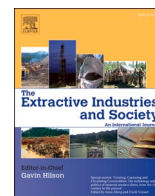


Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

The Extractive Industries and Society

journal homepage: www.elsevier.com/locate/exis

Original article

A global vulnerability analysis of displacement caused by resource development projects

Owen JR^{*}, Kemp D, Lèbre É, Harris J, Svobodova K

Centre for Social Responsibility in Mining, Sustainable Minerals Institute, Sir James Foots Building (47a), The University of Queensland, St Lucia Campus, Queensland 4072, Australia



ARTICLE INFO

Keywords:

Resettlement
Sustainability
Impoverishment
Risk
Climate change
Transparency

ABSTRACT

The authors present a multidimensional analysis of vulnerability conditions surrounding a global cohort of 270 mining induced displacement and resettlement (MIDR) events. A global dataset of MIDR events was compiled using publicly disclosed sources of information and is a repository of displacement events that enables independent examination of MIDR patterns at a scale previously unavailable to development scholars. Each event in the dataset represents the displacement of a single village or settlement. The dataset spans a 50 year period between 1969 and 2019. Using spatial coordinates for individual mining projects, the location of MIDR events was specified and cross-referenced against publicly available spatial datasets to establish proxies for context specific vulnerability. Three indicators were used: the Fragile States Index (FSI), Aqueduct 3.0 Water Risk Framework, and the Global Food Security Index. Recording events by settlement demonstrates how mining land-use patterns create the demand for displacement and resettlement. These results suggest that the number of displacement events increase in direct proportion to the development stage of the project. Our results highlight the depth of information required by governments and communities to make defensible judgements about the medium and long term development trade-offs associated with resource extraction.

1. Introduction: Displacement and the chronic data void

Over the past five decades, scholars and activists have called for deeper institutionalised safeguards to protect the basic interests of people displaced in the name of development. This includes calls to private sector actors, nation states and financiers as the institutional holders of authority, capital and the means to enable or prevent displacement (Kabra, 2018). These calls have not challenged the model that gives rise to these outcomes, but have promoted a kind of institutionally-endorsed natural economic justice whereby those who “make way” for large-scale development projects receive their share of the benefit through “resettlement with development”, with the latter term used to suggest that an upside benefit should accrue to those people who are displaced (Cernea and Marthur, 2008; Vanclay, 2017). As Cernea argues (1997), “Redressing the inequities caused by displacement and enabling affected people to share in the benefits of growth is not only possible but is also necessary, on both economic and moral grounds”. While not explicit in the resulting outcomes experienced by affected populations, States and private sector proponents have embraced this “benefits discourse”, and in the few mentions made of

projects casting local populations aside for the so-called common good there is more often than not, a by-line suggesting that everyone will be better off for their displacement (deWet, 2001). The utilitarian rhetoric of nation-scale development is palpable, but the practice on the ground has been deeply disappointing (Price et al, 2020).

The mechanisms utilised by the State for dispossessing people of land and natural resources has not evolved markedly over the last two centuries (Sikor and Lund, 2009). In most jurisdictions world-wide, the approach is to expropriate land and other natural resources using the power of eminent domain vested in the State (Chimhowu and Hulme, 2006). Compensation is paid at market rates in countries where the laws recognise the right of private citizens to negotiate the transfer of their assets, and in others, people are dispossessed with little regard for the social, cultural and economic value carried in their property (Wang et al, 2020). Forced dispossession can also occur in states where laws recognise only a certain demographic as holding compensable assets, property and other sets of rights (Evans, 2018). Negotiated settlements are increasingly encouraged by international finance institutions, but not to the extent that affected people can elect for the “no displacement option” (Price, 2015a, Price and Tagliarino, 2019). The distinction in

^{*} Corresponding author.

E-mail addresses: j.owen@uq.edu.au (O. JR), d.kemp@uq.edu.au (K. D), e.lebre@uq.edu.au (L. É), jill.harris@uq.edu.au (H. J), k.svobodova@uq.edu.au (S. K).

<https://doi.org/10.1016/j.exis.2021.01.012>

Received 11 January 2021; Received in revised form 24 January 2021; Accepted 25 January 2021

Available online 3 February 2021

2214-790X/© 2021 Published by Elsevier Ltd.

some jurisdictions between land acquisition and land (and water) grabbing can be almost impossible to determine (Rulli et al., 2013).

Development with displacement continues apace and with discernibly low levels of public accountability for the scale or the effect on people who are displaced. Large-scale industrialisation of the kind required to build modern nation States, both in rural and urban environments: retail centres, condominium projects, roads, rail, river and ocean port facilities, conservation zones, hydropower dams, mines, all require people to make way for change. This type of internal displacement, through the assumed peaceful prism of economic development, persists over vast areas, and with scant record to mark where and how people were displaced, or how they fare after their displacement. The numbers of people displaced through State-sanctioned development activities have proven difficult to estimate even after decades of researchers pointing to an absence of data (Cernea and Maldonado, 2018).

This chronic data void has served to shape our collective understanding of displacement and the perils it offers for those unfortunate enough to be caught up in its path (Price, 2015). Much of the foundational work on which the science of resettlement rests is structured around the emblematic case studies of pioneers exposing the harms of dispossession and the failure of States and markets to restore to those that which they lost (Dunning, 1970; Scudder and Colson, 1979; Hall, 1994). Resettlement science found its original point of focus in highlighting the precariousness of the conditions caused by development (Shi, 2000). A watershed moment in the evolution of resettlement science was The World Bank's (1996) internal review of displacement outcomes that it had accrued as a product of projects supported by the bank between 1988 and 1993. This review was conducted at global scale and, in addition to confirming the insights generated through the cumulative building of case studies, also revealed new patterns about the roles played by financiers, States and private enterprises in creating conditions of impoverishment and precariousness. A major omission in the scope of the review, which was noted by the Bank, and the Bank's Senior Policy Advisor, Michael Cernea (1995), was its failure to examine the effect of the mining sector on displacement and resettlement globally.

An alternative to this long-standing model of rights-reductive industrial development is presented in the United Nation's (UN) Sustainable Development Goals (SDGs), and the Millennium Development Goals (MDGs) that preceded them. While the UNSDGs do not refer to this scarred history of development, the framework embraces the benefits discourse; and in doing so presumes that the current approach to development can and will change, and that resettlement with development will prevail. The assumption carried in the UNSDGs is ambitious: that contrary to centuries of economic and environmental injustice, industrial-supported development will become responsive to its effects on people and the environment (Scheyvens et al., 2016).

2. The global mining industry as a critical test case

Mining is a critical test case for tracking the progress of such high ambition. The sector is largely driven by private enterprise, project activities generate significant environmental and social impacts, mineral resources are finite, and the flow of benefits to the State are tied to the performance and lifecycle of the project. Case studies on mining-induced displacement and resettlement (MIDR) raise enormous challenges for private sector led development (Owen and Kemp, 2016): the underlying modality is for people to make way as an accepted "price of progress", and the results case-by-case, indicate that displaced populations are fundamentally worse off as a result (Downing 2002, Owen and Kemp, 2015, Owen et al, 2020). There is no evidence carried in the practices of the industry that speaks to the change assumed by the UNSDGs; that is, that those who make way for resource extraction projects are receiving displacement with dividends.

The absence of historical datasets works to the distinct advantage of both the resource developer and the State. Assertions made by activists

Table 1

Data sources for the MIDR dataset: source types, counts, purpose and limitations.

| Data source | Purpose | # Sources reviewed | Limitations |
|---|--|--------------------|--|
| Peer-reviewed academic literature | Source of rigorously collected data on historical, political and social issues surrounding MIDR case events. | >100 | Case study driven; Mining activities unspecified; Lifecycle unspecified. |
| News media | News articles used for confirming key dates, actors and place names. | >2000 | Case study driven; Mining activities unspecified; Lifecycle unspecified. |
| Grey literature | Source of leads for further investigation. | >400 | Access to primary data to support findings on performance issues; Predominantly case driven. |
| Resettlement Action Plans (RAPs) | Source of comprehensive planning information about individual MIDR events. | >70 | Inconsistent use of measures; Prospective rather than actual; Few final versions in the public domain. |
| Sustainability reports | Source of leads for further investigation. | >60 | No substantive information provided on scale, scope or timing. |
| S&P Global Market Intelligence database | Confirm geo-coordinates of the project in addition to key project milestones. | >20,000 | Settlement location unspecified; mine closure year unreliable. |

at the global scale are made all the more challenging without the evidence base to support claims of industry harm. The limitations of the data have indeed been vast: no consolidated inventory of resettlement events world-wide; and no accompanying information about the developer, the efforts made in acquiring land, or in the attempt to remediate loss. Moreover, inconsistency across reporting regimes has raised doubts over the ultimate value of data at scale (Kinsey and Binswagner, 1993; Kirchherr et al, 2019). While the relatively small number of qualitative MIDR case studies effectively highlights the plight of the displaced (Alexandrescu, 2011; Madebwe et al, 2011; Abuya, 2013; Hemer, 2015; Kemp and Owen, 2015; Akslund, 2018; Kesselring, 2018; Wilson, 2019), they are singular in focus. With a growing repository of case studies it is possible to knit together a patchwork of MIDR cases, however, even with a compelling assortment of thick local examples, researchers are missing opportunities to examine patterns that are only discerned at scale.

