

## Original article

## When subterranean slavery supports sustainability transitions? power, patriarchy, and child labor in artisanal Congolese cobalt mining

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## ABSTRACT

Through the critical lenses of “modern slavery,” “dispossession,” and “gendering,” this study examines the contours of power, patriarchy, and child labor in the artisanal and small-scale mining (ASM) of cobalt in the Democratic Republic of the Congo (DRC). There, a veritable mining boom for cobalt is underway, driven by rising global demand for batteries and other modern digital devices needed for future sustainability transitions. Based on extensive and original field research in the DRC—including 23 semi-structured expert interviews with a purposive sample, 48 semi-structured community interviews with ASM miners, traders, and community members, and site visits to 17 artisanal mines, processing centers, and trading depots—this study asks: What power relations does ASM cobalt mining embed? What are its effects on patriarchy and gender relations? Critically, what is the extent and severity of child labor? It documents the exploitation of ASM miners by the government, the police, and even at times other mining actors such as traders or local communities. It reveals the often invisible gendered nature of mining, showing how many vulnerabilities—in terms of work, status, social norms, and sexual abuse and prostitution—fall disproportionately on women and girls. It lastly reveals sobering patterns of child labor and abuse, again at times by the government or police, but other times by families or mining communities themselves. These factors can at times make cobalt mining a modern form of slavery and a catalyst for social, economic, and even regional dispossession. However, rather than despair, the study also draws from its empirical data to showcase how mining can in selected situations empower. It also proposes a concerted mix of policy reforms aimed the Congolese government (at all scales, including local and national); suppliers and end-user companies for cobalt; and international governments and trading bodies. In doing so, the study humanizes the plight of Congolese cobalt artisanal miners, reveals the power relations associated with the recent mining boom, and also proposes pathways for positive change.

## 1. Introduction

The Democratic Republic of the Congo dominates the global production of cobalt (Bazilian 2018). According to the United States Geologic Survey (2019), in 2018 the DRC produced 90,000 tons of unrefined cobalt, or 64.3% of the world’s total, and it also had 49% of the world’s known cobalt reserves—more than the next top ten countries in the world, combined. Rawles (2018) projects that DRC dominance will only grow in the future, anticipating that the country’s share of cobalt production will rise to 75% by 2021.

Despite the presence of numerous individual large-scale industrial cobalt mines, or LSM, the largest single source of cobalt in terms of number of workers and number of sites remains the artisanal and small-

scale mining (ASM) sector. Al Barazi et al. (2017) estimate that the ASM sector is responsible for about 20% of national supply. If true, this would make the ASM sector responsible for about 12.9% of global cobalt supply (Sovacool 2019). ASM mining, notwithstanding the large volumes it produces, is still predominantly defined by “low-tech, labor-intensive mineral extraction and processing” (Hilson and McQuilken 2014: 104).

The cobalt (and copper) extracted from the DRC end up in some of the most prevalent innovations to become adopted around the world. For instance, due to its primacy in cobalt supply, the DRC supplies artisanal cobalt that constitutes some of the best-known brands of electronics and digital devices in the world, including Apple, Dell, Hewlett-Packard, Huawei, Lenovo, LG, Microsoft, Samsung, Sony, and

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Vodafone (Amnesty International 2016a). More worryingly, Congolese cobalt is an instrumental part of supply chains for emerging low-carbon innovations critical to energy or climate sustainability such as batteries for decentralized energy storage, electric vehicles, and solar panels (Sovacool et al., 2020a; Sovacool et al., 2020b; Lee et al., 2020; Sovacool 2019; Amnesty International 2016a; Tsurukawa et al., 2011). Some have even gone so far as to call Congolese cobalt the “new oil” of our digital economy (Lindberg and Andersson 2019) or part of a critical “mineral foundation” for our future transition to low-carbon technology (Bazilian 2018).

But is the revitalization of ASM cobalt mining actually a positive phenomenon for the Congolese people? Civil society groups and the popular media, for example, have published an alarming number of reports linking ASM mines to human rights abuses, child labor, unfair treatment of women, and overall deleterious effects on local communities (Amnesty International 2016a; Amnesty International 2016b; Crawford 2017; Kara 2018; CNN Money 2018; Business Human Rights.org 2018; Sherman 2018). Callaway et al. (2018: 8) write about perpetual “non-transparency, corruption, violence, and human rights abuses in Congo’s cobalt mining sector,” Lindberg and Andersson (2019: 14) identify a mining sector “plagued by deep poverty and extreme corruption ... of constant war and sexual abuse on a scale that almost cannot be understood.” But are these claims overblown, and backed by robust, mixed methods empirical data?

Based on extensive and original field research—including expert interviews, community interviews, and naturalistic observation at mining sites—this study confirms the veracity, severity, and brutality of some of the media’s claims about cobalt. It asks: What power relations does cobalt mining involve and embed? What are its effects on patriarchy and gender relations? Critically, what is the extent and scope of child labor? In exploring these questions, the aims of the study are to humanize the plight of Congolese cobalt artisanal miners, to reveal the power relations associated with the recent mining boom, but also to propose pathways for positive change. The study finds that Congolese mining can subject people to a series of destructive and dehumanizing power relations and at times violent exploitation, perpetuates gender insecurity and the dispossession of women, and depends on the mistreatment of children. It also, promisingly, can selectively empower communities and at times promote alternative norms to the masculine and environmentally destructive practices associated with mining.

An obvious contribution of this article is empirical, hoping to document, confirm, and humanize the everyday struggles, and practices, of ASM miners and their communities, a helpful contrast alongside studies such as Sovacool (2019) which articulate some of the social and economic benefits to cobalt mining. For as Hilson et al. (2017) compellingly write, in regions of the world such as Sub-Saharan Africa, the informal economy reigns as vital source of livelihood and employment serving three-quarters of the active working population. One of the most prevalent informal activities is ASM, which may involve as many as 20 million people throughout the region with an additional 100 million people dependent on it for survival (Hilson et al., 2017). Hinton et al. (2003: 99) therefore conclude that ASM “provides an important source of livelihood for rural communities throughout the world.” Yet, we urgently need more scholarship on the dynamics of ASM, which Hilson and McQuilken (2014) argue “continue[s] to be overlooked in most international, regional and local economic policies and programs.” Hilson and Gatsinzi (2014) add that ASM remains marginalized as a topic of research among those seeking to address rural economic development and poverty reduction in Africa. Additionally, Bashwira and van der Haar (2020: 79) warn that “women have long remained invisible in representations of artisanal mining” in the Congo.

However, there is also a conceptual contribution of the study in terms of looking at the nexus of “modern slavery” combined with “dispossession” and “gendering.” More concretely, studying economic activities and livelihood strategies—including attempts at legalization, formalisation, and ethical traceability—in the dynamics of such weak

states remains an extremely important trans-disciplinary challenge for social scientists (Vogel 2018). In other words, the DRC is replete with a constantly shifting landscape of power relations with fuzzy lines of public authority and contestation of access to resources (Sovacool 2019; Katz-Lavigne 2019a; 2019b). It is a unique governance environment, where the DRC is “omnipresent” in collecting mining royalties but also often “absent” due to its relative ineffectiveness in providing social services or collective goods (Honke, 2010).

The study proceeds as follows. It firstly discusses its rationale for case study selection with some brief historical background before explaining its research design and introducing its tripartite conceptual framework of “modern slavery,” “dispossession” and “gendering.” It then presents a series of core results organized among the three themes of power, patriarchy, and child labor before reconnecting these results back to slavery, dependence, and empowerment in a discussion section. It then moves to discuss policy recommendations before concluding.

## 2. Case study selection and background

To provide background, the DRC is large country in Central Africa, with a geographic size roughly equivalent to that of mainland Western Europe (BBC 2018). It is the third largest country in Africa, covering more than 2.3 million square kilometers, and the twentieth most populous country in the world, with almost 80 million people (KPMG 2018). The DRC lacks many of the basic services found in more developed countries: the access rate to clean drinking water is 26%; the completion rate to the secondary level of school is 18%; the electrification rate is 6%; and the rate of HIV/AIDS infection is 10% of the sexually active population (KPMG 2018). Previous armed conflicts have displaced about 2 million people but affected three-quarters of the population. Life expectancy there is just 47 years for men, and 51 years for women (BBC 2018).

