CSG staff from non-rural backgrounds and that farmers struggled to explain some concerns because of the different way they interpreted their landscape. These differences were the cause of much frustration and farmers felt that this has led to severe impacts on mental health and well being.”

Women are thought to be a particular risk of decreased mental health in Australian coal mining towns. Several publications (**Sharma, 2010; Reference 19; Lovell and Critchley, 2010; Reference 21; Sharma and Rees, 2007; Reference 27**) investigate the status and wellbeing of women in coal mining towns in Central Queensland; revealing significant socioeconomic disadvantage compared to men living in the region. Dominating male attitudes and roles limited women's self-sufficiency and sense of equality, and their sense of wellbeing was impacted by feelings of isolation from family and friends, difficulties dealing with their partner's long shiftwork and a lack of meaningful things to do.

Australian researchers working in the Upper Hunter Valley (**Albrecht et al., 2007; Reference 28**) are widely known for the identification of a specific negative mental state – solastalgia – that is associated with the loss or significant deterioration of a loved place as a result of environmental degradation. It is characterized by sadness, and a sense of powerlessness in being unable to protect places of deep personal significance from major harm, such as from droughts or open cut mining. It is thought to involve feelings of identity loss as a result of disturbance of sense of place.

Moffitt and Baker (2013, Reference 6) revealed that mental health problems associated with mining can begin with the first announcement, and progress through planning and development stages - long before mining actually begins. These authors found that anticipation of a mine can induce psychological distress among farmers and rising community tensions that can harm mental health. They point out the discrepancy in Australia between those who gain from mining at the state and national level and those that deal with the consequences at the local community level.

Shandro et al. (2011; Reference 16) explored consequences of the mining boom/bust cycle on a coal mining community in Canada. Through interviews with service providers, the authors identified specific patterns in presentations associated boom times (increased frequency of pregnancies and sexually transmitted infections) and bust times (rising domestic and family stress and violence and addiction problems).

3.3 Impact on social capital and community resilience and the meaning of voices of resistance within communities affected by coal mines

Research by **McCrea, Walton and Leonard (2014; Reference 4)** through Australia's CSIRO has sought both practical and theoretical understanding of resilience in rural communities in Queensland facing rapid change as a result of coal seam gas mining developments. These authors argue that resilience – and community wellbeing – are not necessarily linked – and that loss of wellbeing may actually trigger an active resistance to changes that may protect and develop community identity and deeply held values. If successful, this resistance may then lead to a redefinition of community and reinforcement of its values. As there have not been adequate tools identified and used in community resilience studies, it has not been possible to quantify the impact of developments such as coal mines on community resilience.

Much of the specific research on psycho-social impacts of coal mining on local communities has focused on women and the concept of voicelessness. **Bell (2015; Reference 3)** recognised a need for women from coal mining areas of West Virginia to gain a voice about their experiences with the industry. The use of Photovoice was found to be effective in providing a needed avenue for the women's experiences with coal mining to be heard and understood by researchers, policy and decision makers, and other members of their community.

Similarly the book *Something's rising: Appalachians fighting mountaintop removal* (abstract only reviewed) by **House and Howard (2009; Reference 25)** points to a loss of culture, identity and a majestic landscape to mining blasting for the purpose of cheap energy as a deep disturbance in the health and lives of residents. Recovery for the people of the region was assisted by story telling, resistance and coming together to protect their culture, place and identity. Improvisational drama and creative expression through Theatre of the Oppressed in Texas have enabled citizens, scientists and health professionals experience personal and collective transformational change in response to toxicological exposures and environmental injustice (**Sullivan et al., 2008; Reference 26**).

A published speech by **Branton (2014; Reference 5)** highlighted the importance of a search for justice among those feeling oppressed and voiceless by coal and other energy developments. The speech emphasises a viewpoint that persistent organising and speaking out by residents to protect their communities, health, environment and wellbeing is essential for reclaiming power over their lives and situations. While not a research study, this publication expresses a potentially important 'lived experience' from a community leader that allegedly resonated with national conference attendees.

Changing community culture is also a theme arising in a study in the community of Boddington in Western Australia. **Petrova and Marinova (2013, reference 35)** found that the expansion in the intensity of mining operations appears to have significantly altered its demographic profile and community social capital. 'Fly in fly out' workers and other changes were associated with perceived increases in transiency and dependency culture. The authors ask an interesting question, with regards to how the community might adjust or cope – e.g.

"It also raises questions, such as: do we just accept this new culture or do we challenge the existing concept of community to allow for a different approach to planning and mitigating for the social impacts of mining?" (Petrova and Marinova, 2013, p 163).

For a nuanced and localized understanding of these concepts related specifically to coal mining in Central Queensland as understood by some local residents, the following Four Corners episode is recommended for viewing:

<http://www.abc.net.au/4corners/stories/2012/05/25/3510948.htm>.

A paper by **Franks and colleagues (Reference 37, 2010)** on the legislative consideration of cumulative impacts of coal mining argues that case-by-case consideration of mining proposals is ineffective in protecting community values and local and regional systems. They identify the recognition of the need to 'assess the extent to which the environment affected by the proposal is already stressed' and to assess long- and short-term cumulative impacts

[including public health] within the New South Wales Environmental Planning and Assessment Act 1979 (New South Wales Department of Urban Affairs and Planning. Coal Mines and Associated Infrastructure, EIS Guideline).

As mental health is a public health issue, and mental health vulnerability can result from cumulative stressors, this legislation can support consideration of a community's past experiences with distressing circumstances.

3.4 Impacts on wellbeing associated with changing in socioeconomic status, environmental justice and equity

Social and environmental justice concerns are a major focus of many papers addressing social aspects of energy production in general, and coal mining specifically. These included exposures to air pollutants with potential health impacts (**Stokes et al., 2010, Reference 23**) which has been a major environmental justice issue in the Hunter Valley (**Higginbotham et al., 2010, Reference 22**). This can extend to environmental asset protection described as "occupational imbalance, deprivation and alienation" associated with pollution of a valued watershed due to lack of infrastructure (**Blakeney and Marshall, 2009, Reference 24**).

Although not examining today's events, a historical study from Pittsburgh, Pennsylvania in the United States raised questions how to examine issues of social injustice across lines of gender, class and race that continue to play out in both subtle and more visible ways today^{7, 8}. It is notable that Pittsburgh, a city previously renowned for high air pollution levels, made significant, purposive strides in reducing air pollution exposures and enhancing quality of life, which is a point of pride expressed by local government and residents today.

Riva et al. (2011; Reference 18) studied coal mining areas that had collapsed two to three decades previously, and found that chronic disease profiles remained consistently high compared to areas without a coal mining history. However, these authors found that mental health profiles of communities were mixed; with some 'doing well' and other communities 'faring poorly' over the time since the mine closures.

Employment insecurity in coal mining is thought to be increasingly inevitable. **Waddington and Perry (2003; Reference 30)** have highlighted the need for policies to proactively support workers in response to reduced workforces as a result of mechanization of jobs and price volatility.

⁷ Environmental Defenders Office (Victoria) Ltd. Environmental Justice Project Final Report, 2012, https://envirojustice.org.au/downloads/files/law_reform/edo_vic_environmental_justice_report.pdf

⁸ Hanna-Attisha, M. et al., Elevated Blood Lead Levels in Children Associated With the Flint Drinking Water Crisis: A Spatial Analysis of Risk and Public Health Response (2016) American Journal of Public Health, ;106:283–290. doi:10.2105/AJPH.2015.303003)

Appalachian communities in the US (**Hendry, 2013; Reference 8; Partridge et al., 2013 Reference 11; Zullig and Hendryx, 2010; Reference 20; Zullig et al., 2011; Reference 17**) have been viewed as those most heavily affected by coal mining, and particularly of the most invasive form of coal mining, namely mountaintop removal. Lower quality of life, more sick days, and chronic conditions, such as cancers, cardiovascular and respiratory diseases, are prevalent in the regions with coal mining, especially mountaintop removal. These diseases are attributed to possible direct exposures to hazards associated with the mining operations, as well as the depressed social and economic circumstances that residents experience. **Cordial et al. (2012; Reference 12)** suggests that the 'dangerous and noxious aspects of mountaintop removal' have contributed to a high burden of illness, unemployment, poverty and eco-anxiety, resulting in mental health problems that have held these regions back. An argument of researchers working in this region is that many decades of coal mining have not delivered sufficient economic and social improvements to enable residents of these areas to attain health and wellbeing similar to that which other Americans enjoy.

Colaguiri and Morrice (2015; Reference 2) present a case study from the Hunter Valley to argue that the region has experienced a classic 'resource curse' as a result of its emphasis on coal mining. These authors further argue that health impacts affecting communities as a result of coal mining should be included in the environmental and social costs usually considered in the process of weighing the costs and benefits.

These authors (**Morrice and Colaguiri 2013; Reference 9**) also identified a sharp social injustice among those bearing the health risks and consequences of coal mining and those benefiting. They describe the experience of residents when they unexpectedly find themselves faced with *"conflicting priorities and power asymmetries between political and industry interests versus inhabitants of mining communities."* As health risks are particularly important to those affected, the authors further pose a question they say is largely unanswered, *"what would be required for considerations of health to take precedence over wealth?"*.

4. What is the relevance to Gloucester?

4.1 What are the likely stressors for Gloucester residents if the coal mine proceeds?

Before proceeding to suggesting social and mental health impacts from the proposed coal mine, we will first characterise the stressors raised in the literature review that are likely to be experienced by at least some Gloucester residents. Relevant findings of the Community Perception Survey completed by 493 residents (20% of the target sample) are provided as an indicator of the level of concern experienced among respondents regarding these issues.

4.1.1 Solastalgia, loss of environmental assets and vulnerability to impacts of loss of place

Personal relationships with the landscape, sense of place, love of nature and preservation of the beauty and quiet of Gloucester Valley are deeply held by many residents. Gloucester is well known for its scenic beauty, town centre and as a desirable tourist attraction for nature activities. While some may argue that the mine 'can't be seen from the road', other residents express a deeper appreciation of the environmental integrity of the valley and identify this as a primary reason for settling in the community.

The Community Perception Survey indicated that the proposed mine was causing feelings of **extreme concern** among at least 320 people about impacts on local character of the area, while nearly 300 expressed **extreme concern** about visual appearance of the mine, impacts on flora and fauna and noise. Many example responses provided expressions of grief at the thought of damaging the natural amenities of the valley.

It is therefore likely that reinvigoration of the dormant activities at Rocky Hill would increase sadness and feelings of loss for community members. Eco-anxiety, identified as distress caused by damage and fear of damage to the environment is also likely among some residents, particularly so soon after the prolonged period of heightened concern about the proposed unconventional gas activities. Given the large number of people having extreme anticipatory feelings, it is possible that approval and commencement of mining activities will cause significant solastalgia, such as reported by Hunter Valley residents as a result of the many, large open cut coal mines.