In this article we present a multidimensional analysis of vulnerability conditions surrounding a global set of 270 MIDR events. A global dataset (Owen et al, 2019) of MIDR events was compiled over five years using publicly disclosed sources of information and is a repository of displacement events that enables independent examination of MIDR patterns at scale. Our analysis of the dataset reveals four industry-specific displacement patterns. First, that reported MIDR events overwhelmingly occur in countries with pre-existing vulnerabilities in terms of State governance and human development. Second, the mining projects themselves often develop in a haphazard fashion that manifests in sporadic demands for land and spates of unplanned displacement activities thatacerbate conditions of vulnerability. A majority of reported MIDR events can be shown to occur in the productive phase of mine life, often more than a decade after the project was permitted through the apparatus of the State. Third, these disruptive activities in vulnerable locations affect displaced people in the most fundamental of ways. Not only are people's lands acquired involuntarily, but the context for reconstructing people's lives and livelihoods primarily take place in settings that have moderate to severe levels of food and water insecurity. Fourth, where disclosed, records indicate that as mining projects progress through their project lifecycle, the source of

Table 2
MIDR dataset fields.

| Focus | Category | Sub-category | Variable type | % missing cases | | |
|--------------------------------|-------------------------------|---|--|-------------------------|-----------------------------------|---------------------|
| Mining Company/ Project | 1 | Identifying information | Project owner/s | String | 0% | |
| | | | Name of mining project | String | 0% | |
| | 2 | Location: headquarters | Location of primary project owner's headquarters | String | 0% | |
| | | | 3 | Location: mine | Location Reference: Latitude | Scale |
| | Location Reference: Longitude | Scale | | | 0% | |
| | Geographical Region | Categorical | | | 0% | |
| | Resettlement case | 4 | Public sector ownership | Country | Categorical | 0% |
| Categorical: y/n | | | | 1% | | |
| 5 | | Mining commodity/ies | | String | 0% | |
| | | | 6 | Year mine permitted | | Scale |
| 7 | | Expected year of mine closure | | | | Scale |
| | | | 8 | Identifying information | Name of the affected settlement/s | String |
| Number of affected settlements | Scale | 6% | | | | |
| 9 | Time of displacement | Year of displacement | | | Scale | 3% |
| | | Years into the LOM that displacement occurred | | | Scale | 6% |
| 10 | Type of displacement | Mine lifecycle stage at time of displacement | | | Categorical | 3% |
| | | Economic displacement | | | Categorical: y/n | 7% |
| | | Physical displacement | | | Categorical: y/n | 3% |
| 11 | Source of displacement | Physical displacement: on or off the mining lease | Categorical: on/ off | 55% | | |
| | | | Categorical | 26% | | |
| 12 | Extent of displacement | Number households displaced | Scale | 20% | | |
| | | Size of land taken (hectares) | Scale | 58% | | |
| Disclosure mechanisms | 13 | Presence of ASM | | Scale | 35% | |
| | | | 14 | Name/type of mechanism | Applied International Safeguards | Categorical: y/n/NA |
| | IFC Safeguards | Categorical: y/n/NA | | | 18% | |
| | RAP Document | Categorical: y/n/NA | | | 0% | |
| | | Public Plan Document | Categorical: y/n/NA | 0% | | |
| | Completion Report | Categorical: y/n | 5% | | | |

Note. % missing cases = the proportion of cases with no information for the particular category/sub-category; latitude and longitude reported in degrees; y/n = yes/no; LOM = life of mine; ASM = artisanal and small scale mining; IFC = International Finance Corporation; RAP = resettlement action plan.

displacement is considerably more likely to come from the waste stream of the mine compared with other project activities. Unlike mining pits and processing plants that are notionally fixed in place, waste streams can be located and stored in a variety of ways – raising critical questions about the quality of controls used to contain known sources of industrial externality and their impact on vulnerable populations (Owen and Kemp, 2019).

3. Method and characteristics of the MIDR dataset

3.1. Method and data collection

The 2019 dataset contains 270 records for MIDR cases. Each case aims to represent the displacement of a single village or settlement. A decision was made to record settlements as the basis of cases for the following reasons. A single mining project can displace multiple settlements over the course of its lifecycle. Similarly, single settlements can be displaced by the same project multiple times. Recording events by settlement provides the basis for demonstrating how mining land-use patterns across the project lifecycle create the demand for displacement and resettlement.

Data was collected between August 2014 and September 2019. Six (6) sources of information were used in compiling the MIDR dataset. These sources are described in Table 1 below.

The major constraint in developing the dataset was the absence of information in key fields. Due to their remoteness, and the difficulty of accessing mining projects and settlements, companies are able to control the collection and release of information about displacement and resettlement cases. Global reporting initiatives do not require mining companies to disclose full and complete information about the scope of

their resettlement activities, such as the amount or type of land acquired, the locality of settlements, or where people resettle.¹ No requirement for timely reports on performance outcomes exist under current legislative or agreed international standards (Owen and Kemp, 2016). In some instances, third parties, such as consultants, have access to project relevant information pertinent to a more complete understanding of a resettlement event, but non-disclosure and commercial in-confidence arrangements prevent these third parties from sharing this data with researchers and other interested parties. As a result, relatively little information is available in the public domain.

Extensive searches across multiple source types revealed two challenges. First, the scarcity of sources available to confirm that a displacement event has occurred. Second, within these information constraints, to construct a record for the event that provides a reliable basis for comparison against other records in the dataset. Several events were excluded on the grounds that information was overwhelmingly incomplete or that the events referred to a future unconfirmed date (i.e. the resettlement was a proposal at the time the document was produced). The minimum criteria for establishing a case record for an MIDR event was therefore: project, operator, and commodity must be discernible, with at least two fields of reliable information about the displaced population (e.g. name or number of settlements, number of estimated households affected) to allow further development of the record.

Records in the MIDR dataset were then matched with “Metals & Mining Properties” records in the S&P database (S&P 2019) in order to access supplementary information about projects in the MIDR set. The S&P database includes exact coordinates of project locations, current and past ownership details, mined commodities and expected closure year. Mining projects were searched on a case-by-case basis in the S&P

¹ The Global Reporting Initiative G4 (GRI, 2014) Mining Sector Supplement for instance requires only that companies reports sites where resettlements took place, the number of households or individuals resettled, and how their livelihoods were affected in the process.

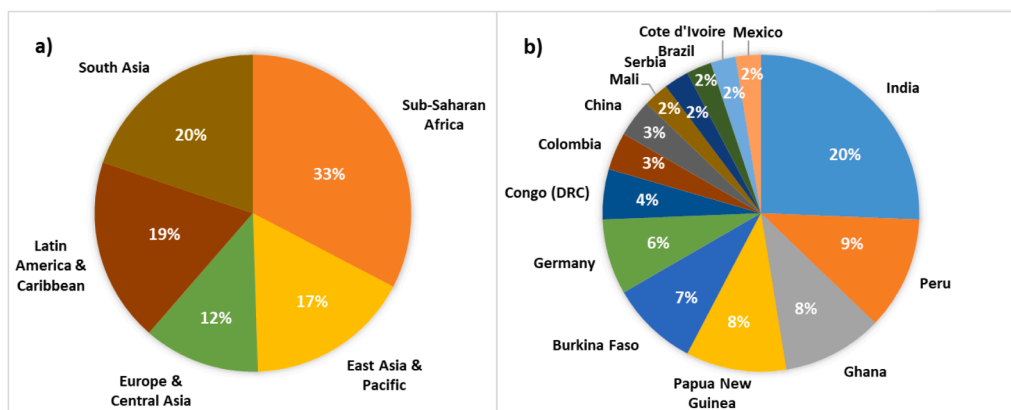


Fig. 1. Geographical distribution of MIDR cases. a) Cases distributed by geographical region (n=270). b) Countries with five or more resettlement cases in the MIDR dataset (n=211).

database using known project name or company name as search terms. Aside from three projects in India and one in Myanmar, matching records were found for all MIDR events, which were attributed corresponding S&P identification numbers.