Notwithstanding these challenges, the DRC has been endowed with prodigious natural resources, including the world’s largest reserves of cobalt. It has almost exactly half (49%) of the world’s known cobalt reserves and it is also a major producer of copper, diamonds, gold, oil, tin, tantalum, tungsten and zinc (EITI 2019). Table 1 offers an overview of some of these mining production activities. The World Bank (2008) affirmed many of these statistics, calling mining the “engine of the Congo economy” and projecting under a base case scenario that the mining sector generated \$186 million to \$388 million in gross production value every year. This means mining as a whole contributes 97.5% to national exports, 20% to national GDP, 24.7% to government revenue, and 23.9% to formal employment (EITI 2019). Reuters (2019) also reported that the mining sector as a whole paid \$1.57 billion in revenues to the government in 2018, and that this amount almost doubled (up

**Table 1**  
Overview of mining activities in the DRC, 2019.

Commodity	Production	Reserves	Unit	Significance
Cobalt	0.84	3,5	Million tons	According to the USGS, the DRC “continued to be the world’s leading source of mined cobalt, supplying more than one-half of world cobalt mine production”.
Copper	1.06	20	Million tons	Production of copper in the DRC reached 1.1 million tons in 2014 according to the EITI report.
Diamond	15.75	150	Million carats	DRC is one of the world’s leading producers of diamonds.
Gold	31.87		Thousand kilogram	Gold production quadrupled in 2014

Source: EITI 2019.

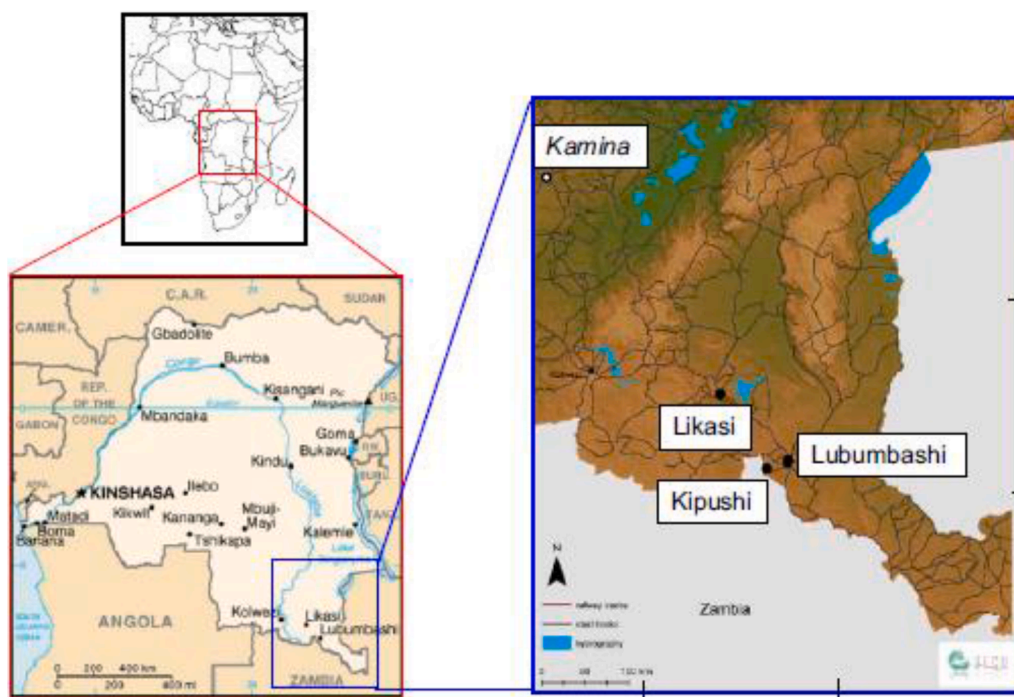


Fig. 1. Case study location of the former province of Katanga, DRC. Source: Banza et al. (2009).

91%) from the previous year. This amount may only scratch the surface, with Higgs (2017) speculating that the DRC could have \$214 trillion in untapped mineral resources.

Within the DRC, cobalt mining is concentrated in the former Katanga province, nestled in the Southeast near the Zambian border (See Fig. 1). This region has essentially the world’s largest single endowment of known cobalt resources (Sovacool 2019). There, cobalt is commonly mined as a byproduct of either copper or nickel mining. This region of DRC has some of the highest quality reserves globally, with many mines having grades above 3% compared to the global average of 0.6 to 0.8% (KPMG 2018). Most mining by volume takes place in corporate, securitized enclaves with capita-intensive modes of production but negligible benefits to local communities (Rubbers 2019). However, the potency of resources also makes cobalt and copper attractive for ASM activities, as cobalt can be harvested with “low-tech” options including digging small tunnels by shovel, pickaxe, or even hand. ASM mining is formally defined by Congolese law as “people carrying out extraction and concentration of mineral substances, using artisanal tools, methods and processes” (Tsurukawa et al. 2011). Other terms used for ASM mining include “semi-industrial” or just “small-scale.” ASM cobalt and copper mining in the DRC generally takes two forms. One form is where miners, typically adult men, work to dig underground tunnels with shovels, chisels, and mallets as far as 30 to 40 m deep (Sovacool 2019). Another form is where some men but mostly children and women collect and dig for cobalt in discarded tailings and slurry close to or even on large-scale mining (LSM) sites (Sovacool 2019).

Although the focus of this article is on Congolese cobalt from ASM activities, there is nonetheless considerable overlap between ASM and LSM. This is because both types of ASM operations—underground tunnels, and surface scavenging among slurry and tailings—connect with LSM concessions. Many ASM miners will attempt to dig their tunnels on the periphery of a LSM concession, in an attempt to reach it surreptitiously. Other times women, children, and diggers collect cobalt legally from LSM waste pits, or illegally by entering those concessions at night (to “steal” cobalt but also fuel, batteries, materials, and other metals). Moreover, while a single LSM site may have only a handful of zones of activity, ASM shafts are much more diffuse, with the ones the author visited having as many as 30–50 “mines” or tunnels in a single site,

compared to an industrial site that has perhaps one to three major pits. The line between LSM and ASM mining in the Congo may perhaps be clear on paper, but in practice remains constantly blurred (Katz-Lavigne 2019b).

The DRC is unlike the regimes of extraction for cobalt and copper found in many other countries. It has a long history of instability, and a current political and social environment replete with chronic conflict, dynamic notions of formality and informality, aggravated rates of poverty, perpetual claims of illegality, and constantly waxing and waning state control (Geenen 2012). Miners themselves are perpetually at the risk of “relative precariousness,” and mining companies generally operate under *more precarious* conditions now than they did in the past (Rubbers 2019). Katz-Lavigne (2019b) adds that mining occurs in a

Table 2  
Semi-structured expert interviews conducted for this study, 2019.

Respondent	Gender	Institution type	Location
CER1	Male	Academic	Belgium
CER2	Male	Private sector	UK
CER3	Male	Academic	Belgium
CER4	Female	Academic	Netherlands
CER5	Female	Civil society	DRC
CER6	Male	Academic	UK
CER7	Female	Academic	Belgium
CER8	Male	Academic	UK
CER9	Male	Academic	USA
CER10	Male	Academic	USA
CER11	Male	Academic	DRC
CER12	Male	Government	DRC
CER13	Male	Government	DRC
CER14	Male	Civil society	DRC
CER15	Male	Academic	DRC
CER16	Male	Academic	DRC
CER17	Male	Academic	DRC
CER18	Male	Civil society	DRC
CER19	Female	Civil society	DRC
CER20	Female	Civil society	DRC
CER21	Male	Private sector	DRC
CER22	Male	Academic	USA
CER23	Female	Civil society	DRC

Source: Author.

complex, dynamic system cutting across three tiers with blurred lines: a corporate component; an “authorized” system for artisanal extraction; and an “unauthorised” and typically clandestine element. Even Chinese mining companies operating in the sector recognize that they must confront what [Rubbers \(2020\)](#) terms “an assemblage of heterogeneous government techniques” related to LSM and ASM activities. These at times contradictory regimes of extraction lead to recurring instability—one that creates a formidable environment for exploitation, dispossession, and gendering (but also as we shall see, some forms of empowerment).