4.1.2 Worries about health and climate change

The Community Perception Survey indicated that 70% of respondents feel **extremely concerned** about the impact of the mine on the local water supply, while 37% were extremely concerned about its impact on climate change. Although 'concerns about health' were not examined, health was a frequent written in response and 65% expressed extreme concern about dust impacts, a likely proxy for concern about exposure to air pollution. Unfortunately, the survey developers did not appear to be aware of the relationship between coal mining and human health impacts and thus direct questions pertaining to health impacts were not included.

Many residents of Gloucester are aware and knowledgeable about the ongoing health and environmental research on coal and unconventional gas mining, as well as climate change. Any developments that may place health or environment at risk needs to address these considerations at an honest and open level and ensure people do not experience undue distress and worries about the safety of themselves and their families. Independent and rigorous monitoring as well as up to date knowledge of research findings on noise, emissions, road safety, mental health and community resilience would be required.

There are many arguments in the literature and social media regarding the long term sustainability of coal mining in the face of vigorous moves to reduce greenhouse gas emissions, and its political and financial support by government. Many people in Gloucester hold these perspectives, and are asking questions, similar to those posed by **Markandya (2000; reference 34)**: why not minimize the cost of carbon emission reductions by not proceeding with new developments with uncertain futures and instead moving rapidly to developments that will supply clean and renewable sources of energy? Some Gloucester residents held a weekend forum in 2015 to explore renewable energy initiatives and to discuss possible citizen approaches to solar developments as a way forward in response to climate change.

Some residents in Gloucester seems to be moving in the direction identified by **McManus and Connor (2013; Reference 41)** who documented the many ways that rural discourses have been undertaken in relation to decisions and actions in rural Australia. Highlighting the Upper Hunter Valley of NSW, the authors suggested that ongoing marginalization of rural communities has stimulated a movement to regain control of their daily lives from government and mining industries. This movement is also causing residents to refocus towards traditional identities of rural life; gaining satisfaction in striving for sustainability and caring for place.

4.1.3 Cumulative psychosocial stress

It is likely that some Gloucester residents have a heightened vulnerability to loss of wellbeing and mental health due to cumulative stressors. After more than 10 years of uncertainty, assessments and exploration activities, the company (AGL) delivered a decision in February 2016, not to proceed with unconventional gas mining. It can be argued that moving quickly forward on a coal mine proposal, so soon after the withdrawal of concerns over coal seam gas, reopens individuals' sense of disempowerment, loss of control, fatigue and exacerbates the community's ongoing divisions. The extent to which the social fabric of the community is already weakened and so recently affected by the long period of disagreement over unconventional gas should be taken into consideration. Mental health and psychosocial distress are important public health impacts that are affected by accumulation and intensity of social and psychological stressors.

4.1.4 Stresses on community harmony – diversity dividing not uniting

There are particularly important aspects of Gloucester that differ from many typical mining towns. The physical beauty and quiet of the community and its surrounds, the people that

have been attracted to live there and the sense of contributing to community life is particularly strong across all sectors.

There are also demographic and occupational diversities among Gloucester residents that influence viewpoints on mining. This includes multigenerational farmers and business owners, long-term residents with families who entered the agricultural, services and business sectors and retirees. Many young people in Gloucester gravitate to life in Newcastle or Sydney, apparently not ready or able to take up the heavy responsibility of farming, unable to find a job, or attracted to urban life for excitement and educational and employment opportunities and challenges.

As a result, some residents view resource extraction developments – whether forestry, unconventional gas or coal mining – as a source of jobs and income for young people and a magnet for young families. For others, these represent an opening door to ‘resource curse’ boom/bust and possible problems with non-resident mining workers, environmental disturbances, loss of visual amenity and peacefulness, health and financial worries, climate change contributions, etc.

4.1.5 Disempowerment and loss of local decision-making

In May 2016, residents witnessed the dissolving of their locally elected Gloucester Shire Council that served its 5,160 residents. A state government amalgamation process created the MidCoast Council serving an estimated 91,000 residents. It is likely that this move engendered feelings of loss of local voice, representation, decision-making power and control. These two recent experiences will no doubt amplify the impact of the decision on the Rocky Hill Project on the community.

The previous Gloucester Shire Council’s submission to the Rocky Hill Project acknowledged that coal mining can benefit local economies, but voiced strong opposition on the basis of its close proximity to residents’ and the township and its placement on E3 zoned environmentally sensitive land. While not everyone agreed with the Council’s positions on mining, the presence of formal local government in their community was highly valued by many residents and its loss deeply felt. Hence this upcoming Rocky Hill Project decision is likely to be felt in the context of the Council’s dissolution.

As evidenced through submission materials submitted by residents, some residents of Gloucester seem to be asking the question, “how can we adjust to these new developments and the positive and negative changes they will bring?” and “how can we ensure our local residents get the jobs and local procurement associated with the mine?”. Others express distress by the close proximity of the mine to residences; and the ‘buying out’ of properties that were once family homes. Many are very concerned about the mine’s intrusion into their everyday lives and potential health impacts. Others appear to be arguing, why are we facing a potential revival of coal mining in Gloucester, with so many having expressed opposition to the proposal, and again facing the consequences to health and wellbeing when the environmental consequences are known to be at a critical point?

These questions are troubling and can promote a sense of futility, which is also detrimental to mental health, associated with a sense of hopelessness and helplessness.

4.1.6 The need for social justice and feeling of trust in government decisions

The findings of Morrice and Colaguiari (2013; 2015) regarding coal mining, social injustice and power dynamics are likely to be highly relevant to some Gloucester residents who are impacted both directly and indirectly and do not want the coal mine to proceed. Some Gloucester residents who lived close to the previous coal seam gas mining exploration activities, and were identified by the industry as ‘receptors’, perceived this as saddening, dehumanizing and demoralizing. Some have described feelings of powerlessness and a sense of shock when they perceived that their health as being unimportant to a government that they previously assumed was ‘on their side’. As Morrice and Colaguiari explain, this can damage and ultimately undermine one’s sense of security and understanding of the world. Such feelings may go some way to promoting suicidal thoughts and potentially actions.

The above is a relevant question for Gloucester in envisioning its present and future. For a number of years, there has been low to no actual activity in gas and coal production, but the spectre of a new unconventional gas industry for more than ten years, and a revival of coal mining in the present proposal, has the potential to exacerbate a concerning divide between groups with different views.

4.2 Implications regarding possible mental health impacts on Gloucester residents

This section examines the potential for mental health impacts resulting from these public understanding of health risks associated with coalmines. This should help to elucidate insights on how health risk-associated anxiety and mental distress is experienced regarding an energy form that is now intimately linked with climate change in a community with an acute awareness of the health and wellbeing challenges posed by this global issue – acting out in a local community.

Uncertainty about potential health risks and other proposal consequences are a known cause of public anxiety⁹ and associated mental health conditions.¹⁰ Anxiety disorders were recorded as the sixth leading cause of disability globally in 2010 in respect to Years Lost to Disability (YLD) in high-income and low and middle incomes countries. This compares with diabetes (globally ranked 9th) and stroke (38th). In 2010, YLD rates for anxiety disorders were six times higher than all cancers aggregated (65 YLDs per 100000).¹¹ The burden of anxiety and associated conditions may increase as communities face intensive energy developments and life alongside multiple forms of generation.

⁹ Anxiety is described as follows (Baxter et al, 2014: 2363): “Anxiety disorders are characterized by intense and prolonged feelings of fear and distress, often accompanied by physiological symptoms. They generally start early in life and follow a recurrent, intermittent course (Kessler et al. 2009), causing substantial disability in terms of health loss, role impairment (Mendlowicz & Stein, 2000) and disadvantage across the lifespan in areas such as income, education and interpersonal relationships (Lochner et al. 2003).”

¹⁰ Wakefield and Elliott (2000); Lima (2004); Venables et al (2012); Roach (2013); Jacquet and Stedman (2014); Walker et al (2014).

¹¹ Baxter et al (2014: 2366).

As well as general anxiety related to fear of changes in a community, e.g. incoming workers¹², established health risk perception topics are:

- anxieties about developing cancer (“cancer anxiety”)¹³ associated with exposures to particulate matter, diesel fumes and volatile organic compounds such as benzene; and air and water pollution, contamination¹⁴, and other multiple health effects, e.g. psychological, eg solastalgia¹⁵, explosions and plumes. There may be other illnesses people also associate with living near a coal mine.¹⁶
- stigmatisation of individuals’ and communities’ affective relationships with the area (e.g. place-based aspects of personal identity: open cut coal mine and tailings impact on surrounding landscape could lead to “spoiled identities” – stigmatised by narratives of contamination).¹⁷ This factor matters in places like Gloucester, where place attachments and identities incorporating the experience of a place are strong.

5. Summary and assessment of risks of social and mental health

5.1 Summary and discussion

In 2016, with advances in many understandings about what secures good health and wellbeing of people and the environment, it should be possible to make development choices that work for both communities as well as states and nations. For example, a decade ago, PM2.5 was hardly known. It is now increasingly expected to be the most potent cause of air pollution-related deaths and ill health globally with no ‘safe’ threshold. This new understanding and capacity to measure the key air pollutants of greatest health concern, combined with studies examining their multiple impacts on the body over the last decade is overcoming limitations of previous health studies. In an updated letter regarding the health concerns associated with the Rocky Hill Project, NSW Hunter New England Health rightly pointed out that some residents in Gloucester will be experiencing levels of PM2.5 above acceptable limits according to figures provided.

However, there are many more potential health concerns associated with coal mining that may be relevant in the Rocky Hill Project. Loss of psycho-social wellbeing as a result of social impacts reduces quality of life and promotes the development of mental health disorders, most commonly anxiety and depression.

Perhaps the most concrete evidence of the potential impacts of the Rocky Hill Project is provided by the Community Perception Survey itself. Despite its limitations in receiving feedback from just 20% of its target, the Survey indicated that over 300 Gloucester residents (and possibly other members of their households) experienced extreme concern over the

¹² Jacquet and Stedman (2014).

¹³ “Cancer anxiety” has been established as a separate form of anxiety by Trumbo et al (2007) due to perceptions of it as the deadliest of diseases.

¹⁴ Mueller (2010).

¹⁵ Barnet (2007); Mueller (2010).

¹⁶ Pidgeon et al (2008).