Using spatial coordinates from the S&P database, the exact location of MIDR events was specified. MIDR events were cross-referenced against publicly available spatial datasets to establish proxies for context-specific vulnerability. Recent global-scale studies applied a similar approach and assessed vulnerability across multiple dimensions (e.g. Valenta et al. 2019, Northey et al. 2017). This approach was formalised in a methodological framework by Lèbre et al. (2019, 2020). To analyse the MIDR dataset, three indicator sets were used: the Fragile States Index (The Fund for Peace 2019), Aqueduct 3.0 Water Risk Framework (World Resources Institute 2019), and the Global Food Security Index (Economist Intelligence Unit 2018).

The *Fragile States Index (FSI)* developed by the Fund for Peace provides a comprehensive definition of the social, political and economic context in which MIDR events take place. The FSI seeks to represent the overall fragility of a country. It provides a mature methodological framework that compiles data from public statistics and qualitative social science research by experts, and generates country-level scores (from 0 to 10) for each of the 12 indicators as well as an overall country score out of 120. The 12 indicators are summarised in Supplementary Material 1. The FSI 2018 update was applied to the countries in which MIDR events are located. Each MIDR case record was attributed an overall FSI score as well as 12 individual indicator scores. Following the FSI methodology, scores above 5 for individual indicators, and above 60 for the overall score, correspond to fragile states. By applying the FSI to the MIDR dataset, we obtain the percentage of MIDR cases located in fragile contexts according to one, several, or all of the FSI indicators, in order to better situate these events in the context in which MIDR takes place.

Vulnerability due to *water security* was evaluated based on the Aqueduct 3.0 water risk framework (World Resources Institute 2019). The framework combines 13 water risk indicators evaluating quantity, quality, and reputational water risks in a composite overall water risk score (see Supplementary Material 1). To analyse the water security of MIDR events, the MIDR dataset was overlaid using the Aqueduct 3.0 water risk framework in ArcGIS. Each MIDR event received a water security score based on their spatial coordinates. Using thresholds defined by Aqueduct 3.0 for each risk indicator, MIDR events scored as 'Medium – High' or, 'High and Extremely High' were classified as 'at risk' in terms of their water security.

Food security was evaluated using the Global Food Security Index (GFSI), a country-level measure across a set of 113 countries (Economist Intelligence Unit 2018). The index is based on an established quantitative and qualitative benchmarking model, constructed from 28

standardised indicators that measure food security. Each indicator is weighted to reflect its relative importance as determined by the members of the Economist Intelligence Unit expert panel. The index considers the core three issues of 'affordability', 'availability', and 'quality and safety' that are assigned 40%, 44%, and 16% respectively. The overall score of GFSI is calculated from a simple weighted average of the three category scores. To measure the severity of food security in MIDR events, the MIDR dataset was overlaid with GFSI country database, using thresholds based on quartiles calculated for each separate GFSI indicator. MIDR events in the top quartiles Q1 and Q2 were considered to have good food security, while MIDR events in the bottom quartiles Q3 and Q4 were considered to be 'at risk' in terms of their food security. The structure and weights of GFSI are shown in Supplementary Material 1.

3.2. MIDR dataset fields

For each case, and where possible, information was categorised according to fields in 14 categories, focusing on characteristics of the mining company or project, the associated resettlement event, and the disclosure mechanism potentially used to report the resettlement (see Table 2). The fields with the highest number of missing cases (>50%) were size of land take, whether the displacement moved people on or off the mining lease, and the expected year of mine closure. Fields were developed based on the need to generate a high level of understanding about the conditions surrounding resettlement events. Given constraints around disclosure, several fields were selected as a means for cross-referencing or further testing case record data when source materials were insufficient to populate a record. For example, in identifying project owners it was possible to locate additional information from external reports or unrelated company disclosures as a supplement to resettlement action plans (RAPs) or consultant reports.

Further, mining project information that discerns different types of owners, company structures, and headquarters location, provides an opportunity to test the extent to which company profiles have an effect on other variables relating to displacement events; for instance, whether multinational, publicly listed companies supporting a range of voluntary international commitments have notably different profiles compared to junior unlisted companies. Fields selected to populate the resettlement dimension of case records represent established risk domains identified in the resettlement policy and academic literatures on MIDR (IFC 2012, Owen and Kemp, 2015, Kemp and Owen, 2019, Hilson et al, 2007). Disclosure fields were selected to discern project level commitments to international safeguard policies and standards, the release of information into the public domain, and the extent of reporting on the progress or completion of resettlement obligations where significant time had passed since the commencement of displacement activities. A summary of

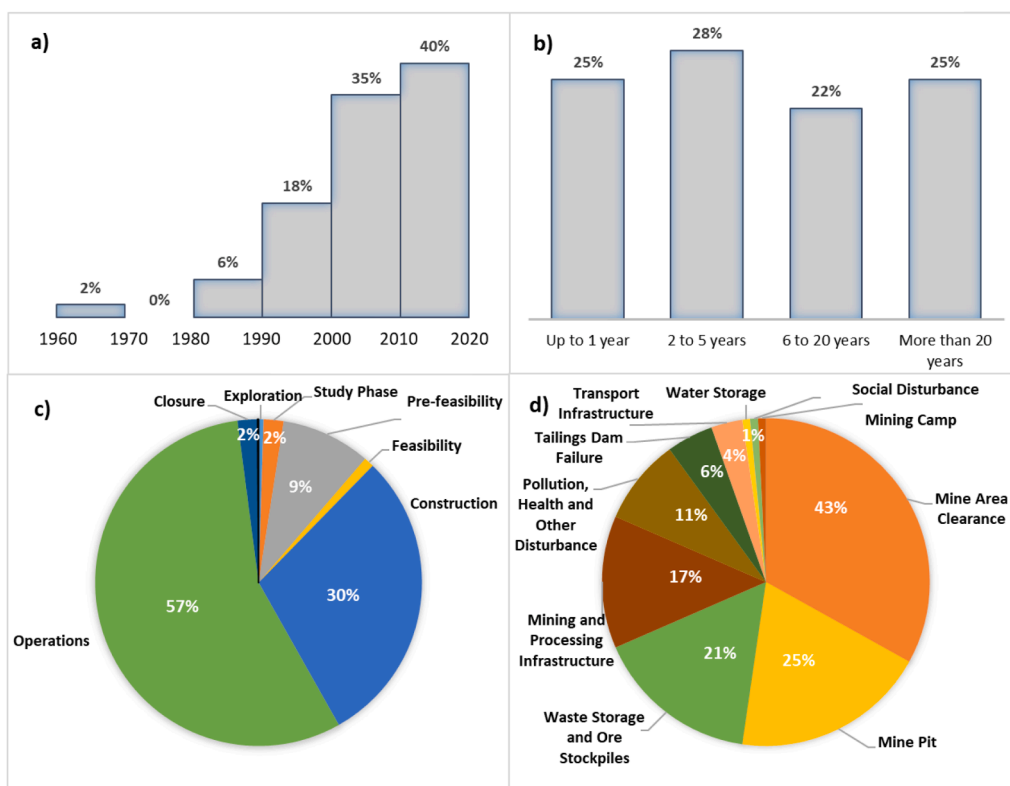


Fig. 2. Characteristics of resettlement cases in the MIDR dataset. a) Breakdown of cases into six decades of displacement (n=263). b) Breakdown of cases into four LOM displacement periods (n=253). c) Breakdown of cases into mine lifecycle stages (n=262). d) Breakdown of cases into sources of displacement (n=200).

the dataset is given below.

4. Findings

4.1. Characteristics of mining projects in the MIDR dataset

Displacement events were reported in five geographical regions, as shown in Fig. 1a. One-third of cases are from Sub-Saharan Africa, about 20% of cases are each from South Asia (20%), Latin America and Caribbean (19%) and East Asia and Pacific (17%). The smallest number of cases are from Europe and Central Asia (12%). The countries with five or more resettlement cases are shown in Fig. 1b, which shows that 20% of cases involve resettlements in India (i.e. all those in South Asia region). The government is a shareholder in 61% of the mines represented in the resettlement cases. There are 30 different commodities represented in the database, but those most commonly recorded are gold (45% of cases), copper (21%) and coal (19%), see Supplementary Material.