The legal framework and regulations governing Congolese cobalt mining are perhaps surprisingly simple and fairly robust on paper. According to the EITI (2019) and KPMG (2018), the three most prominent policies in place are:

- The 2002 mining Code, Law no. 007/2002, which stipulated the conditions by which foreign and domestic persons may own mining rights, and also provided rules to govern all aspects of mining, including acquisition, transfer, operation and termination of mining

rights, environment protection, cultural heritage, protection of neighboring communities, and tax and customs incentives;

- The 2015 General Tax Code, Law no. 010–2015, which reset the shares of tax that the government can lay on mining concessions (alongside reforms to other economic sectors);
- The 2018 Mining Code, Law no. 018/024, which updated and replaced the 2002 mining Code. The new Code increased the taxes that the state can place on mining profits, doubled the stake of the government in new mining projects, and canceled obsolete clauses under the older Code.

However, [Amnesty International \(2018\)](#) starkly warned that even two years after they published a report documenting the extent of child labor and abuse at cobalt mines, little has changed in terms of regulation and policy. They accused the government of making only “limited progress” on its pledges to tackle the problem, companies of “not doing enough” to verify supply chains, suppliers of refusing to disclose a “complete picture” of their trading flows, and miners of still seeing “cheap hand-dug cobalt” as a pathway to getting rich quickly.

**Table 3**  
DRC Community Interview Participants in this Study, 2019.

<u>Respondent</u>	<u>Title</u>	<u>Gender</u>	<u>Institution</u>	<u>Location</u>
CCR1	Safety Coordinator	Male	Gécamines (state-owned mining company)	Lubumbashi, DRC
CCR2	Industrial miner	Male	Gécamines (state-owned mining company)	Kinshasa, DRC
CCR3	Safety inspector	Male	L'entreprise minière Congo Dongfang Mining (CDM)	Lubumbashi, DRC
CCR4	Digger	Male	Artisanal miner, Ruashi	Lubumbashi, DRC
CCR5	Digger	Female	Artisanal miner, Ruashi	Lubumbashi, DRC
CCR6	Digger and sorter	Male	Artisanal miner, Ruashi	Lubumbashi, DRC
CCR7	Driver	Male	Nyati Cross Border Transport (Copper transport and logistics)	Lubumbashi, DRC
CCR8	Owner/manager/boss	Male	Kasulu Artisanal mine	Kolwezi, DRC
CCR9	Digger	Male	Kasulu Artisanal mine	Kolwezi, DRC
CCR10	Digger	Male	Kasulu Artisanal mine	Kolwezi, DRC
CCR11	Digger	Male	Kasulu Artisanal mine	Kolwezi, DRC
CCR12	Digger	Female	Kasulu Artisanal mine	Kolwezi, DRC
CCR13	Digger	Male	Kasulu Artisanal mine	Kolwezi, DRC
CCR14	Digger	Male	Kasulu Artisanal mine	Kolwezi, DRC
CCR15	Sorter and carrier	Male	Depot 169	Kolwezi, DRC
CCR16	Sorter and carrier	Male	Depot 169	Kolwezi, DRC
CCR17	Sorter and carrier	Male	Depot 169	Kolwezi, DRC
CCR18	Carrier	Male	Depot 169	Kolwezi, DRC
CCR19	Refiner/melter	Male	Depot 2	Kolwezi, DRC
CCR20	Refiner/melter	Male	Depot 2	Kolwezi, DRC
CCR21	Refiner/melter	Male	Depot 2	Kolwezi, DRC
CCR22	Carrier	Female	Depot 1000	Kolwezi, DRC
CCR23	Refiner/melter	Male	Depot 1000	Kolwezi, DRC
CCR24	Crusher	Male	Depot Thomas Boss Billy	Kisanfu, DRC
CCR25	Sorter	Male	Depot Thomas Boss Billy	Kisanfu, DRC
CCR26	Sorter and carrier	Male	Depot Thomas Boss Billy	Kisanfu, DRC
CCR27	Industrial miner	Male	Tenke Fungurume Mine	Fungerume, DRC
CCR28	Industrial miner	Male	Ruashi Mining	Fungerume, DRC
CCR29	Manager/boss	Male	Solola and Kabica Artisanal Mines	Fungerume, DRC
CCR30	Digger	Male	Solola and Kabica Artisanal Mines	Fungerume, DRC
CCR31	Digger	Male	Solola and Kabica Artisanal Mines	Fungerume, DRC
CCR32	Digger	Male	Solola and Kabica Artisanal Mines	Fungerume, DRC
CCR33	Digger	Female	Solola and Kabica Artisanal Mines	Fungerume, DRC
CCR34	Boss/negotiator/trader	Male	Katanga and Fungerume Artisanal Mines	Fungerume, DRC
CCR35	Digger	Male	Katanga and Fungerume Artisanal Mines	Fungerume, DRC
CCR36	Digger	Male	Katanga and Fungerume Artisanal Mines	Fungerume, DRC
CCR37	Digger	Male	Katanga and Fungerume Artisanal Mines	Fungerume, DRC
CCR38	Digger	Male	Katanga and Fungerume Artisanal Mines	Fungerume, DRC
CCR39	Digger	Female	Katanga and Fungerume Artisanal Mines	Fungerume, DRC
CCR40	Captain	Male	Fungerume Mining Police	Fungerume, DRC
CCR41	President	Male	Fungerume Mining Negotiator Association	Fungerume, DRC
CCR42	Officer	Male	Fungerume Mining Police	Fungerume, DRC
CCR43	Chief	Male	Depot 18	Museba, DRC
CCR44	Sorter and crusher	Female	Depot 18	Museba, DRC
CCR45	Sorter and crusher	Male	Depot 18	Museba, DRC
CCR46	Boss/manager	Male	Kawama Artisanal Mine	Lubumbashi, DRC
CCR47	Digger	Male	Kawama Artisanal Mine	Lubumbashi, DRC
CCR48	Digger	Male	Kawama Artisanal Mine	Lubumbashi, DRC

Source: Author.

**Table 4**  
DRC Site Visits and Naturalistic Observation Conducted in this Study, 2019.

No.	Name	Type	Description	Location
1	Katanga Artisanal Mine	Artisanal mine	Copper and cobalt mine	Fungurume, DRC
2	Kabica Artisanal Mine	Artisanal mine	Copper and cobalt mine	Fungurume, DRC
3	Solola Artisanal Mine	Artisanal mine	Copper and cobalt mine	Fungurume, DRC
4	Tenke Fungurume Mine Concession	Artisanal mine	Copper and cobalt mine	Fungurume, DRC
5	Depot Laylay	Artisanal trader	Copper and cobalt trader	Kisanfu, DRC
6	Depot Thomas Boss Billy	Artisanal trader	Copper and cobalt trader	Kisanfu, DRC
7	Kasulu	Artisanal mine	Cobalt mine	Kolwezi, DRC
8	Djoni	Artisanal mine	Copper and cobalt mine	Kolwezi, DRC
9	Depot 2	Artisanal trader	Copper and cobalt trader	Kolwezi, DRC
10	Depot 1000	Artisanal trader	Copper and cobalt trader	Kolwezi, DRC
11	Depot 169	Artisanal refinery	Copper and cobalt trader and refinery	Kolwezi, DRC
12	Likasi Artisanal Mine 1	Artisanal mine	Copper and cobalt mine	Likasi, DRC
13	Likasi Artisanal Mine 2	Artisanal mine	Copper and cobalt mine	Likasi, DRC
14	Rwashi Mining Commune	Artisanal mine	Copper and cobalt mine	Lubumbashi, DRC
15	Kawama Artisanal Mine	Artisanal mine	Copper and cobalt mine	Lubumbashi, DRC
16	Depot Samy 888	Artisanal trader	Copper trader	Mulunwishi, DRC
17	Depot 18	Artisanal trader	Copper and cobalt trader	Museba, DRC

Source: Author.

### 3. Research design and ethics

To collect data on ASM cobalt mining in the DRC, this study relies on a mixed methods research design involving expert interviews, community interviews, naturalistic observation and site visits, and a literature review.