¹⁷ Pidgeon et al (2008); Venables (2012); Jacquet and Stedman (2014).

potential of the proposed mine to impact on the water supply, impact on the local character, impact on air quality [dust] and impact on agriculture. Between 250 and 300 residents expressed extreme concern about the visual impacts of the open cut coal mine, noise and the flora and fauna of their community. While the level of resident concern about potential direct health impacts was not systematically assessed, it is also likely to have been high.

While not everyone may feel the same way or recognise these as vital community assets or at any risk, the validity of concern is supported by the findings of this review, and those of the recent published systematic review by MacTaggart et al. (2016). Multiple studies in different settings and using different methodologies to examine the psycho-social and community level impacts where coal mining has generated a consistent list of stressors and losses among residents; similar to those which Gloucester residents see as being at risk.

From a mental health point of view, the evidence of impact from published research is largely qualitative in nature, as validated measures have not been available to measure impacts of mining sensitively and specifically. The significant advances described by Morgan et al. (2016) in achieving this with farmers in NSW paves the way for mental health surveys to be delivered alongside air monitoring in impact assessments.

Finlay-Brook and Holloman (2016; Reference 1) point out that any energy development poses a potential for inequity. Their research on the transition from fossil fuel mining to renewable energies in the United States asks the question,

‘To what extent does the confluence of state, civic, and market processes assure “just” transitions to clean, low-carbon energy production involving equitable distribution of costs, benefits, and decision-making power?’

The answer to this question requires a clear understanding of how much justice and benefit have been enjoyed in the past by communities that have been literally, rather than just figuratively, at the ‘coalface’? The evidence suggests that environmental justice, psycho-social wellbeing and mental health have not always, and in current circumstances in Queensland and NSW, is not well protected in coal rich areas of rural Queensland and NSW.

5.2 Assessment

The Rocky Hill Coal Project poses many familiar risks to psycho-social wellbeing, particularly anxiety and depression, to residents of Gloucester through:

- actual and fear of increased health risks and impacts that are known to be associated with living close to a coal mine – with particular attention to residents of Forbesdale, Thunderbolt and Avon River Estates;
- direct risks/impacts on the local environment (risks to the visual landscape, peace and quiet, flora and fauna, water supplies, agricultural land and tourism interest), which is cherished by many community residents;

- social and economic impacts, such as changes to the social fabric through work schedules leaving little family and community time, influx of non-resident workers creating potential for social problems, pressures on health and social service capacities, economic changes affecting house prices (rising prices away from the development and declining values of houses close to the mining operations) and pressures on rental accommodation and local skills;
- knowledge and recognition among some of the direct contribution to greenhouse gas emissions associated with the mining and ultimate burning of the thermal coal for energy production and with the use of the metallurgical coal in steel production; and
- recognition of the severe impact of climate change on future generations.

5.3 Recommendations

For determinations regarding the Rocky Hill Coal Project:

- **that the evidence brought forth in this review, and the assessed relevance to the Rocky Hill Coal Project and the receiving community of Gloucester, be considered sufficient grounds, along with other significant issues, for rejecting the Project;**
- that the threats to social and mental health that may result from the Project in be recognised as having at least equal, and preferably greater, importance in decision making as the possible economic gains to the regional or state level; and
- that the statements from hundreds of community members regarding their ‘**extreme concerns**’ associated with multiple aspects of the Project be taken very seriously in decision making.

If it is decided that the project should be approved, then it is recommended that:

- there is serious recognition of and response to the underservicing of mental health issues in rural areas such as Gloucester, especially those faced with the immediate risks accompanying coal mining and other resource extraction industries;
- there be recognition of the fact that mental health issues arising from these combinations of social and environmental losses and stressors may present significant challenges to services. Effective therapeutic approaches required for such complex issues may differ from those that typical mental health services deliver;
- a pre-project community-wide assessment of stressors on psychosocial wellbeing and mental health in Gloucester be undertaken, with regular follow up assessments, using rigorous research approaches and tools informed by research conducted by Morgan et al. (2016); and

- that increases in community stress and/or mental health problems associated with the mine should they occur meet with equal seriousness for mitigation as that would be applied to other exceedances, for example, of air and water pollutants.

Whatever the outcome of the Rocky Hill Project, it is recommended that:

- in light of the cumulative nature of multiple divisive stressors that residents of Gloucester have struggled for many years, consideration be given to a moratorium on new or existing proposals regarding resource extraction in or near Gloucester township and Valley. The community has faced many recent challenges and residents may benefit from a quiet period free of external pressure to focus on repairing relationships and reimagining a future that unites residents and enriches their collective social and mental health and wellbeing.

6. References

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7. Appendices

7.1 Citations and abstracts of papers generated in the systematic review.

1. Finley-Brook, M., Holloman, E.L. Empowering energy justice (2016) *International Journal of Environmental Research and Public Health*, 13 (9), art. no. 926. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-84989313345&partnerID=40&md5=c8bc5474033beb1c99fb567a97049b8a> DOI: 10.3390/ijerph13090926

AFFILIATIONS: Department of Geography and the Environment, University of Richmond, Richmond, VA; Southeast CARE Coalition, Newport News, VA, United States

ABSTRACT: The U.S. is experiencing unprecedented movement away from coal and, to a lesser degree, oil. Burdened low-income communities and people of color could experience health benefits from reductions in air and water pollution, yet these same groups could suffer harm if transitions lack broad public input or if policies prioritize elite or corporate interests. This paper highlights how U.S. energy transitions build from, and contribute to, environmental injustices. Energy justice requires not only ending disproportionate harm, it also entails involvement in the design of solutions and fair distribution of benefits, such as green jobs and clean air. To what extent does the confluence of state, civic, and market processes assure “just” transitions to clean, low-carbon energy production involving equitable distribution of costs, benefits, and decision-making power? To explore this question we assess trends with (1) fossil fuel divestment; (2) carbon taxes and social cost of carbon measurements; (3) cap-and-trade; (4) renewable energy; and (5) energy efficiency. Current research demonstrates opportunities and pitfalls in each area with mixed or partial energy justice consequences, leading to our call for (2015) Illustrative energy transition case studies suggest the feasibility and benefit of empowering approaches, but also indicate there can be conflict between “green” and “just”, as evident though stark inequities in clean energy initiatives. To identify positive pathways forward, we compile priorities for an energy justice research agenda based on interactive and participatory practices aligning advocacy, activism, and academics.

2. Colagiuri, R., Morrice, E. Do coal-related health harms constitute a resource curse? A case study from Australia's Hunter Valley (2015) *Extractive Industries and Society*, 2 (2), pp. 252-263. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-84928927376&partnerID=40&md5=154e8bc50356298904cd5464f9acc028> DOI: 10.1016/j.exis.2014.12.004

AFFILIATIONS: Health and Sustainability Unit, Menzies Centre for Health Policy, University of Sydney, Victor Coppleson Building DO2NSW, Australia

ABSTRACT: The term 'resource curse' was coined to describe the phenomenon, usually associated with developing nations, that occurs when the costs and harms of extracting and exporting natural resources outweigh the economic benefits. We argue that this applies to developed countries as well as developing countries; at the local not only national level; and that the magnitude of the associated health burden warrants the inclusion of health in resource curse theory and discourse. With coal mines and power plants in close proximity to human habitat and pastoral land, Australia's Hunter Valley provides a natural laboratory for exploring these issues in local coal mining communities. We identified literature from the Hunter Valley and compared the findings with the international literature on the resource curse using an existing framework, which covered (i) socio-economic, (ii) political and (iii) ecological issues, and adding (iv) health as the fourth component. Despite some variations and knowledge deficiencies there was considerable congruence between the Hunter Valley and the resource curse theory. Effects reported, and mechanisms by which they are promulgated, substantively reflect many aspects of the resource curse literature. Further, the extent and economic impact of coal related health harms warrants inclusion of health in resource curse discourse.

3. Bell, S.E. Bridging activism and the academy: Exposing environmental injustices through the feminist ethnographic method of photovoice (2015) *Human Ecology Review*, 21 (1), pp. 27-58. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-84943382968&partnerID=40&md5=626bc151487492ea1e116b1e9da86afb>

AFFILIATIONS: Department of Sociology, University of Kentucky, Lexington, USA

ABSTRACT: The neoliberal rejection of a strong role for governmental regulation of industry has led to increasingly negative consequences for the environment and the people who are forced to bear a disproportionate share of the health and safety hazards created by corporate polluters. The voices of the victims of environmental injustice often go unheard in the policy arena, while an arsenal of paid industry lobbyists exerts undue influence and power over legislative and regulatory agency processes. In this paper, I argue that we as social scientists are frequently positioned in such a way that we could serve as links between the people we study and policymakers, providing an avenue for exposing the ways that neoliberal policies negatively affect the health, safety, and well-being of disenfranchised groups. Through presenting a "Photovoice" project I conducted with 54 women living in five coal-mining communities in southern West Virginia, I demonstrate how feminist activist ethnography, as a distinct type of activist research, can be used for social science inquiry while simultaneously providing an opportunity for research participants' stories to be heard—and acted upon—by those with political power. © Society for Human Ecology.

4. McCrea, R., Walton, A., Leonard, R. A conceptual framework for investigating community wellbeing and resilience (2014) *Rural Society*, 20 (3), pp. 270-282.
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AFFILIATIONS: CSIRO Ecosystem Sciences, Brisbane, QLD, Australia; CSIRO Ecosystem Sciences, Wembley, WA, Australia; School of Social Sciences, University of Western Sydney, Nepean, NSW, Australia

ABSTRACT: This article presents the conceptual basis for empirically testing the relationship between community wellbeing and resilience. Previous research has argued that rural communities facing rapid economic, social and environmental change need to be resilient to maintain or enhance their community wellbeing. However, it is often not clear what is meant by community wellbeing or resilience, and how they differ. Both concepts are often imprecise and seldom clearly distinguished from each other when placed in a theoretical context. Further, wellbeing and resilience are often assumed to be positively associated but this may not necessarily be the case (Amundsen, 2012; Armitage, Béné, Charles, Johnson, & Allison, 2012; Coulthard, 2012). The present analysis suggests that community resilience is best conceptualised as a type of functioning or process whereby community resources are mobilised in strategic ways by community agents in adaptive responses to change (e.g., Norris, Stevens, Pfefferbaum, Wyche, & Pfefferbaum, 2008) and community wellbeing is best conceptualised as a state, which is hopefully enhanced as a result of community resilience. Rather than a direct correlation, the relationship might be iterative whereby poor wellbeing triggers a mobilising of resilience, which in turn leads to future wellbeing. The article outlines the main dimensions of community wellbeing and resilience that require valid and reliable measurement to test the relationship. The implication of such a relationship is that communities might need to focus on resilience rather than current wellbeing to achieve future wellbeing.