4.2. Characteristics of resettlement cases in the MIDR dataset

Nearly all of the resettlement cases involve physical (95%) and economic (98%) displacement. Those cases involving physical displacements, report between 2 and 10,000 households as displaced, which when added together include 75,012 households.² The displacements occur over 50 years between 1969 and 2019. Apart from five resettlements in 1969, the remainder of the cases occur from 1981 onwards, with 75% of displacements occurring from 2000 (Fig. 2a). In terms of the timing of displacements in relation to the life of the mine

(LOM), apart from an outlier (where the displacement occurred 92 years after the mine was permitted) responses ranged from between less than a year to 55 years after permitting. These were divided into four periods with relatively equal numbers and are shown in Fig. 2b. The median is five years into life of mine, so half of the cases fall below it and half above it.

Nearly 90% of cases involve displacements during the construction (30%) and operations (57%) phases of the mining lifecycle (see Fig. 2c). Information was collected concerning the source of the displacement for 200 of the cases in the database (of 270, 74%). For 30 of these (15%) there was more than one cause of displacement. The most common cause for displacement was mine area clearance, which was present in 86 of the cases (43%), see Fig. 2d. Other common reasons for displacement included: mine pit; waste storage and ore stockpiles; and mining and processing infrastructure, see Fig. 2d.

4.3. Non-disclosure of resettlement in mining

Events were investigated to determine the extent to which mines reported their resettlements and how they did so. Information was collected against five elements relating to the disclosure of information:

- International safeguards (whether any reference to safeguards of any kind were noted)
- IFC safeguards (whether the developer made references to the IFC Performance Standard 5 on Involuntary Land Acquisition and Resettlement)
- RAP documents (whether a RAP document had been prepared, irrespective of disclosure)
- Public planning documents (whether any planning documents had been publicly released)

² This amount is conservative as the database is only able to provide numbers of affected households for 80% of its cases.

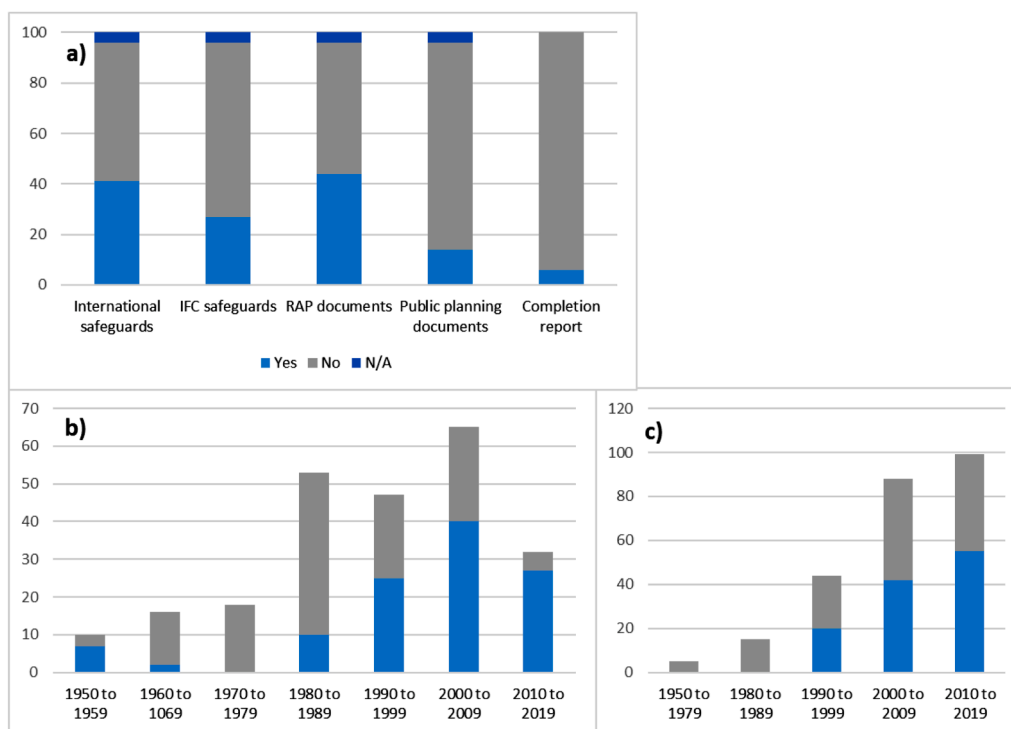


Fig. 3. Disclosure of resettlements. a) The percentage of mines that reported (either yes or no) their resettlements across different safeguards/documents. N/A is not applicable and corresponds to cases of tailings dam failures. b) MIDR cases by decade of permitting where a RAP was publicly disclosed. c) The percentage resettlement events between 1950 and 2019 disclosed via a public RAP.

- Completion reports (whether following an internationally recognised audit process, a completion report has been prepared to signal that the developer had met its stated obligations.

Fig. 3a shows that between six and 44% of mines disclosed some form of information based on the type of documents reviewed. The data shows that developers were more likely to do so using a RAP document or if there were obligations to follow one of the various international standards used by international financial institutions. Only six percent of mines reported being able to official “close out” their resettlement obligations, suggesting that the majority of companies either do not meet all of the criteria to which they have agreed to abide by in their respective commitments, or that no process of hand-over or normalisation has occurred. Either of the two explanations are alarming. One positive take away is that rates of reporting appear to be improving. As shown in Fig. 3b and 3c, rates of disclosures relative to non-disclosures (as represented by a RAP) have increased since the 1990s.

4.4. The fragility of the baseline context for MIDR

Downing (2002) has argued that the effects of MIDR tend to worsen when certain social, political and economic factors converge. Mining activities are inherently disruptive, and such disruption is heightened when it happens in contexts with underlying fragility. Key factors identified by Downing are low land acquisition costs, poor definitions of land tenure, proximity to urban or agricultural lands, high population density and politically weak populations, particularly indigenous peoples. These factors denote both the presence of competing land uses and a lack of State willingness or capability to protect these land uses against external pressure. Understanding the impact of these pressures on subsistence farmers, pastoralists and small scale miners is vital (Chanakira et al, 2019; Wiegink, 2018; Hilson et al, 2020), people whose land rights take a backseat to subsurface rights when large scale mining is involved. In such contexts, mining developments are unlikely to encounter legal

constraints to land access, or regulatory oversight that would ensure MIDR occurs in accordance with internationally established parameters relating to the protection of people.

Socio-economic aspects reflected in the FSI include measures of poverty and inequalities; demographic pressures in relation to access to food, water, and other resources; population inflows and outflows comprising phenomena such as refugee migration, brain drain, human flight, and internal displacement. Such aspects characterise multiple dimensions of precariousness and vulnerability within society, which can generate a climate of tension. Already precarious communities displaced by mining development face risks of further impoverishment as they lose their land, livelihood source, and sometimes cultural identity as kin groups are dispersed and community institutions and social networks weakened.

Socio-political aspects include group grievances and divisions within a society; the fragmentation and lack of legitimacy of state institutions and representatives; and the quality of essential public services. These factors reveal states with weak governance that are unable to effectively maintain peace and protect their citizens, including marginalised groups. In these contexts, local communities impacted by MIDR are unlikely to find governmental support and protection, and may not be afforded the opportunity to consent or even negotiate the conditions of their displacement. Finally, the FSI accounts for the presence of authoritarian regimes and human right abuses, security threats to a State and the influence of external actors in a State’s internal affairs.

The first discernible finding is an overwhelming majority (over 90%) of resettlements in the dataset took place in fragile countries according to the FSI’s classification. This trend, observed across a large sample of cases, is particularly concerning as it is likely to be representative of the global situation for mining-induced resettlement. It confirms the co-occurrence of multiple dimensions of fragility and instability within the host environments recorded in the dataset.

There are variations when looking at the results for the FSI’s 12 individual indicators. The percentage of MIDR cases located in fragile

countries according to a specific indicator (corresponding to a score above 5) varies from 55% for Refugees and Internally Displaced Persons, to 88% for Uneven Economic Development. The indicators contributing the most to the high overall FSI score are: Uneven Economic Development, Demographic Pressures, Public Services, Human Flight and Brain Drain, and Factionalised Elites. Our sample of disclosed MIDR events is characterised by a socio-economic context of high inequalities and tensions around the sharing of land and natural resources. The great majority of MIDR events took place or are taking place in a political context of fragmented state institutions and poor public services.