#### 3.1. Qualitative expert interviews

The author first conducted 23 semi-structured expert research interviews in February to April 2019 at a variety of institutions involved with knowledge of mining in the DRC, located in the DRC but also other locations including Belgium, the Netherlands, the United Kingdom and the United States (See Table 2). The expert interviews could be classified as elite or key informant interviews, seeking those with knowledge and expertise about cobalt mining generally or mining in the DRC. This included:

- Government agencies such as the Service d'Assistance et d'Encadrement du Small Scale Mining (SAESSCAM, recently renamed SAEMAPE) and the Ministry of Mines in the DRC;
- International civil society groups such as Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and the German Federal Institute for Geosciences and Natural Resources (BGR) as well as local groups such as Resource Matters and the Carter Center;
- Private sector firms and organizations including Gécamines (state-owned mining company), L'entreprise minière Congo Dongfang Mining (CDM mining), Tenke Fungurume Mining (TFM), Glencorps, and Ruashi Mining;
- Academic institutions, including the Universities of Liège in Belgium, University of Groningen in the Netherlands, Colorado School of Mines in the United States, University of Bath in the United Kingdom

as well as the Université de Kinshasa and the Université de Lubumbashi in the DRC.

During each interview, the author asked the following research questions: “How would you describe the mining activities for copper and cobalt in the DRC? “What positive benefits and negative costs associated with mining have occurred?” “Who has been the most vulnerable, or significantly impacted?” “What policies need implemented?” Each interview lasted generally between 45 and 120 min, and respondents were guaranteed full anonymity to encourage candor and protect respondents from potential retaliation. Each participant was given a unique respondent number (e.g. CER1 to CER 23), referred to throughout the rest of the paper. Given that gendering is a focal point of the research, it is worth noting that six of these expert respondents identified themselves as female.

#### 3.2. Qualitative community interviews

Given the research questions focused partly on community perceptions and impacts, expert interviews were coupled with actual semi-structured community interviews throughout the cobalt mining sector. Community interviews were conducted also throughout January to April 2019, and were meant to include perspectives from non-expert or elite participants who lived, worked, or resided close to the mining sites and communities in question. The author interviewed ASM diggers (*creuseurs* or *kwanda*) as well as artisanal bosses or chiefs, crushers, carriers, drivers, refiners, safety inspectors, sorters, labor unions and even members of the mining police. In total, 48 of these community interviews were conducted, following the same questions or script as the expert interviews, although usually shorter in duration. The average community interview lasted between 10 and 45 min. Each respondent was guaranteed anonymity, and also assigned a unique respondent number shown in Table 3. Again, as gendering is a focal point of the research, it is worth noting that six of these community respondents identified themselves as female.

In both sets of interviews, the author used purposive sampling and a critical stakeholder lens that sought perspectives from those “for” and “against” mining as well as a diversity of institutions cutting across government, the private sector, civil society institutions, and independent research organizations (including universities). This balancing of views was intended to ensure the positionality of the research team remained dispassionate, independent, and neutral. Most, though not all, of the interviews were recorded, though all interviews were fully transcribed and analyzed, and then coded, with some of the coding results shown in Appendix I.

#### 3.3. Naturalistic observation

To complement the interviews, the author conducted 17 site visits for naturalistic observation during the same duration in 2019—encompassing 10 ASM mines, 6 artisanal trading depots, and 1 artisanal refinery or processing center—summarized in Table 4. Various sites were selected for observation, to ensure a mix of different location, sizes, ownerships structures, as well as accessibility during the field research. Fig. 2 shows the major ASM mining communities of Fungurume, Kolwezi, and Lubumbashi. Naturalistic observation, or unstructured observation, involves what McLeod (2015) calls “studying the spontaneous behavior of participants in natural surroundings,” with the researcher recording what they see. This helps supplement structured or controlled methods in that it enables examining behavior or events in the real world—much like the difference between viewing rare birds in an aviary, or their natural habitat. Key strengths of the method include greater validity, with highly realistic and authentic accounts being produced that can capture spontaneous events or reactions; little to no interviewer influence or biases of social desirability; and the opportunity to study a situation in its total context and complexity (McLeod 2015).

a. *Fungurume*



b. *Kolwezi*



c. *Lubumbashi*



Fig. 2. Central locations for ASM site visits and naturalistic observation. a. *Fungurume*. b. *Kolwezi*. c. *Lubumbashi*. Source: Author.

Weaknesses include the lack of a representative sample, the reliance on a small (micro) scale, and inability to replicate findings (McLeod 2015). Hence the utility of mixing naturalistic observation with the other two methods in the study of expert and community interviews. Each of these naturalistic site visits lasted between 20 and 180 min. These observational data is used to supplement the narrative when interpreting interview data, and in the visual form of photographic evidence.

### 3.4. Ethics and triangulation

In terms of ethics, a risk assessment was conducted before field research commenced, and a debriefing occurred when the research team returned from the field. Ethics approval was given by the university ethics committee before field research began (reference ER/BS289/4), and all children (or their parents) and participants gave written consent to the use of their quotes and other research materials including photographs.

For all community interviews and site visits, the author travelled with a team of Congolese research assistants who spoke English, French, and local languages. The research team was given exceptional access given our *Ordre de Mission*, our permit to undertake research, was sponsored collectively by the University of Lubumbashi, the Congolese Ministry of Education, both the provincial governors of Haut-Katanga (home to the mines in Likasi and Lubumbashi) and Lualaba (home to the mines in Kolwezi, and Fungurume), and the Congolese Secret Service. Nevertheless, is not believed that the *Ordre de Mission* limited access, because hardly anyone checked for our *Order de Mission* in the field, especially at mining sites or depots. The research team also included a justice advocate, a Congolese lawyer, to enhance the legitimacy of the visit but also minimize any opportunities for corruption.

To triangulate the data from the interviews and site visits, and also to better position the study within the body of growing research, the author lastly conducted an interdisciplinary literature review of studies looking at cobalt mining in the DRC, especially in the former Katanga province, published within the past ten years (i.e., from 2010 to mid-2020). The Scopus and Science Direct databases were searched for terms such as “copper,” “cobalt,” “mining” and “extractive industries” as well as phrases such as “Congo,” “Lubumbashi,” and “Kolwezi.” Because only a small number of actual peer reviewed studies (about a dozen) were collected, the author repeated the search for non-academic sources including reports, policy briefs, and magazine and newspaper articles. The resulting corpus of approximately fifty studies is cited throughout this study to help situate or confirm its findings within the literature.

## 4. Tripartite conceptual framework: slavery, dispossession and gendering

To help guide the analysis and filter the data, the study engages with three separate conceptual devices or frameworks: that of “modern slavery,” “dispossession” and “gendering.”

### 4.1. Modern slavery

In its broadest view, [Rodrigues and Craig \(2018\)](#) write that slavery refers to the “subjugation and transformation of a person into a commodity governed by forces of the market.” [Mende \(2019\)](#) notes prominent definitions in international law that conceive of slavery as “the status or condition of a person over whom any or all of the powers attaching to the right of ownership are exercised” to the “movement of people for the purpose of their exploitation.” [Jackson and Sparks \(2020\)](#) add that the term “modern slavery” has become an umbrella that covers various human rights violations and abuses including institutions and practices such as slavery, forced labor, servitude, and human trafficking. [McGrath and Watson \(2018\)](#) use the acronym TFLS to capture “trafficking, forced labor, and slavery” and note that this language is embedded in international efforts to promote decent work, notably in

SDG Target 8.7 that commits states to “take immediate and effective measures to eradicate forced labor, end modern slavery and human trafficking and secure the prohibition and elimination of the worst forms of child labor.” [Acemoglu et al. \(2012\)](#) note that slavery is very similar to coercion, feudalism and serfdom as well—where great restrictions are placed on both movement and occupational choices—and is often used to describe general patterns of labor repression.

Notions of “modern slavery” or “new slavery” center heavily on the groundbreaking work of [Bales \(1999, 2005, 2016\)](#), who defines modern slavery as a state of control exercised over another human being. New slavery in this context is defined in terms of exploitation, violence or the threat of violence, and the loss of free will or control. This control is often (a) based on the potential or actual use of violence, (b) lacks any remuneration beyond subsistence, and (c) appropriates the labor or other qualities of the slave for economic gain. [Bales \(1999\)](#) notes that the different outcomes of slavery are exploitative in nature, such as an appropriation of unpaid labor for productive activities that benefit the slaveholder, treatment of a person as an object or an item of conspicuous consumption, or enslaving a person for sexual pleasure or force marriage. [Bales \(2016, 2017\)](#) notes that modern slavery is often a family affair, with family members placing other family members into slavery. [Bales \(1999\)](#) cautions that new forms of slavery are extremely difficult to identify, because they are so diffuse and it is also difficult to locate the slave owner or holder.