5. Blanton, T. It's not about energy--it's about power! (2014) *New solutions : a journal of environmental and occupational health policy* : NS, 24 (2), pp. 231-234.
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84928588282&partnerID=40&md5=307b7fcd8a8e2d9b37d8f9f5af3aa8bc> DOI: 10.2190/NS.24.2.g

AFFILIATIONS: Native of Harlan County, Kentucky

ABSTRACT: Teri Blanton is a former chairperson and current fellow at Kentuckians for the Commonwealth, a statewide organization that works "for a new balance of power and a just society aimed at changing unfair political, economic, and social systems." In March 2014 she was a keynote speaker addressing the annual conference of the Toxics Action Center in Boston, Massachusetts. We are publishing her speech, presented to the many environmental activists from community- and labor-based organizations that work on state and regional concerns. Ms. Blanton energized the conference with her message of persistent organizing to attain justice against the threats posed to our communities, health, and environment by powerful forces who exploit our lives and labor for their profit and power. She calls upon us to build the power to make the transition to more sustainable and democratic human development.

6. Moffatt, J., Baker, P. Farmers, mining and mental health: The impact on a farming community when a mine is proposed (2013) *Rural Society*, 23 (1), pp. 60-74. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-84892777614&partnerID=40&md5=f15d84a156d320a8204ba059ae2fd54b> DOI: 10.5172/rsj.2013.23.1.60

AFFILIATIONS: Rural Clinical School, School of Medicine, University of Queensland, Brisbane, QLD, Australia

ABSTRACT: Introduction: In Australia where the economic benefits of minerals resources development accrue at the national and regional levels, it is farming communities that are at the forefront of the challenges resulting from competing land use. This paper maps the mental health impacts on a farming community in the Clarence-Moreton coal basin, QLD, after a minerals development proposal was announced. Methods: An exploratory study was conducted using an interpretive approach based on semi-structured interviews within a case study design. Results: A thematic account of existing and anticipated mental health impacts of minerals development on this community has two primary themes: Psychological stress experienced by the farmers; and tensions within the community. Conclusions: In addition to the long-term and increasing pressures on Australian farmers and a developing knowledge of the mental health risks they face, this study reveals a comparatively new source of psychological stress - the impacts from the announcement of a mining development proposal. The pre-development impacts that occurred in the Felton Valley resemble those known to occur with the announcement of large scale developments. There is opportunity therefore for such impacts to be anticipated, prepared for and resources set aside, with which to assist communities and individuals whose lives are adversely affected. © Copyright eContent Management Pty Ltd. AUTHOR KEYWORDS: Australia; Farmers; Mental health; Mining; Queensland; Rural communities; Rural health; Social impact assessment; Suicide

7. Hossain, D., Gorman, D., Chapelle, B., Mann, W., Saal, R., Penton, G. Impact of the mining industry on the mental health of landholders and rural communities in southwest Queensland (2013) *Australasian Psychiatry*, 21 (1), pp. 32-37. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-84874605624&partnerID=40&md5=de155e2fd530c252bc88d172a64bd9dc> DOI: 10.1177/1039856212460287

AFFILIATIONS: Centre for Rural and Remote Area Health, University of Southern Queensland, West St., Toowoomba, QLD 4350, Australia; Rhealth, Toowoomba, QLD, Australia; AgAssist, Toowoomba, QLD, Australia; Queensland Murray Darling Committee, Toowoomba, QLD, Australia

ABSTRACT: Objective: We aimed to ascertain the extent of mental health problems in rural communities of southwest Queensland. Methods: Twelve workshops were conducted within this region, asking community members about the issues, which were affecting their mental health, the gaps in services and facilities, and suggestions as to how to strengthen their capacity to deal with mental health problems. Results: The participants highlighted the higher cost of living through increased rental and goods and services costs. Non-resident workforces, putting a strain on housing availability and succession planning, were among key concerns. The rapid increase in population has also put strains on health services within these communities, highlighting the need for mental health resources and a greater clarification and coordination of available health services. Conclusions: The rural communities in this region are under sustained stress resulting from the incursion of the mining and coal seam gas industries. This has an impact on community mental health and wellbeing.

8. Hendryx, M. Personal and family health in rural areas of Kentucky with and without mountaintop coal mining (2013) *Journal of Rural Health*, 29 (SUPPL.1), pp. s79-s88. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-84882888178&partnerID=40&md5=8c3dab0b6a7b7440ca8853bf2b113a38> DOI: 10.1111/jrh.12016

AFFILIATIONS: Department of Health Policy, Management and Leadership, School of Public Health, West Virginia University, Morgantown, WV, United States

ABSTRACT: Purpose: This study investigates health disparities for adults residing in a mountaintop coal mining area of Appalachian Kentucky. Mountaintop mining areas are characterized by severe economic disadvantage and by mining-related environmental hazards. Methods: A community-based participatory research study was

implemented to collect information from residents on health conditions and symptoms for themselves and other household members in a rural mountaintop mining area compared to a rural nonmining area of eastern Kentucky. A door-to-door health interview collected data from 952 adults. Data were analyzed using prevalence rate ratio models. Findings: Adjusting for covariates, significantly poorer health conditions were observed in the mountaintop mining community on: self-rated health status, illness symptoms across multiple organ systems, lifetime and current asthma, chronic obstructive pulmonary disease, and hypertension. Respondents in mountaintop mining communities were also significantly more likely to report that household members had experienced serious illness, or had died from cancer in the past 5 years. Significant differences were not observed for self-reported cancer, angina, or stroke, although differences in cardiovascular symptoms and household cancer were reported. Conclusions: Efforts to reduce longstanding health problems in Appalachia must focus on mountaintop mining portions of the region, and should seek to eliminate socioeconomic and environmental disparities.

9. Morrice, E., Colagiuri, R. Coal mining, social injustice and health: A universal conflict of power and priorities (2013) *Health and Place*, 19 (1), pp. 74-79. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-84870288958&partnerID=40&md5=7da43f3c5fald53d917e635a45828642> DOI: 10.1016/j.healthplace.2012.10.006

AFFILIATIONS: Health and Sustainability Unit, Boden Institute for Obesity Nutrition Exercise and Eating Disorders, The University of Sydney, Australia

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.

10. Merritt, T.D., Cretikos, M.A., Smith, W., Durrheim, D.N. The health of Hunter Valley communities in proximity to coal mining and power generation, general practice data, 1998-2010 (2013) *New South Wales Public Health Bulletin*, 24 (2), pp. 57-64. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-84922270290&partnerID=40&md5=5ae056701b3a8fa1e225a52a6a73f466> DOI: 10.1071/NB12109

AFFILIATIONS: Hunter New England Population Health, United Kingdom; Centre for Epidemiology and Evidence, NSW Ministry of Health, United Kingdom; Environmental Health Branch, Health Protection NSW, United Kingdom

ABSTRACT: Aim: An analysis of general practice data for rural communities in close proximity to coal mining and coal-fired power generation in the Hunter Valley region of NSW was conducted to identify unusual patterns of illness. Methods: Bettering the Evaluation and Care of Health general practice consultation data from the Hunter Valley region for 1998-2010 were compared with data from all other rural NSW residents. Results: There were no significantly higher rates of problems managed or medications prescribed for Hunter Valley region residents compared with the rest of rural NSW. Rates of respiratory problem management in the Hunter Valley region did not change significantly over time, while for all other rural NSW areas these rates significantly decreased. Conclusion: There was no evidence of significantly elevated health issues for residents in the Hunter Valley region of NSW. The diverging trend for respiratory problem management over time is worthy of further exploration.

11. Partridge, M.D., Betz, M.R., Lobao, L. Natural resource curse and poverty in Appalachian America (2013) *American Journal of Agricultural Economics*, 95 (2), pp. 449-456. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-84872706243&partnerID=40&md5=a108da7a9310ac03aca32ee0dbd4fd72> DOI: 10.1093/ajae/aas086

AFFILIATIONS: Department of Agricultural, Environmental and Developmental Economics, Ohio State University; School of Environment and Natural Resources, Ohio State University, United States

ABSTRACT: There is a large body of literature arguing that the area's dependence on coal mining has contributed to its deep poverty through: weaker local governance, entrepreneurship and educational attainment; environmental degradation; poor health outcomes; and limitations on other economic opportunities. There are multiple ways MTM may influence poverty rates. First, greater coal mining in general may displace workers in other sectors, including industries that may not desire the local labor climate associated with mining. Second, MTM counties are faced with a host of negative externalities that may increase poverty. MTM requires the removal of timber and other vegetation, and the resulting waste disposal causes elevated airborne particulate levels and contaminates surface and ground water. Demographic factors in the DEM vector include age, race, and education. Recent immigrant shares and the single-male and single female household shares are also included to control for challenges faced by these social groups. Demographic variables are lagged ten years prior to the dependent variable to mitigate concerns about endogenous relationships with the dependent variable.

12. Cordial, P., Riding-Malon, R., Lips, H. The effects of mountaintop removal coal mining on mental health, well-being, and community health in central Appalachia (2012) *Ecopsychology*, 4 (3), pp. 201-208.
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84872871973&partnerID=40&md5=4eb771d528c549635f7f5e1f306d1444> DOI: 10.1089/eco.2012.0032

AFFILIATIONS: Radford University, 335 Russell Hall, Radford, VA 24141, US

ABSTRACT: Mountaintop removal coal mining (MTR) is a form of surface mining frequently utilized in Central Appalachia. MTR is exactly what the name suggests; mountaintops are removed to expose coal seams for cheap extraction. The harmful environmental implications of this form of mining are well documented. Research also shows that MTR has detrimental effects on human health and on the functioning of local communities. Although virtually no research has been undertaken on the psychological effects of MTR, reports of people living close to MTR sites along with research on similar environmental problems suggest a high probability of an increased risk of mental health problems for those living near MTR sites. Solastalgia due to drastic environmental changes, eco-anxiety, and stress resulting from the dangerous and noxious aspects of MTR are likely among the most significant contributors to this increased risk of mental health problems. High rates of unemployment and poverty and lower rates of educational attainment persist in Central Appalachia despite significant gains in other areas of Appalachia. These pre-existing socioeconomic problems compound the stressors created by MTR.

