Health Impacts of Resource Extraction & Development (HIRED): Knowledge synthesis and policy insights

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OVERVIEW

• Health Impacts of Resource Extraction & Development
  o Background and Context
  o Knowledge Synthesis (Phase 1): Scoping Review “as a process of mapping the existing literature or evidence base” (Armstrong et al 2011)

• Methods and Analysis
  o “from 21237 to 2801”...
  o Analysis: general description and extent of the evidence.

• Findings and Discussion
  o Overview of findings
  o Next steps
Supporting Communities with Evidence

What does the evidence say? What do communities want?

UNBC HIRED

YGT

northern health

First Nations Health Authority
Health through wellness

Community Level Engagement

Health and Resource Development Support Tools

..... designed with First Nation and local communities in mind

Northern Health

Canada
Overall guiding question: How are the public health impacts of resource development understood and addressed, and how can these approaches be applied (especially to the context of northern BC)?

**Phase 1:** Scoping Review (comp. May 2016). **Specific Question:**

“What is the scope of published literature that addresses the links between resource extraction from the earth’s crust (e.g. mining/oil & gas) and health outcomes?”

→ A ‘map’ of the what kinds of papers have been published;
→ Does not comment on the quality of evidence;
→ Does identify hotspots (and/or gaps) for future work.

**Phase 2:** Informed by the Scoping Review (May 2016-Sept 2017)

• Metanarrative Analysis
+ Targeted Systematic Literature Reviews
Cumulative Determinants of Health Impact:

- Diverse drivers of change in region or landscape of concern;

→ A ‘cascade of effects and impacts’

- Direct effects
- Direct impacts (as a consequence of effects)
- Indirect Impacts
- Long-term indirect (downstream) impacts

(Parkes et al, Figure 5.2 in Gillingham et al, 2015)
Selection of review sample

- Initial scan completed by UNBC librarian (n = 21237)
- Use of inclusion/exclusion criteria to narrow search (n=4473)
- Final Sample for coding/tagging (n=2801)
Inclusion Criteria

When the title/abstract deals with extraction OR transport of resources from the earth’s crust AND one or more health outcomes OR human exposures to toxic substances. Includes papers that describe/address:

- environmental distribution of toxic substances AND actual calculated or measured human exposure and/or health impact;
- resource extraction and health services, even if they don’t describe health outcomes (e.g. paramedics on resource extraction worksites);
- changes in human physiology in relation to resource extraction, even if you don’t recognize those physiological changes as a pathology or health ‘problem’;
- occupational health risks at a national, regional / continental or even global level if they specifically mention mining/oil & gas
- health interventions to prevent health impacts from resource extraction, even if it doesn’t specify any specific health outcomes;
- historical accounts of social / legal / political / scientific / health services activity related to health effects of extractive industry (even if they describe events long ago);
- mathematic models of resource extraction – health relationships in humans;
- ‘safety’ in resource extraction;
- diagnostic tests for health conditions actually or potentially related to resource extraction.

Health Impacts of Resource Extraction & Development (HIRED)
Scoping Review Analysis

Explore the extent of the literature in a particular domain without describing findings in detail (Armstrong, 2011)

- General Descriptors: Year of publication, Journal, country, world economies
- Sector/type of extractive activity
- Affected population
- Objective of the study
- Type of health impacts
- Methodological approach used in the study
- Type of impact pathways examined in the study
Results: Distribution of Sources per Year

Number of articles triple in 20 years
Results: Distribution of Sources per Journal

<table>
<thead>
<tr>
<th>Journal</th>
<th>Number of Articles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Journal of Occupational and Environmental Medicine</td>
<td>192</td>
</tr>
<tr>
<td>American Journal of Industrial Medicine</td>
<td>117</td>
</tr>
<tr>
<td>Science of the Total Environment</td>
<td>78</td>
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<tr>
<td>Occupational Medicine</td>
<td>61</td>
</tr>
<tr>
<td>Environmental Health Perspectives</td>
<td>57</td>
</tr>
<tr>
<td>International Journal of Occupational &amp; Environmental</td>
<td>47</td>
</tr>
<tr>
<td>Annals of Occupational Hygiene</td>
<td>42</td>
</tr>
<tr>
<td>International Archives of Occupational &amp; Environmental</td>
<td>39</td>
</tr>
<tr>
<td>Safety Science</td>
<td>38</td>
</tr>
<tr>
<td>Radiation Protection Dosimetry</td>
<td>38</td>
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<tr>
<td>Environmental Geochemistry &amp; Health</td>
<td>38</td>
</tr>
<tr>
<td>Health Physics</td>
<td>36</td>
</tr>
<tr>
<td>Journal of Safety Research</td>
<td>33</td>
</tr>
<tr>
<td>Environmental Research</td>
<td>32</td>
</tr>
</tbody>
</table>