Building on these definitions, dichotomies often emerge in the literature. [Bezemer et al. \(2014\)](#) distinguish between export oriented slavery, i.e. the shipping of slaves to places like Europe or North America from Africa that are traded beyond the continent, or indigenous slavery, i.e. slavery that is locally occurring and within a country. [Patterson \(2001\)](#) distinguishes between slave holding societies, where slavery occurs although often illegally, and large-scale, genuine slavery where slavery operates systematically as a recognized institution.

Despite these conceptualizations and distinctions, “modern slavery” is not an uncontested idea. [Mende \(2019\)](#) offers a useful survey noting that slavery has “many faces” and at least fourteen different occurrences that differ greatly in terms of scope, scale, and severity. These are:

- Human trafficking;
- Debt bondage;
- Chattel slavery (ownership of the slave and all future offspring);
- Contract slavery;
- Enforced prostitution;
- War slavery (including unlawful Recruitment and Use of Child Soldiers);
- Restavecs (children given into domestic service);
- Child labor;
- Forced marriage;
- Forced or compulsory labor;
- Work in sweatshops, mining, and brick lanes;
- Cult and ritual slavery in religious shrines;
- The selling of human organs;
- Domestic slavery in private households (domestic servitude).

(Indeed, we see many of these forms arise in our own study of the DRC, including human tracking, contract slavery, and child labor). Despite this diversity of forms of repression and inequality, [Mende \(2019\)](#) suggests that modern slavery has three common “denominators:” the control of a person over another, an involuntary aspect in their relation, and the element of exploitation.

Application of the modern slavery concept is not immune from criticism. [McGrath and Watson \(2018\)](#) argue that strict binaries between slaves and non-slaves, or victims and liberators, are unhelpful and that slavery should be conceived of as a continuum or have called for alternative labor or human rights paradigms. Most importantly, researchers need to avoid fetishizing modern slavery, or using it as a sense of Western superiority, given that slavery still exists in societies that have

higher levels of economic development than Africa or Asia. Mende (2019) also cautions that there is a danger that “definitions of modern slavery may entail the risk of masking structural violence, power relations, and economic and social inequalities.” This study takes these concerns seriously, and it does not mean to imply that all those being exploited in the Congolese cobalt sector need rescued. Indeed, as we will see in Section 6, labor practices for cobalt do have the potential to empower. Nevertheless, given that our respondents used the words “slavery” themselves we felt it most appropriate to value and recognize their concerns through the heuristic of modern slavery.

#### 4.2. Dispossession

The second conceptual device utilized in the study is that of “dispossession.” Dispossession is associated with processes through which actors, often elites, come to possess the assets of others, and it constitutes a central theme in political ecology, political economy, and human geography research (Sovacool et al. 2019). Harvey (2004: 4) elaborates the concept of “accumulation by dispossession,” defined as the “centralization of wealth and power in the hands of a few by dispossessing the public of their wealth or land.”

Accumulation by dispossession can take a variety of forms, including the privatization of land and forcible relocation of people residing there, the establishment of property rights or suppression of rights to the commons, and the process of appropriating assets such as natural resources or land (Harvey 2003, 2006). Political dispossession has been defined as the (neoliberal) restructuring of the state by finance through the privatization of profits, and the socialization of losses (Keucheyan 2018:498). Bernstein (2010) has also developed a typology of land dispossession presented in Table 5. Sometimes, farmers or peasants are displaced by local elites that own property or agrarian capital; or, they are displaced by their neighbors who begin to accumulate wealth and differentiate themselves by class. In other times, dispossession can be more a national and international phenomena, with pressures coming from political elites in urban areas or even transnational flows of capital. In neoMarxist terms, these are instances of the capitalist class gaining power at the expense of the labor class.

#### 4.3. Gendering

Gendering is our third and final conceptual apparatus. This connects mining not only with gender relations but also feminist research on livelihoods, postcolonialism, and power relations (Lahiri-Dutt 2012; Lahiri-Dutt 2015). The approach conceives of gender not as static or biological, but instead dynamic and rooted in gender as a social relation that intersects with other social relations and inequalities as well as solutions and policies.

In their review of the topic, Buss and Rutherford (2020) argue that gendering recognizes the representational work that constructs women’s labor, but also the extent to which it can empower and improve livelihoods (or not). They note three recurring themes within this body of work. Firstly, gendered division of labor, and how women engage in mining activities with different skills, knowledge, and practices than men or those of other genders. Second, the productive and often uneven

**Table 5**  
A Schematic Typology of Land Dispossession.

Type	Main class agents
Dispossession of small farmers or peasants	Landed property, agrarian capital
Accumulation from below/class differentiation	Rich peasants, emergent capitalist farmers
Dispossession by indigenous classes of capital and politically powerful groups	Indigenous urban classes of capital, local or national political elites
Dispossession by international capitals and foreign governments	International capital and states

Source: Bernstein (2010).

effects of gender norms, how notion of masculinity and femininity, or caring, nurturing, working, enterprising, and other practices vary geographically and temporally, and come to achieve gendered meanings that can be constructed and deconstructed, contested and uncontested. Third, gendered relations and structures of authority, how dominant social structures create webs of power relations that can both constrain but also empower women. In our study we see all three themes of gendered labor, gender norms, and gender structures at play—although we also document the lived experiences of these women in their own words or the words of those working with or near them, practicing patriarchy or resisting it.

#### 4.4. Synthesis

As Fig. 3 attempts to capture, our conceptual approaches do not sit in isolation. Instead, they often intersect and can even reinforce each other. The outer triangle in Fig. 3 reveals not only our three concepts of modern slavery, gendering, and dispossession, but it shows how they are linked to multiple dimensions that connect closely with each of the other two aspects of the framework. Gendering sits between labor inequality (women valued less than men) but also gendered norms about masculinity and femininity, and acceptable practices, which can lead to dispossession. Dispossession can connect to gender, women may be dispossessed more than men or more susceptible to it, but also cycles of poverty (structural drivers often behind dispossession, or gendered structures) and violence (coercion used to dispossess). Modern slavery, too, is a form of coercion and dispossession, but one that manifests itself more in labor inequality. The framework also leads to three clusters of results in the inner triangle, which we discuss in depth in the next section: violent exploitation, patriarchy and prostitution, and child labor.

### 5. Results: Contours of power, patriarchy, and child labor

This section of the study presents its core results, divided thematically among the topics of power and exploitation, gender, and child labor. Or, more precisely, three of the most vulnerable groups: ASM miners, women, and children. The next section discusses intersections with slavery, dependence, and dispossession.

As Fig. 4 reveals, issues of power and exploitation, gender insecurity, and child labor were selected as themes because they were not isolated occurrences within the interview data. They came up with perhaps shocking consistency and frequency, with more than three-quarters of expert interviewees mentioning the exploitation of miners at the hands of government, foreign firms, or police and military. An even greater number of community interviewees (more than 80%) identified exploitation at the hands of government, police/military, and foreign firms. More than 80 percent of expert interviewees identified the gendered nature of drudgery and manual mining work, with undue burdens placed on women, and more than 80 percent of the community interviewees pinpointed the debilitating health impacts of mining that fall disproportionately on women. Other gender issues may have come up less in the community interviews because the author spoke mostly to men and male miners. Finally, more than half of expert interviewees discussed drudgery and manual labor, degraded health, and physical abuse among children, alongside more than half of community interviewees identifying degraded health and drudgery and manual labor for children.