13. Riva, M., Terashima, M., Curtis, S., Shucksmith, J., Carlebach, S. Coalfield health effects: Variation in health across former coalfield areas in England (2011) *Health and Place*, 17 (2), pp. 588-597.
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-79952486651&partnerID=40&md5=e02bab59459df7477cb0da827c0a7b68> DOI: 10.1016/j.healthplace.2010.12.016

AFFILIATIONS: Department of Geography, Institute of Hazard, Risk and Resilience, Wolfson Research Institute, Science Laboratories, South Road, Durham, DH1 3LE, United Kingdom; Department of Community Health and Epidemiology, Dalhousie University, Centre for Clinical Research, 5790 University Avenue, Halifax, NS B3H 1V7, Canada; Centre for Health and Social Evaluation, Health and Social Care Institute, Teesside University, Parkside West, Middlesbrough, TS1 3BA, United Kingdom

ABSTRACT: Regions affected by deindustrialisation are often characterised by unfavourable local health profiles. This was the situation in coalfield areas in England, where the scale and suddenness of the job losses in the 1980s and 1990s left these communities experiencing difficult socioeconomic conditions, and associated poor health status. Using data from the Health Survey for England, this paper examines whether poorer health outcomes still characterise coalfield areas today. Findings confirm a 'coalfield health effect' related to limiting long-term illness. With regards to self reported general health and mental health outcomes, results are less clear. The population health profile of coalfield communities is not homogeneous, with some coalfield communities faring worse than others, indicating more localised health issues.

14. Castleden, W.M., Shearman, D., Crisp, G., Finch, P. The mining and burning of coal: Effects on health and the environment (2011) *Medical Journal of Australia*, 195 (6), pp. 333-335. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-84856365693&partnerID=40&md5=bd31e3d06b5cac0094366a1006367afc> DOI: 10.5694/mja11.10169

AFFILIATIONS: Department of Vascular Surgery, Fremantle Hospital, Fremantle, WA, Australia; Department of Medicine, University of Adelaide, Adelaide, SA, Australia; Doctors for the Environment Australia, Adelaide, SA, Australia; Perth Pain Management Centre, Perth, WA, Australia; Murdoch University, Perth, WA, Australia

ABSTRACT: Australia's coal conundrum is that all political parties say they are concerned about climate change while sanctioning an unprecedented expansion of coalmining and coal seam gas extraction in Australia. Australia's coal contributes to climate change and its global health impacts. Each phase of coal's lifecycle (mining, disposal of contaminated water and tailings, transportation, washing, combustion, and disposing of postcombustion wastes) produces pollutants that affect human health. Communities in which coalmining or burning occurs have been shown to suffer significant health impacts. The health and climate costs of coal are unseen, and when costs to health systems are included, coal is an expensive

15. Epstein, P.R., Buonocore, J.J., Eckerle, K., Hendryx, M., Stout, B.M., Heinberg, R., Clapp, R.W., May, B., Reinhart, N.L., Ahern, M.M., Doshi, S.K., Glustrom, L. Full cost accounting for the life cycle of coal (2011) *Annals of the New York Academy of Sciences*, 1219 (1), pp. 73-98. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-79951659579&partnerID=40&md5=6b4e528340adb79d95c3971e411ca221> DOI: 10.1111/j.1749-6632.2010.05890.x

AFFILIATIONS: Center for Health and the Global Environment, Harvard Medical School, Boston, MA, United States; Environmental Science and Risk Management Program, Department of Public Health, Harvard School of Public Health, Boston, MA, United States; Accenture, Sustainability Services, Philadelphia, PA, United States; Department of Community Medicine, West Virginia University, Morgantown, WC, United States; Wheeling Jesuit University, Wheeling, WV, United States; Post Carbon Institute, Santa Rosa, CA, United States; Boston University School of Public Health, Boston, MA, United States; Kentuckians for the Commonwealth, London, KY, United States; Department of Pharmacotherapy, Washington State University, Spokane, WA, United States; Gund Institute for Ecological Economics, University of Vermont, Burlington, VT, United States; Clean Energy Action, Boulder, CO, USA

ABSTRACT: Each stage in the life cycle of coal-extraction, transport, processing, and combustion-generates a waste stream and carries multiple hazards for health and the environment. These costs are external to the coal industry and are thus often considered "externalities." We estimate that the life cycle effects of coal and the waste stream generated are costing the U.S. public a third to over one-half of a trillion dollars annually. Many of these so-called externalities are, moreover, cumulative. Accounting for the damages conservatively doubles to triples the price of electricity from coal per kWh generated, making wind, solar, and other forms of nonfossil fuel power generation, along with investments in efficiency and electricity conservation methods, economically competitive. We focus on Appalachia, though coal is mined in other regions of the United States and is burned throughout the world.

16. Shandro, J.A., Veiga, M.M., Shoveller, J., Scoble, M., Koehoorn, M. Perspectives on community health issues and the mining boom-bust cycle (2011) *Resources Policy*, 36 (2), pp. 178-186. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-79957559905&partnerID=40&md5=26a7c641ab5c1dff4a31c00f1d7100f5> DOI: 10.1016/j.resourpol.2011.01.004

AFFILIATIONS: Norman B. Keevil Institute of Mining Engineering, University of British Columbia, Vancouver, BC V6T 1Z4, Canada; School of Population and Public Health, Faculty of Medicine, University of British Columbia, Vancouver, BC, V6T 1Z3, Canada

ABSTRACT: The health of mining communities is becoming a priority for the mining industry, governments, and researchers. This paper describes an exploratory qualitative study into community health issues and mining activities (associated

with the mining boom-bust cycle) from the perspective of health and social service providers in the northern Canadian coal mining community of Tumbler Ridge, British Columbia. Health and social service providers report on increases in pregnancies, sexually transmitted infections, and mine related injuries during booming mine activities. During bust times, mental health issues such as depression and anxiety were reported. Overarching community health issues prominent during both boom and bust periods include burdens to health and social services, family stress, violence towards women, and addiction issues. This paper concludes by providing recommendations as to how the industry can enhance community health made by this important stakeholder group.

17. Zullig, K.J., Hendryx, M. Health-related quality of life among central Appalachian residents in mountaintop mining counties (2011) *American Journal of Public Health*, 101 (5), pp. 848-853.
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-79954608640&partnerID=40&md5=f757e2cad68330708c0d7e32d11842ba> DOI: 10.2105/AJPH.2010.300073

AFFILIATIONS: Department of Community Medicine, School of Medicine, West Virginia University, Morgantown, WV 26506-9190, United States

ABSTRACT: Objectives. We examined the health-related quality of life of residents in mountaintop mining counties of Appalachia using the 2006 national Behavioral Risk Factor Surveillance System. Methods. Dependent variables included self-rated health; the number of poor physical, poor mental, and activity limitation days (in the past 30 days); and the Healthy Days Index. Independent variables included metropolitan status, primary care physician supply, and Behavioral Risk Factor Surveillance System behavioral and demographic variables. We compared dependent variables across 3 categories: mountaintop mining (yes or no), other coal mining (yes or no), and a referent non-mining group. We used SUDAAN MULTLOG and multiple linear regression models with post hoc least squares means to test mountaintop mining effects after adjusting for covariates. Results. Residents of mountaintop mining counties reported significantly more days of poor physical, mental, and activity limitation and poorer self-rated health ($P < .01$) compared with the other county groupings. Results were generally consistent in separate analyses by gender and age. Conclusions. Mountaintop mining areas are associated with the greatest reductions in health-related quality of life even when compared with counties with other forms of coal mining.

18. Riva, M., Terashima, M., Curtis, S., Shucksmith, J., Carlebach, S. Coalfield health effects: Variation in health across former coalfield areas in England (2011) *Health and Place*, 17 (2), pp. 588-597.
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-79952486651&partnerID=40&md5=e02bab59459df7477cb0da827c0a7b68> DOI: 10.1016/j.healthplace.2010.12.016

AFFILIATIONS: Department of Geography, Institute of Hazard, Risk and Resilience, Wolfson Research Institute, Science Laboratories, South Road, Durham, DH1 3LE, United Kingdom; Department of Community Health and Epidemiology, Dalhousie University, Centre for Clinical Research, 5790 University Avenue, Halifax, NS B3H 1V7, Canada; Centre for Health and Social Evaluation, Health and Social Care Institute, Teesside University, Parkside West, Middlesbrough, TS1 3BA, UK

ABSTRACT: Regions affected by deindustrialisation are often characterised by unfavourable local health profiles. This was the situation in coalfield areas in England, where the scale and suddenness of the job losses in the 1980s and 1990s left these communities experiencing difficult socioeconomic conditions, and associated poor health status. Using data from the Health Survey for England, this paper examines whether poorer health outcomes still characterise coalfield areas today. Findings confirm a 'coalfield health effect' related to limiting long-term illness. With regards to self reported general health and mental health outcomes, results are less clear. The population health profile of coalfield communities is not homogeneous, with some coalfield communities faring worse than others, indicating more localised health issues.

19. Sharma, S. The impact of mining on women: Lessons from the coal mining Bowen Basin of Queensland, Australia (2010) *Impact Assessment and Project Appraisal*, 28 (3), pp. 201-215.

AFFILIATIONS: School of Human Services, Griffith University, Logan Campus, Meadowbrook, QLD 4131, Australia

ABSTRACT: The select indicators of gender equity from the Australian Bureau of Statistics Census 2006 reveal that women of the mining towns of the Bowen Basin region of central Queensland are at a substantial social and economic disadvantage to men. Through a review of select social science literature on mining communities the paper examines work, family and community structures and processes that promote and sustain patriarchy in mining communities and within households that could negatively influence mental health and relationship wellbeing of women in mining towns. This is a relatively neglected field of inquiry in the social impact assessment processes of large-scale mining in Australia. The paper suggests areas of research and policy initiatives to enhance women's economic self-sufficiency, gender equality and wellbeing.

20. Zullig, K.J., Hendryx, M. A comparative analysis of health-related quality of life for residents of U.S. counties with and without coal mining (2010) Public Health Reports, 125 (4), pp. 548-555.

<https://www.scopus.com/inward/record.uri?eid=2-s2.0-77955600936&partnerID=40&md5=d21981e19419343405211903fa03b045>

AFFILIATIONS: Department of Community Medicine, School of Medicine, West Virginia University, PO Box 9190, Morgantown, WV 26506, United States

ABSTRACT: Objectives. We compared health-related quality of life (HRQOL) in mining and non-mining counties in and out of Appalachia using the 2006 Behavioral Risk Factor Surveillance System (BRFSS) survey. Methods. Dependent variables included self-rated health, the number of poor physical and mental health days, the number of activity limitation days (in the last 30 days), and the Centers for Disease Control and Prevention Healthy Days Index. Independent variables included the presence of coal mining, Appalachian region residence, metropolitan status, primary care physician supply, and BRFSS behavioral (e.g., smoking, body mass index, and alcohol consumption) and demographic (e.g., age, gender, race, and income) variables. We compared dependent variables across a four-category variable: Appalachia (yes/no) and coal mining (yes/no). We used SUDAAN® Multilog and multiple linear regression models with post-hoc least-squares means to test for Appalachian coal-mining effects after adjusting for covariates. Results. Residents of coal-mining counties inside and outside of Appalachia reported significantly fewer healthy days for both physical and mental health, and poorer self-rated health ($p < 0.0005$) when compared with referent U.S. non-coal-mining counties, but disparities were greatest for people residing in Appalachian coal-mining areas. Furthermore, results remained consistent in separate analyses by gender and age. Conclusions. Coal-mining areas are characterized by greater socioeconomic disadvantage, riskier health behaviors, and environmental degradation that are associated with reduced HRQOL.