4.5. MIDR and water and food insecurity

Food and water both feature as key topics in the UNSDGs (SDGs 2 and 6) (UNDP 2015). Mining development causes impacts on land and water, and on the people that depend on these resources (UNSDSN 2016). Agriculture is the primary livelihood for poor rural communities (UN 2019) and mining's use of the land directly competes with existing uses. Mining activities typically have high water requirements, exacerbating existing water stress and competing with other water users (Kemp et al, 2010). Concurrently, mine waste and voids expose reactive material that can spread through waterways and contribute to water and land contamination (Akcil and Koldas 2006). As such, water and food are key dimensions of vulnerability in the context of MIDR.

In terms of overall water security, from a total of 270 resettlement events, 203(85.2%) appeared as "at risk". Based on different water risk indicators recognised by Aqueduct 3.0, 247 resettlement communities (91.5%) are in locations with severe regulatory and reputational water risks. 79.3% of cases are located in regions with high water quality risks, and 60.4% in regions with high water quantity risks (see Fig. 5).

In terms of overall food security, a majority of resettlement cases (over 60%) occurred in food-insecure countries according to all three measured categories of food security (see Fig. 5). A total of 32 out of 270 MIDR events had no record for GFSI. These were not included in the percentage calculations. The highest risk was measured in the food availability category where over 76% locations of resettlements are at risk.

Co-occurrence analyses overlaying MIDR dataset by food security (GSFI) and water security (Aqueduct 3.0) showed that 54.8% of recorded resettlement cases are in both water and food-insecure locations. All cases with high water insecurity are also in countries with high food insecurity. A total of 50 cases were located in contexts with good food security, but with high water insecurity. The remaining 40 events were in regions with good water and good food security. Fig. 6 shows spatial distribution of the resettlement events according to severity in water and food security (for results presented as tabled, see supplementary material).

4.6. The industrial source of displacement

The unique dynamic in mining and its influence over displacement outcomes relates to changes in form and function in the project footprint. This unique footprint dynamic is established in the academic and grey literature (Downing 2002, Downing 2014, Owen and Kemp 2015). Recent technological advancements have enabled researchers to demonstrate this dynamic in spatial and temporal terms by connecting the mining project lifecycle to specific changes in land-use over time (Lechner et al, 2017; Werner et al., 2020). Using two empirical case examples from the Porgera Gold Mine in Papua New Guinea, and the Sepon Copper-Gold Mine in the Lao People's Democratic Republic, Lechner et al (2019) confirm the critical link between lifecycle stage, activity type and displacement patterns in mining developments. The "brownfield effect" described by Owen and Kemp (2015) relates to the degree of complexity carried in displacement processes as mining projects develop over time. Data demonstrating the frequency of late project stage displacement events, or the precise source of activity driving

displacement conditions, however, has not been a feature of research. Fig. 7 shows the split between project lifecycle, the source of displacement for cases reported in the MIDR dataset.

Analysis of the global MIDR dataset corroborates the footprint pattern asserted by Owen and Kemp (2015) and Lechner et al (2019), showing that comparatively fewer projects displace people in the earlier stages of mine development. These results suggest that the number of displacement events increase in direct proportion to the development stage of the project. One major finding is the high number of cases in the operational phase where mine area clearance, mine pit or waste storage are identified as the primary source of displacement. Fig. 7 illustrates this finding, in addition to highlighting the prevalence of displacement cases decades after initial project permits were granted by the State.

Mining pits and waste or ore stockpile areas will commonly expand, either as the project discovers new resources, adopts improved mining methods, or generates more material in response to changing market demands for metal (Mudd and Jowitt, 2018). As an activity, mine area clearance, however, is typically associated with the pre-development or early stages of projects where, in accordance with safety requirements at permitting, people will be required to make way in order to establish various components of the overall mining installation. The relatively high frequency of mine area clearance as a generic descriptor corresponds directly with the low levels of information provided by companies about their activities in the later stages of mine life, and in particular in relation to the displacement of people and property. Further confirmation of the data is required, but given what is known about mine footprints at various stages of the project development cycle it is likely that the majority of cases reporting mine area clearance as the source of displacement, would upon testing, be either waste or infrastructure related.

5. Discussion and implications: how the data void is hiding harm

Our analysis confirms a clear confluence between the precariousness of displacement effects and the absence of data to demonstrate the need to protect against harm-generating practices. The evidence base needed to drive wholesale change and to transform the value proposition for development is hidden from public view. To collect, analyse, or report on any facet of the total process of displacement and resettlement occurs at the discretion of mining corporations; a demonstration of a power asymmetry elsewhere described as "proprietary advantage" (Owen et al, 2020). The MIDR dataset is the result of collecting and compiling an extensive amount of dispersed information across incomplete sources. In a small number of cases, companies disclosed information due to financing conditions, but even under these conditions, companies are not required to publish details about the effects of the mining project on the displacement process. We can only assume that retaining proprietary advantage protects their overall economic position, or that of the financier.

The findings from our dataset show the severity of the local vulnerability conditions. Our results highlight the multidimensional character of project localities and the risk that displacement, by any institution, poses for local populations. Global datasets on food and water insecurity and the more general suite of factors that relate to fragility are largely based on regional or national level data, meaning that the overlay with our dataset provides the most optimistic reading of likely conditions in the sense that they do not account for the impact that displacement has on pre-existing circumstances. RAPs as information sources have similar limitations, not because they present the prospective displacement in a broader societal context, but because the documents do not account for, or propose to account for, actual changes that result from the MIDR process.

Incremental improvements in the availability of cross-disciplinary data make it possible for researchers to utilise new technologies to highlight global patterns, and to drive a disclosure agenda. While the

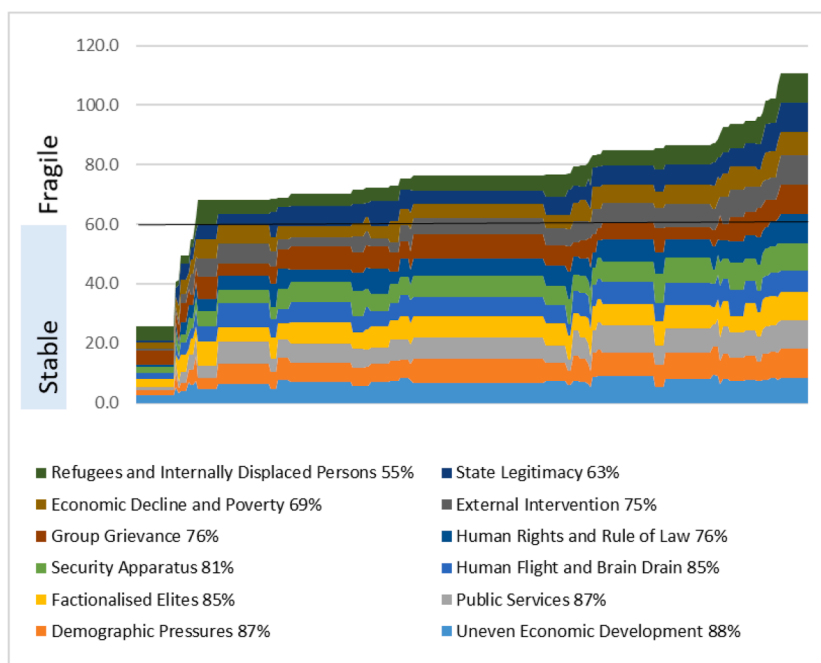


Fig. 4. MIDR cases plotted against their FSI score. Percentages in the legend indicate the proportion of cases scoring above five for the 12 individual indicators. For the purpose of the analysis, country scores were assumed not time dependent.

overlay data presented in this article does not account for the post-displacement effect and circumstances caused by mining processes, the evidence indicates high levels of vulnerability in basic areas of human wellbeing. Without strong commitments from either the resource developer or the State to understand these vulnerabilities, circumstances can be expected to erode markedly as a result of MIDR. Long held disciplinary concepts, such as “subsistence minimums” or “subsistence thresholds” (Scott, 1976) are illustrative of the underlying risk present in these arrangements, where base socio-economic factors hold people in near proximity to crisis. These lines are only manageable given the networks and resources that people are able to access and mobilise. The major under-statement carried in resettlement policy and in the literature is the extent to which the disruption instigated through displacement diminishes or dismantles marginal but otherwise functional local systems that keep people from falling into crisis conditions. Taken together, the picture generated through the FSI, and the food and water insecurity measures, show that MIDR affected people are living in circumstances where the margin prior to dispossession is already tenuous. While dispersed, the cumulative knowledge from qualitative case studies confirms that developers are not actively working to offset the risk of people falling into crisis level poverty, or that the baseline conditions function to shape the approach or investment made in executing these exercises.