#### 5.1. Power relations and violent exploitation

Our data revealed that ASM cobalt miners, due to their self-stated lack of skills, tenuous legal standing, and lack of organization compared to LSM firms or the government, are constantly exploited and operate at the bottom of a hierarchy of Congolese power relations. According to the data, this occurs most often at the hands of government, foreign firms, and the police and military, but it can also be by local



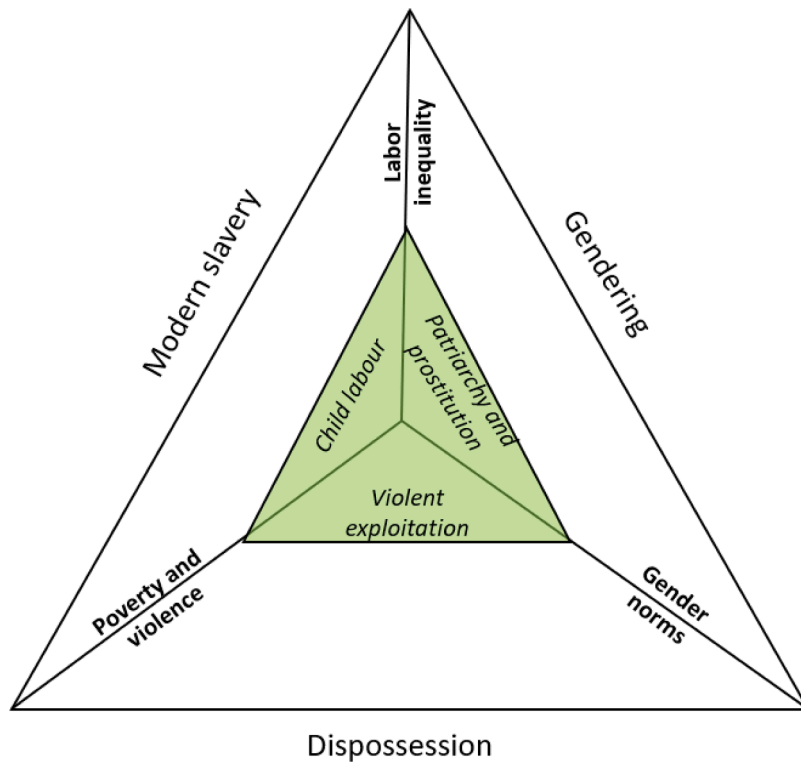


Fig. 3. Conceptualizing the interconnections between modern slavery, dispossession, and gendering. Source: Author.

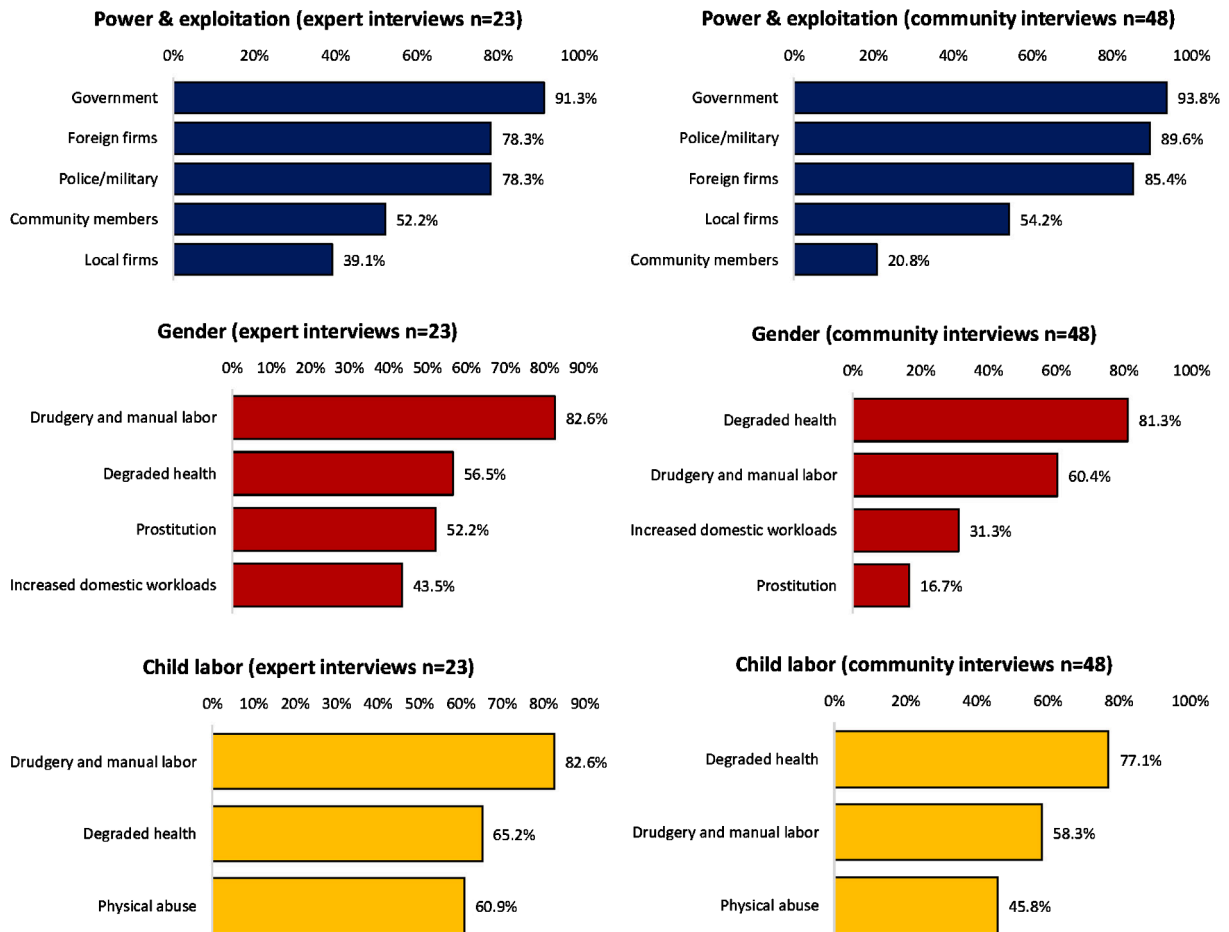


Fig. 4. Overview of empirical evidence identifying the prevalence of power relations, gender insecurity, and child labor in Congolese cobalt mining Source: Author.

firms or even other community members themselves. Expert interviewees identified community members as exploitative of miners in more than half (52.2%) of the interviews and community interviewees identified local firms as exploitative in more than half (54.2%) of the interviews and fellow community members as exploitative in more than a fifth (20.8%) of the interviews.

CER1, for example, explained that “ASM miners in the Congo are a textbook case of a vulnerable group. They literally rely on spades and buckets to mine cobalt, transporting it by bicycle or motorbike. They cannot even afford ladders, or trucks. Some even dig by hand.” The site visits undertaken by the author confirmed this trend, with Fig. 5 showcasing ASM mining teams and shafts operating on concessions illegally, with tunnels and pits not standardized or safe, and ASM operations always working in rural areas in small teams.

This precarious legal standing subjugates ASM cobalt miners to constant exploitation by mining bosses, by trading companies, the

mining police, the local police, and the national secret service. Multiple miners discussed being taken advantage of by either the bosses they worked for, the local companies they sold cobalt to, or LSM operations that artificially depressed the price of cobalt. CCR8 said:

*I am very angry about CDM and other concessions. Since they have come, my livelihood and my family have really suffered. The price for cobalt is too low, for one they have an oversupply so there is not enough demand to meet their supply. Second, they pay less than market prices, which hurts us even more because we cannot compete with them on an open market. We are displaced and undercut with prices at the same time.*

This statement underscores the economic forces at work which doubly dispossess miners. Using similar language, CCR39 talked about “double taxation” and added that “we can never get enough money, the mining police always taking a share of my cut, then we have to sell below market prices anyways.” CCR46 spoke again of prices being too low, so

a. Kolwezi, operating illegally on the backside of the Sicomines concession



b. Kasulu, operating illegally on the CDM concession



c. Kawama, operating illegally on another CDM concession



d. Solola, operating illegally on the TFM concession



**Fig. 5.** Four cobalt ASM sites in Kolwezi, Kasulu, Kawama, and Solola. a. Kolwezi, operating illegally on the backside of the Sicomines concession. b. Kasulu, operating illegally on the CDM concession. c. Kawama, operating illegally on another CDM concession. d. Solola, operating illegally on the TFM concession. Source: Author. Permission granted by participants for the use of all photographs.

low that the traders exploit the diggers and pay only for the copper, demanding the cobalt is “free” as a tax. CCR44 explained that currently (as of March 2019), the depots say they “don’t want cobalt, copper is more profitable, I give them cobalt for free.”