21. Lovell, J., Critchley, J. Women living in a remote Australian mining community: Exploring their psychological well-being (2010) Australian Journal of Rural Health, 18 (3), pp. 125-130. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-77954842684&partnerID=40&md5=d39f9b604312ffaa2cca32a5ea3c6fe5> DOI: 10.1111/j.1440-1584.2010.01143.x

AFFILIATIONS: School of Rural Health, University of Melbourne, Shepparton, VIC, Australia ABSTRACT: Objective: To explore the factors believed to influence the psychological well-being of women living in a modern remote Australian mining community. Design: A qualitative phenomenological study conducted through focus group discussions. Setting: Remote Australian mining town. Participants: Sixteen women living in a remote Australian mining town with a partner undertaking shiftwork at one of the local mines. Main outcome measures: Women in a remote Australian mining community revealed, through focus group discussion, the factors influencing their psychological well-being. Results: Four themes were identified to be of importance for the women. These were the impacts of mining work, isolation, culture and the social environment on their happiness and well-being, and that of their families and the broader community. Conclusions: Psychological well-being of women in a remote mining community might be improved through better local medical services, increased efforts at social inclusion and community connectedness, greater access to child care and better community infrastructure and pleasant surrounds. The findings also question the stereotypes of strong masculinist cultures and limited activities and services in such communities. Further research is highly recommended.

22. Higginbotham, N., Freeman, S., Connor, L., Albrecht, G. Environmental injustice and air pollution in coal affected communities, Hunter Valley, Australia (2010) Health and Place, 16 (2), pp. 259-266.
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-73349138557&partnerID=40&md5=3958f2e7445fc6227914a2b66836f447> DOI: 10.1016/j.healthplace.2009.10.007

AFFILIATIONS: Centre for Clinical Epidemiology and Biostatistics, Faculty of Health, The University of Newcastle; Department of Anthropology, School of Social and Political Sciences, The University of Sydney; School of Sustainability, Faculty of Sustainability, Environmental and Life Sciences, Australia

ABSTRACT: The authors describe environmental injustice from air pollution in the Upper Hunter, Australia, and analyse the inaction of state authorities in addressing residents' health concerns. Obstacles blocking a public-requested health study and air monitoring include: the interdependence of state government and corporations in reaping the economic benefits of coal production; lack of political will, regulatory inertia and procedural injustice; and study design and measurement issues. We analyse mining- and coal-related air pollution in a contested socio-political arena, where residents, civil society and local government groups struggle with corporations and state government over the burden of imposed health risk caused by air pollution.

23. Stokes IV, S.C., Hood, D.B., Zokovitch, J., Close, F.T. Blueprint for communicating risk and preventing environmental injustice (2010) Journal of Health Care for the Poor and Underserved, 21 (1), pp. 35-52.
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-77249087737&partnerID=40&md5=f06581a257c4af2c01b7d421f7e126ce> DOI: 10.1353/hpu.0.0234

AFFILIATIONS: Florida A and M University, Environmental Sciences Institute, Tallahassee, United States; College of Pharmacy and Pharmaceutical Sciences, United States; WildLaw, St. Petersburg, FL, United States; Meharry Medical College, United States; Meharry Medical College, Neurobiology and Neurotoxicology, Ctr. for Molecular and Behavioral Neuroscience, 1005 D.B. Todd Blvd., Nashville, TN 37208, United States

ABSTRACT: Toxic environmental emissions have the potential to harm already susceptible populations living in close proximity to industries with pollutant emissions such as coal-fired electrical power plants. The organized dissemination of information in communities that find themselves susceptible to occupation by industries with pollutant emissions is a crucial step in the long and arduous process of preventing such harm. Here, we present a blueprint that can be used by community organizations to prevent industries that pollute the environment from locating in communities that are already disproportionately exposed to pollution (referred to here as environmental justice communities). We base this blueprint on a specific case in Taylor County, Florida, where the steps outlined successfully prevented the Taylor Energy Center (TEC) consortium from obtaining the necessary permits for the operation of a proposed coal-fired electrical power plant, thereby minimizing the risks of additional toxicant exposure to the affected community.

24. Blakeney, A.B., Marshall, A. Water quality, health, and human occupations (2009) American Journal of Occupational Therapy, 63 (1), pp. 46-57.
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-58649092342&partnerID=40&md5=2ab419041d4a75b478a667d59991bad9>
AFFILIATIONS: Department of Occupational Therapy, Eastern Kentucky University, 521 Lancaster Avenue, Richmond, KY 40475, United States; Department of Occupational Therapy, Eastern Kentucky University, Richmond, United States

ABSTRACT: OBJECTIVE. To introduce evidence of the critical link between water quality and human occupations. METHOD. A participatory action research design was used to complete a three-phase project. Phase 1 included mapping the watershed of Letcher County, Kentucky. Phase 2 consisted of surveying 122 Letcher County health professionals. Phase 3, the primary focus of this article, consisted of interviews with Letcher County adults regarding their lived experiences with water. The Occupational Therapy Practice Framework: Domain and Process (American Occupational Therapy Association, 2002) was used to structure questions. The Model of Occupational Justice provided the theoretical framework for presentation of the results. RESULTS. The watershed in Letcher County, Kentucky, is polluted as a

result of specific coal mining practices and a lack of adequate infrastructure. As a result, citizens experience occupational injustice in the forms of occupational imbalance, occupational deprivation, and occupational alienation. AUTHOR KEYWORDS: Environment; Health services research; Human activities; Rural health; Water

25. House, S., Howard, J. *Something's rising: Appalachians fighting mountaintop removal* (2009) *Something's Rising: Appalachians Fighting Mountaintop Removal*, pp. 1-306. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-84896253742&partnerID=40&md5=3a2ce00de4133e3fe2fc6cb3f517bffb>

ABSTRACT: Like an old-fashioned hymn sung in rounds, *Something's Rising* gives a stirring voice to the lives, culture, and determination of the people fighting the destructive practice of mountaintop removal in the coalfields of central Appalachia. Each person's story, unique and unfiltered, articulates the hardship of living in these majestic mountains amid the daily desecration of the land by the coal industry because of America's insistence on cheap energy. Developed as an alternative to strip mining, mountaintop removal mining consists of blasting away the tops of mountains, dumping waste into the valleys, and retrieving the exposed coal. This process buries streams, pollutes wells and waterways, and alters fragile ecologies in the region. The people who live, work, and raise families in central Appalachia face not only the physical destruction of their land but also the loss of their culture and health in a society dominated by the consequences of mountaintop removal. Included here are oral histories from Jean Ritchie, "the mother of folk," who doesn't let her eighty-six years slow down her fighting spirit; Judy Bonds, a tough-talking coal-miner's daughter; Kathy Mattea, the beloved country singer who believes cooperation is the key to winning the battle; Jack Spadaro, the heroic whistle-blower who has risked everything to share his insider knowledge of federal mining agencies; Larry Bush, who doesn't back down even when speeding coal trucks are used to intimidate him; Denise Giardina, a celebrated writer who ran for governor to bring attention to the issue; and many more. The book features both well-known activists and people rarely in the media. Each oral history is prefaced with a biographical essay that vividly establishes the interview settings and the subjects' connections to their region. Written and edited by native sons of the mountains, this compelling book captures a fever-pitch moment in the movement against mountaintop removal. Silas House and Jason Howard are experts on the history of resistance in Appalachia, the legacy of exploitation of the region's natural resources, and area's unique culture and landscape. This lyrical and informative text provides a critical perspective on a powerful industry. The cumulative effect of these stories is stunning and powerful. *Something's Rising* will long stand as a testament to the social and ecological consequences of energy at any cost and will be especially welcomed by readers of Appalachian studies, environmental science, and by all who value the mountain's majesty-our national heritage.

26. Sullivan, J., Petronella, S., Brooks, E., Murillo, M., Primeau, L., Ward, J. *Theatre of the oppressed and environmental justice communities: A transformational therapy for the body politic* (2008) *Journal of Health Psychology*, 13 (2), pp. 166-179. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-40349103665&partnerID=40&md5=1108dd8c49b9c80c13a2758db752d7ba> DOI: 10.1177/1359105307086710

AFFILIATIONS: University of Texas Medical Branch, Galveston, TX, United States; Sealy Center for Environmental Health and Medicine, NIEHS Center in Environmental Toxicology, University of Texas Medical Branch, 301 University Blvd, Galveston, TX 77555-1110, United States

ABSTRACT: Community Environmental Forum Theatre at UTMB-NIEHS Center in Environmental Toxicology uses Augusto Boal's Theatre of the Oppressed (TO) to promote involvement of citizens, scientists, and health professionals in deconstructing toxic exposures, risk factors, and cumulative stressors that impact the well-being of communities. The TO process encourages collective empowerment of communities by disseminating information and elaborating support networks. TO also elicits transformation and growth on a personal level via a dramaturgical system that restores spontaneity through image-making and improvisation. An NIEHS Environmental Justice Project, Communities Organized against Asthma & Lead, illustrates this interplay of personal and collective change in Houston, Texas.

27. Sharma, S., Rees, S. *Consideration of the determinants of women's mental health in remote Australian mining towns* (2007) *Australian Journal of Rural Health*, 15 (1), pp. 1-7. <https://www.scopus.com/inward/record.uri?eid=2-s2.0->

AFFILIATIONS: Centre for Domestic and Family Violence Research, Centre for Social Science Research, Central Queensland University, Mackay, QLD 4740, Australia; School of Public Health, Tropical Medicine and Rehabilitation Sciences, James Cook University, Cairns, QLD, Australia

ABSTRACT: Families in remote mining towns constitute a specific sociological group living under unique geographical and sociocultural circumstances. Isolation from friends and relatives and limited resources and opportunities for family members of mine workers are some of the distinct disadvantages of these towns. Decades ago it was observed that a large number of women in new and remote mining towns suffered from neurotic problems. In contemporary times there is a deficit of knowledge about the mental health of women in remote mining towns. However, there are certain indicators of significant mental distress among women living in these particular environments. Deriving from a review of literature, this paper explores various mining work-related issues and sociocultural settings and processes within remote mining towns that could possibly exert coercive pressures on the psychological health of female partners of mine workers and their relationship well-being. The paper suggests that work schedules and preponderance of men in mining jobs help promote a patriarchal culture within the community and the family; thereby marginalising women to a secondary status. Limited opportunities and resources within the community isolate women to domestic lives; while atypical work rosters associated with mining employment could negatively impact on the relationship well-being of couples. The paper recommends that an inquiry into psychiatric well-being among women of remote mining communities needs to consider the sociocultural structure and processes within these communities, and the structural nature of the mining job that could be responsible for role strain-induced stress and mental health problems among these women.