At the meta-scale, the discourse on economic improvement or “resettlement with development” is suffering from a kind of unreflexive hope and blind opportunism. The base model that determines who, how and what is “developed” remains unchallenged. The UNSDGs do not spell out the human costs of pursuing these goals, nor the portion of that cost that is carried by people who are making way for these grand and distant objectives. The roll out of the UNSDGs through the benefits discourse warrants concern given the assumed role of private corporations, and the absence of complimentary evidence or sector-specific regulation to demonstrate how private sector led developments in the 21st century will avoid repeating the calamity of harms created in previous decades. Our results clearly demonstrate the extent of local context vulnerability and the enormous effort required by States and corporations to uphold basic rights enjoyment across a range of areas.

The proliferation of international safeguards and ambitious

programs of global scale development emerge at a time where the lofty rhetoric among institutions is trending one way, while the practice of corporations is tracking in another. Internationally-agreed standards for managing social and environmental hazards and risks state emphatically that development proceeds from a comprehensive, evidence-based due diligence approach across the social and environmental frontiers of projects (United Nations, 2011; IFC, 2012). Country level systems echo to some extent the seemingly widely held view that corporations ought to collect, utilise and be held to account on evidence supported by data and management systems (Jayewardene, 2019; Tagliarino, 2018). The practice, if the status and availability of accessible information on displacement process is any measure, is running in the opposite direction: studies are not consistently undertaken nor systematically incorporated into project designs so as to avoid or minimise the impost of displacement; performance data does not exist in any global form to show the impact of MIDR on pre-mining local vulnerability, and tightening controls on the permitting of mines along with the growing normalisation of free prior informed consent (FPIC) appear to have little effect on the industry practice of drastically altering its land acquisition practices, even decades after initial state permits were granted. Our results show that neither governments nor communities have access to the level of information required to make medium or long-range judgements about the cost-benefit proposition of mining projects for their respective constituencies.

Corporate reporting efforts can exacerbate the issue considerably. Since reporting schemes are voluntary, the form and content of disclosures trend almost exclusively toward upholding the proprietary advantage of companies. Disclosure, even under conditions where there is some public release of information, is a choice that corporations are at liberty to interpret and respond to through self-declarations of adoption and superficial legitimation (Harrison and Sekalala, 2015). A case in point is the reporting relationship corporations self-structure through United Nations instruments. The United Nations’ (2011) Guiding Principles on Business and Human Rights (UNGPs) for example aligns most directly with the issues associated with MIDR, given the explicit link to project affected people and the risk displacement poses to human rights. To report against MIDR projects through this mechanism, however, would run against the ethic of proprietary advantage, as a form of

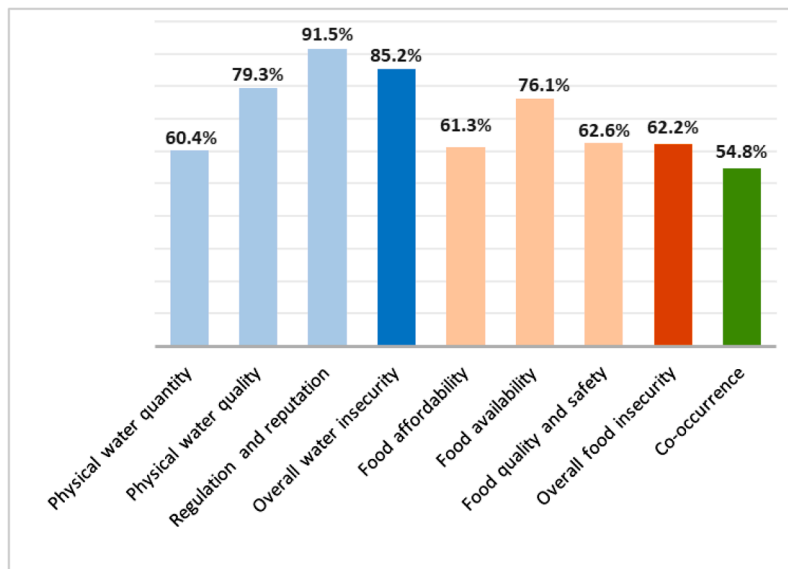


Fig. 5. Percentage of MIDR cases in contexts of water insecurity and food insecurity. In blue: water insecurity across three categories and aggregated into overall water insecurity (source: [World Resources Institute, 2019](#)), n=270. In orange: food insecurity across three categories and aggregated into overall food insecurity (source: [Economist Intelligence Unit, 2018](#)), n=238. In green: percentage of overlap between water insecurity and food insecurity, n=238.

admission of potential harm-making. The Corporate Human Rights Benchmark (CHRB, 2019), for instance, indicates that the majority of global 200 companies assessed in their study do not demonstrate sufficient respect for human rights. Of the 56 extractive companies assessed, the human rights performance average was 29.4%, with nearly half of these companies in the lowest performance bands. Across the entire sample, the CHRB concludes that companies are failing to show remedy and compensation for victims of human rights abuse. Of the almost 150 severe allegations reviewed in 2019, in only 3% of cases do companies show that they provided remedy considered satisfactory to victims. The benchmark notes that “the indicator most reliant on the voice of affected stakeholders and most clearly linked to human rights impacts is almost universally unfulfilled by companies” (CHRB, 2019:8). Instead, corporate reporting gravitates towards the ready-made “upside” narratives contained in the UNSDG platform, which requires no evidence base to

demonstrate that harms, such as those forged through MIDR processes, are recognised and remedied through a corporation’s base-level development practice.

6. Conclusion: Alarming levels of post-MIDR vulnerability

The quest for a global resettlement science begins with data. Across the spread of displacement-inducing industries, the unchecked under production, distribution and consumption of meaningful data undermines the progress of this science. Nonetheless, through the deep retrieval of source material, it is both possible to compile and analyse data about MIDR events at scale. Viewed globally, MIDR events showcase the range of severe contextual vulnerabilities that States, private sector actors, and potentially displaced people must reconcile. The levels of vulnerability identified through cross-tabulating the MIDR dataset

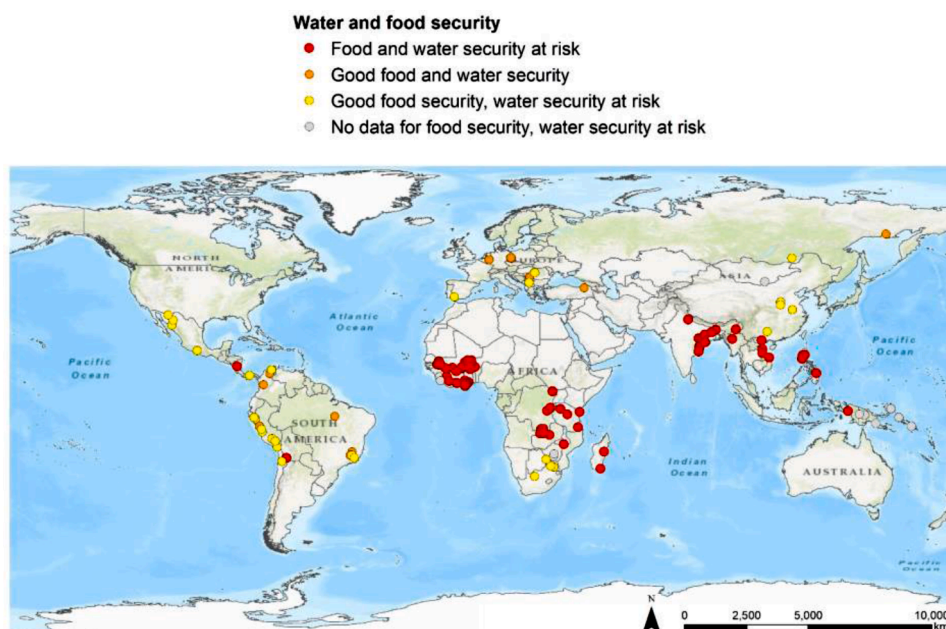


Fig. 6. Spatial distribution of resettlement cases based on water and food security.