Other ASM miners are constantly harassed by the police or military. CCR6 and CCR14 both talked about being repeatedly “beaten” by bosses or even family members if they did not meet ASM production quotas. CCR15 discussed how he and many of his friends were repeatedly “beaten by security forces, arrested by the police, constantly threatened with violence or intimidation, frequently tear gassed, often chased by dogs, and occasionally killed or disappeared.” CCR44 discussed how they left digging, to work at a trading depot for cobalt, because “my brother was killed by the mining police and I felt staying as a digger was a death sentence.” CCR45 framed it more as tensions and conflict between mining teams, the police, and industrial mining operations, saying “it’s almost like a third Congolese war sometimes.”

Our findings mirror and buttress those from Rubbers (2020), who also found that exploitation of Congolese mining occurred across three separate dimensions: between employment in industrial and artisanal mining companies; between jobs for mining or subcontracting companies; and between jobs for expatriates, Congolese skilled workers and local unskilled workers. As Rubbers (2020) concluded, “far from simply reflecting existing social inequalities, the labor market has been actively involved in their creation, and its control has caused growing tensions in the Congolese copperbelt region.”

Moreover, some academic studies do discuss how the DRC faces exploitation from foreign firms to attract industry and keep prices low. For example, Marysse and Geenen (2009) report that trade agreements with China enable Chinese firms to buy at prices below world market levels. Mohan and Power (2008) thus caution that mining will not challenge fundamentally Africa’s extroverted relationship with the world economy, which keep it at a perpetual disadvantage and locked into supplying raw materials to global markets, rather than adding value to the local economy. De Haan and Geenen (2016) also noted that mining cooperatives, intended to support local miners, have in one other sector (South Kivu) done the opposite and become tools furthering the exploitation of miners at the hands of the elite.

## 5.2. Patriarchy, gender insecurity and prostitution

A second vulnerable group is women, who go against some social norms to mine—also putting those that do in a precarious situation. Expert interviewees identified drudgery and backbreaking manual labor as gendered in 82.6% of the interviews, alongside 60.4% of the community interviews. Degraded health was mentioned in 56.5% of the expert interviews and 81.3% of the community interviews. Prostitution was mentioned in 52.2% of the expert interviews and 16.7% of the community interviews; increased domestic workloads mentioned in 43.5% of the expert interviews and 31.3% of the community interviews.

For example, CER12 stated in no uncertain terms that they believed “the mining law forbids women and children from being exploited for mining.” However, in practice a different picture emerges. For instance, CER4 admitted that:

*Women often get overlooked in the mining literature, as according to Congolese [norms] they are not allowed in the mines or near the mines. But the reality is different. There are some female miners and many more many female traders, complaining that the quality of minerals is no longer as good. Other women do not directly mine or trade, but are doing everything else, washing minerals, processing them, feeding the miners, providing sex services, having and raising children. The universal truth in artisanal mining is that it is run invisibly by women.*

This statement underscores social dynamics which may dispossess women. CER8 added that:

*Cobalt mining activities are very gendered: For example, you rarely find women going into the pits and digging, but they play a central role in cleaning, processing, transporting, and trading. Prostitution is rife in mining camps, and sex workers are among the most vulnerable to poverty, and also violence, in particular because they are often internal migrants with few local connections or support networks.*

This statement notes the intersection of gender, sex, and migration as shaping patterns of gender exploitation. CER20 elaborated that because the work of women is both illegal and invisible, they suffer many of the same patterns of exploitation mentioned in Section 4.1. As CER20 stated:

*Women and children are some of the most exposed, exploited, and vulnerable in an already vulnerable class of miners. They don’t get access to the best mining sites, they don’t get paid equal revenue, they don’t have the physical strength of men, they fall sick more often or are more easily harmed. Parents will even send daughters into the mine when times are dire; husbands will send wives; even grandparents will send their granddaughters.*

This statement supports the notion that even local community or family members may dispossess each other of assets or pressure each other to enter mining sites. The site visits conducted by the author confirmed these findings, with Fig. 6 showing women (and girls) being observed digging for cobalt, carrying, and sorting, as well as conducting support activities such as selling vegetables to miners and hauling water.

While stark, a growing evidence base has confirmed many of these gendered and patriarchal dimensions to cobalt mining or ASM mining as a whole, many of which extend beyond the mine. The World Bank (2007) estimated that 45 to 50% of all ASM workers in Africa are women. Buss et al. (2017) also calculated that across all of sub-Saharan Africa, an estimated 25–50% of artisanal miners are women. PACT (2012) estimated that in the Democratic Republic of the Congo in particular, 20% of the active ASM community, or 400,000 miners, sorters, transporters and suppliers, are women. Nkulu et al. (2018) found that many young diggers bragged about spending their money on alcohol or prostitutes. CER4 agreed that “within ASM communities, because it is such a hard life, miners use drugs, alcohol, and prostitutes to numb the harshness of their circumstances.” Tshilobo (2005) confirmed that prostitution in mining camps is widespread, with some sexual workers as young as 12 years old, often exploited street children and orphans. Tsurukawa et al. (2011) also reported the prostitution of children in ASM settlements. The World Bank (2007) noted across the ASM sector broadly, Congolese women constitute a growing proportion of miners and workers but, due to their low status, are generally forced to undertake the most strenuous or poorly paid activities, or to merely enhance the status of their husbands.

The literature also notes an array of other indirect effects ASM mining has on gender relations and disempowerment. Hinton et al. (2013) writes that many of the health impacts from mining are gendered, with women facing additional illness, injury, and stress as well as extreme exertion and exhaustion from very labor-intensive activities (i.e., digging for several hours, hauling heavy loads long distances, bending over in awkward positions). Women thus remain on the perpetual boundary between “poverty and misery” (Hinton et al., 2013: 12). Rustad et al. (2016) found in the Eastern Congo that women living in closer proximity to ASM sites were more likely to experience sexual violence. Tsurukawa et al. (2011) noted that women in mining communities in the DRC face the ever present risk of contracting dangerous diseases being spread by miners and migrants, including diarrhea, hepatitis, meningitis, bilharziosis, cholera, typhoid, tetanus, typhus, malaria, yellow fever, tuberculosis, musculoskeletal disorders, respiratory disorders and headaches.

Moreover, the fact that most ASM mining for cobalt is nomadic adds stress to family routines and structures, with women often having to take care of children, orphans, the elderly and widows in addition to their mining activities (World Bank 2007). ASM miners may also come to

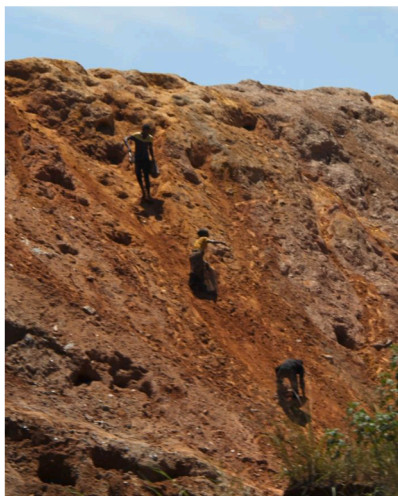
a. Digging and carrying in Rwashi



d. Vending in Funguerume



b. Digging and carrying in Kolwezi



e. Collecting water in Funguerume



c. Sorting in Lubumbashi



Fig. 6. The gendered nature of ASM cobalt activities in the Democratic Republic of the Congo, March 2019. a. Digging and carrying in Rwashi. b. Digging and carrying in Kolwezi. c. Sorting in Lubumbashi. d. Vending in Funguerume. e. Collecting water in Funguerume. Source: Author. Permission granted by participants for the use of all photographs.

practice polygamy or catch and spread sexually transmitted diseases to women, including HIV/AIDS, as well as higher rates of teenage pregnancy. The remote and temporary nature of many ASM settlements frequently leads to alcoholism and drug abuse, which then correspond to higher levels of domestic and sexual violence, rape, and abuse of women. Mining activities tend to create higher temporary wages which then lead to local inflation that makes many household items less affordable—also negatively impacting women. As CER1 explained:

*ASM cobalt mining may bring communities some money, but it also results in more inequality. People take advantage of the mining boom, get rich, but others who did not, get less. The cost of living has become high, unaffordable for the chronic poor. Food prices have risen, imports from Zambia increased, school fees have risen, housing prices all dramatically climbed. Prices have increased 300 or even 400%, and it is usually women that suffer as they struggle to provide for the family.*

This statement may explain why such a high number of expert and community respondents discussed negative relationships between mining and household workloads for women. The World Bank (2007) confirmed that ASM activities in the Congo do frequently result in localized artificial inflation, food insecurity, and increased demands on already limited basic infrastructure for food, water, health, and education. Mining camps are also reputed to have higher rates of crime and theft—and sexual violence and abuse that can be related to it (World Bank 2007).