28. Albrecht, G., Sartore, G.-M., Connor, L., Higginbotham, N., Freeman, S., Kelly, B., Stain, H., Tonna, A., Pollard, G. Solastalgia: The distress caused by environmental change (2007) *Australasian Psychiatry*, 15 (SUPPL. 1), pp. S95-S98. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-36348980465&partnerID=40&md5=2edbc472b15b5be099cab6ff1327ccec> DOI: 10.1080/10398560701701288

AFFILIATIONS: School of Environmental and Life Sciences, The University of Newcastle, Callaghan, NSW, Australia; Centre for Rural and Remote Mental Health, The University of Newcastle, Callaghan, NSW, Australia; Centre for Asia Pacific Transformation Studies (CAPSTRANS), School of Humanities and Education, The University of Newcastle, Callaghan, NSW, Australia; School of Medicine and Public Health, The University of Newcastle, Callaghan, NSW, Australia; Centre for Clinical Epidemiology and Biostatistics, School of Medicine and Public Health, The University of Newcastle, Callaghan, NSW, Australia

ABSTRACT: Objective: Solastalgia is a new concept developed to give greater meaning and clarity to environmentally induced distress. As opposed to nostalgia - the melancholia or homesickness experienced by individuals when separated from a loved home - solastalgia is the distress that is produced by environmental change impacting on people while they are directly connected to their home environment. The paper will focus on two contexts where collaborative research teams have found solastalgia to be evident: the experiences of persistent drought in rural NSW and the impact of large-scale open-cut coal mining on individuals in the Upper Hunter Valley of NSW. In both cases, people exposed to environmental change experienced negative affect that is exacerbated by a sense of powerlessness or lack of control over the unfolding change process. Methods: Qualitative (interviews and focus groups) and quantitative (community-based surveys) research has been conducted on the lived experience of drought and mining, and the findings relevant to solastalgia are presented. Results: The authors are exploring the potential uses and applications of the concept of solastalgia for understanding the psychological impact of the increasing incidence of environmental change worldwide. Conclusions: Worldwide, there is an increase in ecosystem distress syndromes matched by a corresponding increase in human distress syndromes. The specific role played by global-scale environmental challenges to 'sense of place' and identity will be explored in the future development of the concept of solastalgia.

29. Lambert, T.W., Guyn, L., Lane, S.E. Development of local knowledge of environmental contamination in Sydney, Nova Scotia: Environmental health practice

from an environmental justice perspective (2006) *Science of the Total Environment*, 368 (2-3), pp. 471-484. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-33746744391&partnerID=40&md5=315e28e9fd9242fdbbc02030929c4d38> DOI: 10.1016/j.scitotenv.2006.03.012

AFFILIATIONS: Department of Community Health Sciences, University of Calgary, Calgary, Alberta, Canada; Environmental Health, Calgary Health Region, Canada; Department of Information and Evaluation Unit, Mental Health and Psychiatric Services, Calgary Health Region, Canada

ABSTRACT: In Sydney, Nova Scotia, from 1901 through 1988 a coke and steel factory operated with no pollution controls, depositing over a million tons of particulate matter and releasing several thousands of tons of coal tar into the estuary. Previously we documented the presence of lead, arsenic and PAHs, in soil above Canadian guidelines, and in house dust in the communities surrounding the site [Lambert, TW, Lane, S. Lead, arsenic, and polycyclic aromatic hydrocarbons in soil and house dust in the communities surrounding the Sydney, Nova Scotia, tar ponds. *Environ Health Perspect* 2004; 112:35-41.]. In this paper we further the research by documenting and developing community knowledge with a study of resident's observations and experiences of the industrial contamination. We conducted two surveys, a quantitative door-to-door survey and qualitative dust interview, designed to complement each other and bring together the observations and experiences in the different communities to develop the local knowledge. The combined methodology uses techniques from both social and physical science, and was developed with the cooperation of community members. The research supports the proposition that local knowledge adds contextual meaning that complements the physical measurement of environmental contaminants, in order to understand the complex environment in which people live, and the multiple exposure pathways through which they can be affected. Residents in all three communities provided vivid observations and detailed experiences of the industrial pollution in their community and homes. The local knowledge is consistent with our physical data and review of the historical scientific research in Sydney, and supports the inference that the community was adversely impacted by the coke and steel facility. From a justice perspective, the three communities should be equally considered for remediation as part of the 'tar pond remediation policy' rather than the current policy of including only a few streets and houses. © 2006 Elsevier B.V. All rights

30. Waddington, D., Parry, D. Managing industrial decline: The lessons of a decade of research on industrial contraction and regeneration in Britain and other EU coal producing countries (2003) *Institution of Mining and Metallurgy. Transactions. Section A: Mining Technology*, 112 (1), pp. A47-A55. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-0038605754&partnerID=40&md5=f64e9f6a124431b9241e9b7310567329> DOI: 10.1179/037178403225011042

AFFILIATIONS: School of Cultural Studies, Sheffield Hallam University, Collegiate Crescent Campus, Sheffield, S10 2BP, United Kingdom; National Research Officer, Coalfield Communities Campaign, United Kingdom **ABSTRACT:** This paper draws on an ongoing 10 year research programme into the social impact of industrial contraction and regeneration on mining communities. Though focusing primarily on the consequences of rationalisation and regeneration for British mining communities, the paper also alludes to the impact of recent policies in Belgium, Germany and Spain. The insights deriving from this research are offered as useful lessons for policymakers in Central and Eastern European countries where similar reductions in mining capacity appear imminent. The potentially negative effects of job loss and employment insecurity on working and former miners and their families are highlighted, emphasising how the decimation of the UK coal industry and its recent privatisation has produced widespread trade union exclusion and marginalisation, while arousing growing concerns for the health and safety of employees. Regeneration strategies in the UK are compared with those implemented by its Western European neighbours. Such a comparison underlines the need for coherent and well integrated policies, backed up by sustained long term funding.

31. Moffatt, S., Pless-Mulloli, T. "It wasn't the plague we expected." Parents' perceptions of the health and environmental impact of opencast coal mining (2003) *Social Science and Medicine*, 57 (3), pp. 437-451. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-0038617636&partnerID=40&md5=27b789a6b091f6597f6607a83dcd8067> DOI: 10.1016/S0277-9536(02)00369-6

AFFILIATIONS: Sch. of Pop. and Health Sciences, Medical School, University of Newcastle upon Tyne, Framlington Place, Newcastle upon Tyne NE2 4HH, UK

ABSTRACT: This paper explores the health and environmental concerns of parents living close to opencast coal mines in the UK and characterises parental risk perceptions in relation to children's asthma status. This qualitative research was undertaken in tandem with an epidemiological investigation aiming to establish whether opencast coal mining adversely affected children's respiratory health. Using a social construction approach, the centrality of health claims in environmental health disputes becomes apparent for a number of claims-makers. We focus on claims of non-activist participants in an epidemiological study, hitherto unknown and unexplored. In all but one case health claims were anticipated rather than realised. No link was found between children's asthma and exacerbation of the condition although some parents of children with asthma had greater concerns during the opencast planning stage. In fact, parents' discourses on children's health largely mirrored the epidemiological findings which showed increased dust, no increase in asthma prevalence but higher rates of general practitioner (GP) consultations for respiratory conditions suggesting that the commonly observed lack of convergence between lay and expert knowledge should not be taken for granted. In spite of this overall lack of an experienced health effect, the sociological data highlight respondents' recognition of the place-specificity of exposures, hence, the reasons why opencast proposals are likely to continue to be met with opposition. Environmental health studies which incorporate epidemiological and social approaches simultaneously have a better chance of arriving at conclusions meaningful to affected communities and facilitate greater understanding of environmental disputes.

32. Linehan, D.a , Gruffudd, P.b Bodies and souls: Psycho-geographical collisions in the South Wales coalfield, 1926-1939 (2001) *Journal of Historical Geography*, 27 (3), pp. 377-394. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-0034799248&partnerID=40&md5=3fcd4987924a5b5d047709922893bece> DOI: 10.1006/jhge.2001.0328

AFFILIATIONS: Department of Geography, University College Cork, College Road, Cork, Ireland; Department of Geography, University of Wales Swansea, Singleton Park, Wales Swansea, SA2 8PP, United States

ABSTRACT: The study of our region is not merely a study of scenery and climate, vegetation and animal life, it may, and must increasingly include a study of ourselves. And this study, while it will deal with our houses, roads and buildings, may well also include a survey of ourselves, body and souls! H.J. Fleure, *Regional Surveys and Welfare*, 1929 From these deep valleys may flow redeeming waters that can save society, or a flood of hate and class antagonism that may swamp our national life. But nothing else than a gospel that embraces the needs of body and soul, and synthesizes the redemption of the individual and society can release the former and save us from the latter. Reginald J. Barker, *Christ in the Valley of Unemployment*, 1936 Why should I go to Viola Chasm's Distressed Area; did she come to my Model Madhouse?

33. Gugliotta, A. Class, gender, and coal smoke: Gender ideology and environmental injustice in Pittsburgh, 1868-1914 (2000) *Environmental History*, 5 (2), pp. 165-193. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-0033924587&partnerID=40&md5=177269a66fd7c5be6a668a0861081c16> ABSTRACT:

ABSTRACT: Gender, class, and race are standard analytical categories that structure much of contemporary social and cultural history. Environmental historians have employed these categories to trace differential impacts of pollution across social divisions in studies concerned with 'environmental justice.' With class and race, it is easy to see disproportionate impacts-pollution burdens are distributed along spatial lines, and residential segregation has, in varying degrees, historically characterized American cities. The relevance of gender to environmental justice is less clear. How then do we talk about environmental justice and gender? Did gender differences influence concern about environmental justice with respect to race or class? Can we treat women or men as social groups who suffered unjust pollution burdens? How can we use 'gender as a ... category of historical analysis' to treat the articulation of the power relations that gave rise to differential pollution burdens? These three dimensions of gender and environmental justice intersect in the history of air pollution (smoke) in Pittsburgh. Changing conceptions of values, virtues, and the human good determine the meaning that 'environmental justice' can have in differing social groups.