Dominated by Journals in Occ & Env Health
Results: Distribution of Sources per Country

Number of Hits for Country Name

Country:
- South Africa
- United States
- China
- Australia
- India
- Brazil
- Canada
- Germany
- Nigeria
- Ghana
- Mexico
- Chile
- Italy
- Iran, Islamic Rep.
- Turkey
- Tanzania
- Spain
- Japan
- Peru

World Bank Classification
- High-Income
- Upper-middle Income
- Lower-middle Income
- Low-income

Title and Abstract

Health Impacts of Resource Extraction & Development (HIRED)
Key findings: Orientation of Study

- **Industry:** Mining was cited in 85% of the sources; Oil and Gas in 15% of the studies.
- **Affected population:** workers (57%) and surrounded communities (18%) most often cited as affected populations.
- **Objectives of the published studies:** Of the study objectives cited in the publications, 83% focused on distinct health impacts (as described in modeling, epidemiological or toxicological studies). Occupational health and safety intervention were the next most common study objective.
- **Study designs of published studies:** Nearly all studies (89%) used a quantitative methodological framework in their design. Other study types included: Qualitative (5%); Mixed Methods (3%) and Other (3%).
Key findings: Types of impact in study sample

Types of Health Impacts reported on in the sample of publications

- Well-being/quality of life
- Mental or psychosocial, including trauma and stress
- Sexually Transmitted Infections
- Other
- Musculoskeletal
- Chronic disease
- Chronic injury, e.g. back pain or eye strain
- Acute injury, e.g. due to accidents
- Disability
- Death
- Blood disorders and poisonings
- Cancer
- Respiratory
- Birth defects and pregnancy issues
- Genetic damage
- Other

Social, mental and behavioural
Occupational
Environmental
Other
Key findings: Type of Impact Pathways

Exposure to toxic substances, e.g. chemical or radiological: 1661
Workplace accident or hazardous condition: 481
Ecosystem change: 315
Occupation name: 266
Behavioral or social, e.g. HIV risk, experience of trauma: 224
Social determinants: 105
Disaster: 78

Health Impacts of Resource Extraction & Development (HIRED)
Discussion

• **Limitations:** Scoping review – does not pick up information available in reports and grey literature (including unpublished health impact assessments)

• Provides a ‘map’ of studies published – including parameters, patterns and gaps:
  → Some surprises, some affirmations, a more informed view

• **Mismatch between types of studies published and community concerns,** including:
  • Impacts on mental health and well-being
  • Impact on determinants of health, via social pathways
  • Impacts to culture, community cohesion (including through ecological pathways)
Conclusions & Next steps

• The ‘map’ of published studies has identified gaps:
  • What kinds of bias could be contributing to these gaps? A bias in what kinds of research is funded? Is conducted? Is published in peer-reviewed sources? and/or a reflection of ‘traditional methods’?

“Absence of evidence is not evidence of absence”

• Targeted systematic reviews –inc. grey literature e.g.
  • Impacts on mental health and well-being? (solastalgia)

• Metanarrative synthesis: ‘eco-social’ pathways of impact?
  • via ‘social’ pathways: housing, education, social cohesion, community infrastructure;
  • via ‘ecological’ pathways: land, water, air, ecosystem services (supporting, provisioning, regulating and cultural services for wellbeing)
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Gillingham, M.P, Halseth, G.R Johnson, C.J, & MW. Parkes (Eds.), The Integration Imperative: Cumulative Environmental, Community and Health Effects of Multiple Natural Resource Developments (pp. 3–20). Cham: Springer International Publishing. [http://dx.doi.org/10.1007/978-3-319-22123-6_1](http://dx.doi.org/10.1007/978-3-319-22123-6_1)