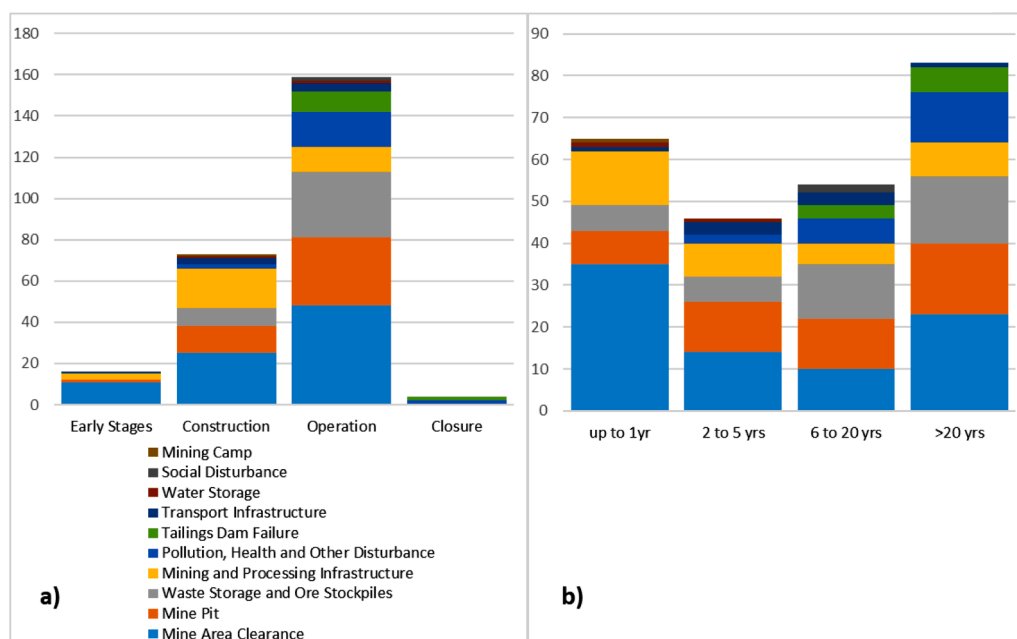


Fig. 7. The source of displacement. a) The number of cases split by source of displacement and stage of mine lifecycle. b) The number of cases split by source of displacement and years into life of mine.

with key global indicator sets, should be understood as the likely baseline conditions prior to MIDR and not a statement of the industry's performance in delivering resettlement and livelihood restoration outcomes.

Instead, this data should be read with great concern, given that the evidence gathered to date on company performance indicates, unequivocally, that mining companies do not have the capability to prevent affected people from experiencing known displacement risks, or the track record to suggest an imminent turn around in their practice. Actual levels of post-displacement vulnerability, on any of the global measures used in this study, can only be assumed to be far greater than what we have presented. Without a radical transformation in disclosure regimes, it is not possible to determine the precise levels of development or decline among people displaced by mining. At the same time, there is no basis from which companies can reasonably claim to have met, or exceeded, their voluntary commitments under agreed international frameworks.

Non-disclosure similarly impacts the relationship between consumers and producers of metals, and the potential for consumers to make informed judgements about the human consequences carried in market goods and materials (Chen and Slotnick, 2015). Trade supported by private sector institutions is fundamental to the UNSDG framework, and the ever-present footprint of mining, either in manufacturing or emerging energy markets, raises deep questions about the stability and sincerity of this global economic agenda. The invisibility of displaced people in the production of market goods and materials, and in many international frameworks, is alarming, and threatens the moral premise of UNSDGs that promote ideals of inclusion, equity and human rights. While a dearth of data on MIDR events may appear insignificant against the glowing rhetoric of global development initiatives, this dearth represents a blemish of major proportions. Considering the enduring prevalence of mining activities world-wide, the clearly understood impact that these activities have on land, land resources, and land connectedness, the current situation of financiers, insurers, private sector developers and nation states operating on the basis of such incomplete information about these events must be rectified. (Fig 4)

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.exis.2021.01.012](https://doi.org/10.1016/j.exis.2021.01.012).

References

- Abuya, W., 2013. What is in a coconut? An ethnoecological analysis of mining, social displacement, vulnerability, and development in rural Kenya. *Afr. Stud. Q.* 14 (1&2), 1–21.
- Akcil, A., Koldas, S., 2006. Acid Mine Drainage (AMD): causes, treatment and case studies. *J. Clean. Prod.* 14 (12–13), 1139–1145.
- Aksland, H., 2018. A dying village: Mining and the experiential condition of displacement. *Extract. Ind. Soc.* 18 (2), 230–236.
- Alexandrescu, F., 2011. Gold and displacement in eastern Europe: risks and uncertainty at Rosia Montana. *Rev. Romanian Sociol.* 1 (2), 78–107.
- Cerne, M., 1995. Understanding and preventing impoverishment from displacement: reflections on the state of knowledge. *Refugee Stud. Q.* 8 (3), 245–264.
- Cerne, M., 1997. The risks and reconstruction model for resettling displaced populations. *World Dev.* Vol. 25 (10), 1569–1587.
- Cerne, M., Maldonado, J.K., 2018. Challenging the prevailing paradigm of displacement and resettlement. Its evolution and constructive ways of improving it. In: Cerne, M., Maldonado, J.K. (Eds.), *Challenging the Prevailing Paradigm of Displacement and Resettlement: Risks, Impoverishment, Legacies, Solutions*, Routledge, London.
- Cerne, M., Mathur, M.H., 2008. *Can Compensation Prevent Impoverishment? Reforming Resettlement Through Investments and Benefit-Sharing*. Oxford University Press, New Delhi.
- Chanakira, D.K., Mujere, J., Spiegel, S., 2019. Traditional leaders and the politics of labour recruitment in Zimbabwe's platinum mining industry. *Extract. Ind. Soc.* 6 (4), 1274–1281.
- Chen, J.Y., Slotnick, S., 2015. Supply chain disclosure and ethical sourcing. *Int. J. Prod. Econ.* 161, 17–30.
- Chimhowu, A., Hulme, D., 2006. Livelihood dynamics in planned and spontaneous resettlement in Zimbabwe: converging and vulnerable. *World Dev.* Vol. 34 (4), 728–750.
- Corporate Human Rights Benchmark (2019) Corporate Human Rights Benchmark 2019 Key Findings. Available: <https://www.corporatebenchmark.org/sites/default/files/2019-11/CHRB2019KeyFindingsReport.pdf>.
- deWet, C., 2001. Economic development and population displacement: can everybody win? *Econ. Political Wkly.* 36 (50), 4637–4646.
- Downing, T.E. 2002. Avoiding new poverty: mining-induced displacement and resettlement (Vol. 52), International Institute for Environment and Development.
- Downing, T.E. 2014. Does the Kosovo power projects proposed forced displacement of Kosovars comply with international involuntary resettlement standards? The Kosovo Civil Society Consortium for Sustainable Development. Available at: <http://allthingsaz.com/wp-content/uploads/2014/04/Final-Draft-Downing-Involuntary-Resettlement-at-KPP-Report-2-14-14.pdf> (accessed 04.06.14).
- Dunning, H.C., 1970. Land reform in Ethiopia: a case study in non-development. *UCLA Law Rev.* 18 (2), 271–307, 1970.