34. Markandya, A. Employment and environmental protection: The trade-offs in an economy in transition (2000) *Environmental and Resource Economics*, 15 (4), pp. 297-322. <https://www.scopus.com/inward/record.uri?eid=2-s2.0-0034177445&partnerID=40&md5=ef5e2d8a9d9fc2be172b839e8af969ef> DOI: 10.1023/A:1008324810845

AFFILIATIONS: Dept. of Econ. and Intl. Development, University of Bath, UK

ABSTRACT: One of the most pressing problems in an economy in transition is that of unemployment. Hitherto the 'costs' of this unemployment have either focused on the value of the lost production, or on the costs to the government of supporting the unemployed. From a social viewpoint this is inappropriate. In this paper, we discuss the costs of unemployment in terms of their impacts on human welfare, particularly the health effects. On the positive side, as inefficient industries are shut down and as production responds to market pressures, wasteful government subsidies are reduced, as is the level of environmental pollution. Clearly, therefore, there is a trade-off between the environmental and economic benefits on the one hand and the welfare costs of unemployment on the other. In this paper, a simple model is developed to analyze this trade-off. A single firm has a short-run production function in which output is dependent on the level of employment. The present position is characterized by 'inefficiency' in that the firm is making a loss and overproduction is taking place. Environmental damage is a function of the level of output. The efficient production point is known, as are the efficiency prices. The problem to be solved is to minimize the costs of moving to the efficient point. The paper characterizes the efficient dynamic path and gives some illustrations of such a path for the coal sector in Russia, for given values of the efficiency losses, the environmental costs of using coal and costs of unemployment.

7.2 Additional references not generated in the systematic literature search

35. Petrova, S., Marinova, D. Social impacts of mining: Changes within the local social landscape (2013) *Rural Society*, 22:2, 153-165, DOI: 10.5172/rsj.2013.22.2.153 <http://dx.doi.org/10.5172/rsj.2013.22.2.153>

Abstract: Understanding the social impacts at a community level triggered by mining operations is a challenging exercise. This paper reflects on a community's perceptions and interpretation of these impacts as well as on the qualitative changes in the local social landscape and their implications for a sustainable future. The findings are based on an exploratory research carried out in a small established settlement in Western Australia. Considered as an agricultural community for decades, Boddington currently hosts two mining operations. Even though mining has been carried out there for decades, the recent opening of a large-scale mining operation is triggering significant demographic changes which result in a structural and functional transformation of the local social environment. Two new phenomena, namely transiency and a dependency culture are identified. Maintaining existing levels of social and economic capital as well as mobilizing the community's resources to capitalise on the opportunities associated with mining, are identified as key challenges for the settlement's sustainability.

36. Franks, D.M., Brereton, D., Moran, C.J. Managing the cumulative impacts of coal mining on regional communities and environments in Australia (2010) *Impact Assessment and Project Appraisal*, 28:4, 299-312, DOI: 10.3152/146155110X12838715793129 <http://dx.doi.org/10.3152/146155110X12838715793129>

The expansion and contraction of the coal mining industry in Australia has placed pressure on regional communities and environments and multiplied the extent, magnitude and profile of cumulative impacts. While some mining communities have benefited from the expansion of the coal industry through the creation of jobs and the investment in economies, the compounding impacts of multiple mining operations have stretched environmental, social, human and economic systems and rendered conventional mine-by-mine governance approaches ineffective. In this paper we draw from examples in the Bowen Basin, Hunter Valley and Gunnedah Basin to traverse the range of cumulative impacts resulting from mining activities, and detail working examples of management and assessment practices that aim to enhance positive, and avoid and mitigate negative, cumulative impacts.

37. Chen, C., Randall, A. The economic contest between coal seam gas mining and agriculture on prime farmland: It may be closer than we thought (2013) *Journal of Economic and Social Policy*: 15(3), Article 5.
<http://epubs.scu.edu.au/jesp/vol15/iss3/5>

AFFILIATIONS: University of Sydney, Sydney, NSW Australia

ABSTRACT: There is substantial market impetus behind the expansion of coal seam gas (CSG) in Australia, driven by buoyant international demand for liquefied natural gas. The benefits of CSG development come in the first few decades, followed by a potentially long period in which the agricultural and environmental costs dominate. We identify the key drivers influencing the economic contest of CSG versus agriculture on prime farmland, and undertake a Darling Downs case study using evidence from primary and secondary sources. Despite the momentum driving CSG development, under some plausible scenarios, the long-term economic net benefits from agriculture-only exceed those from CSG-only and CSG-agriculture coexistence.

38. Morgan M., Hine D.W., Bhullar N., Dunstan D., Bartik W. Fracked: Coal seam gas extraction and farmers' mental health (2016) *Journal of Environmental Psychology*, 47, 22-32 [10.1016/j.jenvp.2016.04.012](https://doi.org/10.1016/j.jenvp.2016.04.012)

ABSTRACT: Farmers are exposed to a unique range of vocational stressors, and while mental health morbidity is similar to their non-rural counterparts, suicide rates in the farming community are higher. We examined the contribution of coal seam gas (CSG) extraction to the global stress burden and mental health of 378 Australian farmers (mean age = 53.08 years; SD = 10.28). Exploratory factor analysis revealed that CSG items added two unique dimensions to the Edinburgh Farming Stress Inventory (EFSI): Off-Farm CSG Concerns (concerns about possible impacts of CSG extraction on human health, communities, and the environment) and On-Farm CSG Concerns (potential CSG impacts on farm profitability, disruption of farm operations, and privacy). Subscales based on the new factors correlated significantly with farmers' self-reported levels of depression, anxiety and stress reactivity, as assessed by the DASS-21. Latent profile analysis categorized farmers into four distinct segments based on their overall stress profiles: Non-Stressed (39%), Finance-Stressed (31%), CSG-Stressed (15%) and Globally-Stressed (15%). Farmers in the CSG-Stressed and Globally-Stressed profiles exhibited clinically significant levels of psychological morbidity. This information can be used to inform strategies for improving mental health outcomes in the agrigasfields of Australia

39. Huth N.I., Cocks B., Dalgliesh N., Poulton, P., Marinoni O., Navarro J. (2014) Farmers' perceptions of coexistence between agriculture and a large scale coal seam gas development: working paper, June 2014,

Commonwealth Science and Industry Research Organisation, (CSIRO), Australia.

ABSTRACT: The Coal Seam Gas (CSG) extraction industry is developing rapidly within the Surat Basin in southern Queensland, Australia, with licences already approved for tenements covering more than 24,000 km². Much of this land is used for a broad range of agricultural purposes and the need for coexistence between the farm and gas industries has been the source of much conflict. Whilst much research has been undertaken into the environmental and economic impacts of CSG, little research has looked into the issues of coexistence between farmers and the CSG industry in the shared space that is a farm business, a home and a resource extraction network. We conducted a series of workshops with farmers from across a broad region undergoing CSG development to explore farmers' perceptions of some of the issues arising from large scale land use change. Workshops explored the importance of place identity and landscape aesthetics for farmers, farmers' acceptance and coping with change, and possible benefits from off-farm income. We found that farmers believed that place identity was not well understood by CSG staff from non-rural backgrounds and that farmers struggled to explain some concerns because of the different way they interpreted their landscape. These differences were the cause of much frustration and farmers felt that this has led to severe impacts on mental health and well being. Farmers felt that a change in culture within the CSG companies will be required if engagement with farmers is to improve and that efforts to employ local people in these communications was helping this. The workshops also identified a range of issues perceived by farmers arising from increased traffic volumes, impacts to mental health and well being, place identity and loss of water resources for farmers. Finally, it was suggested that scientists and agricultural industry

groups will need to work closely with farmers to develop understanding of these emerging issues and to develop solutions that are timely and relevant.

40. McManus, P., Connor, L.H. What's mine is mined(d): Contests over marginalisation of rural life in the Upper Hunter, NSW (2013) *Rural Society* 22 (2), 166-183.

AFFILIATIONS: School of Geosciences, The University of Sydney, Sydney, NSW;
*Department of Anthropology, The University of Sydney, Sydney, NSW, Australia

ABSTRACT: Rural life in the Upper Hunter Region of NSW is threatened by the mining and burning of coal and coal seam gas extraction. Extensive open-cut mining is a serious threat to productive rural enterprises between Singleton and Muswellbrook, while mining and gas extraction is expanding into communities on the Liverpool Plains and around Gloucester. The marginalisation of rural life has economic, environmental and sociocultural dimensions. Economically, the marginalisation of rural life refers to declining food production, threatened rural industries such as thoroughbred breeding and viticulture, and to the loss of commercial services in rural towns. Environmental damage includes air and water pollution, biodiversity loss, destruction of aquifers and waterways, and the loss of fertile agricultural land. Socio-cultural impacts include threats to human health, rising income inequality, depopulation of villages, and damage to the fabric of rural communities from mining incursion. The article examines the competing scripts employed in land use contests and how communities are using new and reflexive constructions of 'the rural' that integrate traditional identity, discourses of sustainability and the re-centring of rural life. This analysis illuminates the entrent situation of marginalisation and the possible future of rural life in the Upper Hunter and surrounding areas.

41. McTaggart, F., McDermott, L., Tynan, A., Gericke, C. Examining health and well-being outcomes associated with mining activity in rural communities of high-income countries: A systematic review (2016) *Australian Journal of Rural Health*, 24, 230-237.

AFFILIATIONS: Wesley Medical Research, The Wesley Hospital, School of Public Health and Social Work, Queensland University of Technology and School of Public Health, University of Queensland, Queensland, Australia

ABSTRACT: Objective: It is recognised internationally that rural communities often experience greater barriers to accessing services and have poorer health outcomes compared to urban communities. In some settings, health disparities may be further exacerbated by mining activity, which can affect the social, physical and economic environment in which rural communities reside. Direct environmental health impacts are often associated with mining activity and are frequently investigated. However, there is evidence of broader, indirect health and well-being implications emerging in the literature. This systematic review examines these health and well-being outcomes in communities living in proximity to mining in high-income countries, and, in doing so, discusses their possible determinants. Methods: Four databases were systematically searched. Articles were selected if adult residents in mining communities were studied and outcomes were related to health or individual or community-level well-being. A narrative synthesis was conducted. Results: Sixteen publications were included. Evidence of increased prevalence of chronic diseases and poor self-reported health status was reported in the mining communities. Relationship breakdown and poor family health, lack of social connectedness and decreased access to health services were also reported. Changes to the physical landscape; risky health behaviours; shift work of partners in the mine industry; social isolation and cyclical nature of 'boom and bust' activity contributed to poorer outcomes in the communities. Conclusion: This review highlights the broader health and well-being outcomes associated with mining activity that should be monitored and addressed in addition to environmental health impacts to support co-existence of mining activities and rural communities.