- Economist Intelligence Unit, 2018. Global food security index. Available at: <https://foodssecurityindex.eiu.com/>.
- Evans, J, 2018. Why and how the World Bank should pursue abuse-free development and protect against rights violations linked to its projects. In: Cernea, M, Maldonado, J.K (Eds.), *Challenging the Prevailing Paradigm of Displacement and Resettlement: Risks, Impoverishment, Legacies, Solutions*, Routledge, London.
- Hall, A, 1994. Grassroots action for resettlement planning: Brazil and beyond. *World Dev.* Vol. 22 (12), 1793–1809.
- Harrison, J, Sekalala, S, 2015. Addressing the compliance gap? UN initiatives to benchmark the human rights performance of states and corporations. *Rev. Int. Stud.* 41, 925–945.
- Hemer, S, 2015. Emplacement and resistance: Social and political complexities in development-induced displacement in Papua New Guinea. *Austr. J. Anthropol.* 27 (3), 279–297.
- Hilson, G., Sauerwein, T., Owen, J, 2020. Large and artisanal scale mine development: The case for autonomous co-existence. *World Dev.* 130, 104919.
- Hilson, G., Yakovleva, N., Banchirigah, S.M., 2007. To Move or Not to Move": reflections on the resettlement of artisanal miners in the western regions of Ghana. *African Affairs* 106 (424), 413–436. Hilson et al Autonomous co-existence. WD.
- International Finance Corporation (IFC), 2012. Performance standards on environmental and social sustainability. IFC. Retrieved from <http://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/ifc-sustainability/publications/publications_handbook_pps>.
- Jayewardene, R, 2019. Why national law is essential for protecting public interest and providing safeguards in land acquisition and forced displacement. In: Price, S, Singer, J (Eds.), *Country Frameworks for Development Displacement and Resettlement: Reducing Risk*. Building ResilienceCRC Press, London.
- Kabra, A, 2018. Displacement, resettlement, and livelihood restoration: safeguard standards in practice. *Dev. Pract.* 28 (2), 269–279.
- Kemp, D, Bond, C.J, Franks, D.M, Cote, C, 2010. Mining, water and human rights: making the connection. *J. Clean. Prod.* 18 (15), 1553–1562.
- Kemp, D., Owen, J, 2015. A Third Party Review of the Barrick/Porgera Joint Venture off-Lease Resettlement Pilot: Operating Context and Opinion on suitability. Centre for Social Responsibility in Mining (CSRMI). The University of Queensland, Brisbane.
- Kemp, D, Owen, J.R, 2019. Characterising the interface between large and small-scale mining. *Extract. Ind. Soc.* 6 (4), 1091–1100.
- Kesselring, R, 2018. At an extractive pace: Conflicting temporalities in a resettlement process in Solwezi, Zambia. *Extract. Ind. Soc.* 5 (2), 237–244.
- Kinsey, B, Binswagner, H, 1993. Characteristics and Performance of Resettlement Programs: A Review. *World Dev.* 21 (9), 1477–1494.
- Kirchherr, J., Ahrenshop, M.P., Charles, K, 2019. Resettlement lies: Suggestive evidence from 29 large dam project. *World Dev.* 114, 204–219.
- Lèbre, É., Owen, J.R., Corder, G.D., Kemp, D., Stringer, M., Valenta, R.K., 2019. Source risks as constraints to future metal supply. *Environ. Sci. Technol.* 53 (18), 10571–10579.
- Lèbre, É., Stringer, M., Svobodova, K., Owen, J.R., Kemp, D., Cote, C., Arratia-Solar, A., Valenta, R, 2020. The social and environmental complexities of extracting energy transition minerals. *Nat. Commun.* 11, 4823.
- Lechner, 2017. Challenges of integrated modelling in mining regions to address social, environmental and economic impacts. *Environ. Model. Softw.* 93, 268–281. July 2017, Pages.
- Madebwe, C., Madebwe, V., Mavusa, S., 2011. Involuntary displacement and resettlement to make way for diamond mining: the case of Chiadzwa villagers in Marange, Zimbabwe. *J. Res. Peace, Gender Dev.* 1 (10), 292–301.
- Mudd, G, Jowitt, S, 2018. Growing global copper resources, reserves and production: discovery is not the only control on supply. *Econ. Geol.* 113 (6), 1235–1267.
- Northey, S.A., Mudd, G.M, Werner, T.T., Jowitt, S.M., Haque, N., Yellishetty, M., 2017. The exposure of global base metal resources to water criticality, scarcity and climate change. *Global Environ. Change* 44, 109–124.
- Owen, J.R, Kemp, D, 2015. Mining-induced displacement and resettlement: a critical appraisal. *J. Clean. Prod.* 87, 478–488.
- Owen, J.R, Kemp, D, 2016. The weakness of resettlement safeguards in mining. *Forced Migration Rev.* (52), 78–81.
- Owen, J.R., Kemp, D, 2019. Displaced by mine waste: the social consequences of industrial risk-taking. *Extract. Ind. Soc.* 6 (2), 424–427.
- Owen, J.R, Lebre, E., Northcott, D., Harris, J., Huda, M., and Verrier, B (2019) Global mining induced displacement and resettlement (MIDR) events dataset. The University of Queensland. Data Collection. <https://doi.org/10.14264/uql.2019.764>.
- Owen, J.R., Zhang, R., Arratia-Solar, A, 2020. On the economics of project-induced displacement: a critique of the externality principle in resource development projects. *J. Clean. Prod.* 276, 123247.
- S&P, 2019. S&P Global Market Intelligence. Thomson Reuters, New York viewed 24 March 2019. <https://www.spglobal.com/marketintelligence/en/>.
- Price, S, 2015. Is there are global safeguard for development displacement? (eds) In: Satiroglu, I, Choi, N (Eds.), *Development-induced displacement and resettlement. New Perspectives on Persisting Problems*, Routledge, London.
- Price, S, 2015a. A no-displacement option? Rights, risks and negotiated settlement in development displacement. *Dev. Pract.* 25 (5), 673–685.
- Price, S, Tagliarino, N, 2019. Higher risk, higher reward? Negotiated settlements, wellbeing and livelihoods in development displacement. In: Price, S, Singer, J (Eds.), *Country Frameworks for Development Displacement and Resettlement: Reducing Risk*. Building ResilienceCRC Press, London.
- Price, S., Van Wicklin., Koenig, D., Owen, J., de Wet, C, Kabra, A, 2020. Risk and value in benefit-sharing with displaced people: looking back 40 years, anticipating the future. *Soc. Change* 50 (3), 447–465.
- Rulli, M.C., Saviore, A., D’Odorico, P, 2013. Global land and water grabbing. *Proc. Natl. Acad. Sci.* 110 (3), 892–897.
- Scheyvens, R., Banks, G, Highes, E, 2016. The Private sector and the SDGs: the need to move beyond “Business as Usual. *Sustain. Dev.* 24 (6), 371–382.
- Scott, J.C, 1976. *The Moral Economy of the Peasant*. Yale University Press, New Haven.
- Scudder, T., Colson, E, et al., 1979. Long-term research in Gwembe Valley, Zambia. In: Foster, G.M., et al. (Eds.), *Long-term Field Research in Social Anthropology*. Academic Press, New York, pp. 227–254.
- Sikor, T, Lund, C, 2009. Access and property: a question of power and authority. *Devel. Change* 40 (1), 1–22.
- Tagliarino, N, 2018. The need for national-level legal protection for populations displaced by expropriation: laws on land acquisition and resettlement in 50 countries. In: Cernea, M, Maldonado, J.K (Eds.), *Challenging the Prevailing Paradigm of Displacement and Resettlement: Risks, Impoverishment, Legacies, Solutions*, Routledge, London.
- The Fund for Peace, 2019. Fragile States Index. Available at: <https://fragilestatesindex.org/data/>.
- United Nations (2011) *Guiding Principles on Business and Human Rights: Implementing the United Nations “Protect, Respect and Remedy” Framework*. United Nations Human Rights Council, UN Doc. HR/PUB/11/04 <http://www.ohchr.org/Documents/Publications/GuidingPrinciplesBusinessHR_EN.pdf>.
- UNDP, 2015. *Transforming our World: the 2030 Agenda for Sustainable Development*. United Nations Development Programme, New York, USA.
- UNSDSN (2016). *Mapping mining to the sustainable development goals: An Atlas, Columbia Center on Sustainable Investment, United Nations Development Programme, UN Sustainable Development Solutions Network, World Economic Forum*.
- United Nations (2019). *Sustainable Development Goals: Goal 2: Zero Hunger* <http://www.un.org/sustainabledevelopment/hunger/>.
- Valenta, R., Kemp, D., Owen, J., Corder, G., Lèbre, É., 2019. Re-thinking complex orebodies: Consequences for the future world supply of copper. *J. Clean. Prod.* 220, 816–826.
- Vanclay, F, 2017. Project-induced displacement and resettlement: from impoverishment risks to an opportunity for development? *Impact Assess. Project Apprais.* 35 (1), 3–21.
- Wang, H., Owen, J.R., Shi, G, 2020. Land for equity? A benefit distribution model for mining-induced displacement and resettlement. *Bus. Strat. Environ.* 29 (8), 3410–3421.
- Werner, T, Mudd, G, Schipper, A, Huibregts, Taneja, L and Northey, S (2020) Global-scale remote sensing of mine areas and analysis of factors explaining their extent *Global Environmental Change*, 60, 102007.
- Wiegink, N, 2018. Imagining booms and busts: conflicting temporalities and the extraction-“development” nexus in mozambique. *Extract. Ind. Soc.* 5 (2), 245–252.
- Wilson, S, 2019. Mining-induced displacement and resettlement: The case of rutile mining communities in Sierra Leone. *J. Sustain. Min.* 18 (2), 67–76.
- World Bank, 1996. *Resettlement and development. The bankwide review of projects involving involuntary resettlement 1986-1993*. Environ. Depart. Pap. Paper No. 032.
- World Resources Institute, 2019. *Aqueduct 3.0: Updated Decision-Relevant Global Water Risk Indicators*. Available at: <https://www.wri.org/publication/aqueduct-30>.