Given that the World Bank data is somewhat dated, more recent data confirms trends of both gender inequality and migration. Cuvelier (2014, 2017) similarly documented that mining activities and mining camps in the DRC entrench particularly masculine values related to money and migration and also lock in particular gender relations where conspicuous consumption of money plays a vital role in the mining subculture; where credit and debt dominate financial lifestyles; and where greater workloads are placed on women for household chores. Cuvelier (2014) even goes as far as to say that mining has created new norms about what being a modern man in Congolese society means. Hoffmann (2020) also affirms continued migration in the region towards mining, a new cycle of worker camps leading to a “recent boom” in mining given that the unstable conditions leading to internal displacement have not disappeared, especially due to the conflict and discord around mining operations in the East.

Three caveats deserve mentioning, however, to contextualize these findings. First, as iterated above, it is not always men responsible for patriarchy or the subjugation of women; as Bashwira and Cuvelier (2019) confirm in their research, power relations *between* women can contribute to patterns of patriarchy or gender inequality as much as power relations between women and men. Second, although outside the remit of this study, gender issues are not isolated to only ASM practices. Pugliese (2020) notes gender inequality within the industrial and large-scale mining sector as well. They conclude that despite a plethora of gender equality programs at the corporate scale, processes continue to produce the norm that Congolese mining is a masculine activity best done by men, and lead to problematic and unequal gender roles. Pugliese (2020) adds that because “discourses and processes continue to produce Congolese Copperbelt mines as masculine spaces at different levels,” gender practices and equality policies “are not easily implemented” and must “confront a region marked by the paternalistic social policies of mining companies in the past, which have entrenched a certain gender hegemony.” Third, there are aspects of where women mining can be empowering. Although not directly supported by our data, we do discuss findings from other studies in Section 6.3.

### 5.3. Child labor and degraded health

A final group explicitly identified by our expert interviews as being exploited and vulnerable were children. A strong majority of expert

interviews (82.6%) and community interviews (58.3%) mentioned the prevalence of child labor within cobalt mines. Degraded health was also mentioned in 65.2% of expert interviews and 77.1% of community interviews; physical abuse mentioned in 60.9% of expert interviews and 45.8% of community interviews.

Confirming these data, CER2 explained that “*children are in artisanal cobalt mines as the only way to feed themselves or their family. So the economics of the market are currently tilted towards child labor and human rights abuses.*” CER12 remarked that “*children will sneak into mining concessions at night, to mine for cobalt or copper or even steal materials.*” CER22 said that:

*The issue of scavenger miners really puts industrial mining companies in a bind. They are damned if they do, and damned if they don't. If they completely prevent ASM miners from operating, especially women and children, they are seen by local communities as a threat to be resisted and fought. But if they allow ASM mining on the fringes, they risk their reputations, and also that security guards will be accused of human rights abuses for permitting child labor. There is no 'win' in this formula.*

This statement reveals how LSM operations may condone ASM activities that then lead directly or indirectly to child labor.

Perhaps more compelling statements come from cobalt miners themselves. CCR4, a digger who stated to be fourteen but looked less than ten years old, said that he “*works 10 to 14 hrs a day, when there is daylight, so that I can send money to my sisters and my mother. Sometimes, at night, I will sneak into the concession to look for copper, cobalt, and malachite, though I need to watch out for the dogs and the guards. I make about \$0.50 a day.*” CCR6, another young miner, told the author he was an “orphan” and that he “*mines cobalt with a shovel to support three younger siblings.*” CCR6 continued to say that “*I will never go to school, but at least I know I will bring a better life for my family. I have to be careful, though, as I don't have permission to enter the mining zone. I have to sneak in at night, sometimes mining in the dark. I am sometimes chased by guard dogs, or beaten by security police.*” The author noted that none of these young cobalt miners had shoes or gloves, yet alone pants, respirators, or helmets. CCR37 remarked that:

*Most of us suffer from coughing, muscle aches, and our body hurts all over. We work without protection so we breathe in the dust, it gives me a permanent flu. We don't wear protective gear, which is difficult to afford or find those types of materials. Plus they slow us down, hurt our timing in the mine.*

CCR16 noted that not just miners, but also how others in the value chain, refiners or “smelters”, are at risk. Many carry heavy sacks of minerals, others melt and chemically process cobalt or copper. As CCR16 elaborated, “*I treat it and fry the cobalt, breathing in the smoke that does make me cough, and my eyes water ... I do not like my job. It breaks my heart. But I have nothing else.*” CCR24, who carries, crushes, and sorts cobalt at a depot, says they sometimes manually crush 200 sacks of cobalt a day. As they continued, “*I do get really tired, I am often sick and injured, my job is not much better than a digger. I am not paid very well, I was never planning to do this as a job, just forced into it, [with] no time to go to school, or to find any other alternative.*” The site visits at ASM pits and slurries also heavily featured the presence of children, with Fig. 7 showing them digging, sorting, carrying, trading, and washing cobalt and copper.

In terms of how widespread it is, CER8 estimated that “*child labor is practiced extensively*” and CER14 admitted that “*although the numbers are uncertain, my guess is between 10,000 and 15,000 children are currently working in the cobalt sector.*” Other respondents estimated a range of child miners between 4500 and 40,000. The numbers of child miners can jump significantly during school holidays, as thousands of children (or their families) view it as the only way to earn money and afford school fees (Tshilobo 2005). The World Bank (2007) adds that other factors contributing to child labor in the ASM sector include the large numbers

a. A young digger in Fungerume



c. A young digger in Lubumbashi



e. A carrier and trader near Likasi



b. A young digger in Rwashi



d. A carrier at Rwashi



f. A sorter at Rwashi



g. A washer in Kolwezi



Fig. 7. Child labor and ASM cobalt mining in the Democratic Republic of the Congo, March 2019. a. A young digger in Fungerume. b. A young digger in Rwashi. c. A young digger in Lubumbashi. d. A carrier at Rwashi. e. A carrier and trader near Likasi. f. A sorter at Rwashi. g. A washer in Kolwezi. Source: Author. Permission granted by participants for the use of all photographs.

of orphans from HIV/AIDS, children refugees fleeing war, ex-child soldiers attempting to retrain for a new life, and lack of incentives for schooling. Although dated, the International Labor Organization estimated that as many as 35% to 70% of the diggers in Katanga were children less than 18 years old (World Bank 2007). More recently, a research team from BGR (2019) also visited 58 copper and cobalt mines in the DRC, and they detected the presence of children working at almost one-third (29%) of the mines inspected. Kara (2018) similarly visited 31 ASM sites across the DRC and Zambia, and estimated that of the roughly 255,000 diggers mining cobalt, at least 35,000 of whom were children, some as young as six. Amnesty International (2016a) documented child mining and noted that many children drop out of school, and/or are driven by family poverty, to mine for cobalt. PACT (2012) estimated that between 800,000 and 1 million miners were children under the age of 18 (across mining as a whole, not just cobalt).

Apart from its extent or frequency, the scope and severity of child labor at ASM cobalt sites has been documented by a number of reports. Although its methods were questioned by respondents, Amnesty International (2016a) documented children miners working in the open, working in high temperatures, working in poor conditions (such as in the rain or at night), falling sick and “hurting all over”. The International Labor Organization (ILO) even classified child mining for cobalt as one of the “worst forms of child labor,” given that it:

- Exposes children to physical and at times psychological and sexual abuse;
- Requires working underground, underwater, at dangerous heights, or in confined spaces;
- Involves dangerous equipment and tools as well as the manual handling of heavy loads;
- Places children in unhealthy work environments that expose children to toxic substances, agents, and processes;
- Necessitates difficult conditions including working for long hours or at night.

Often, children will carry sacks of ore that weigh more than they do. Often, they are also exposed to physical abuse and beatings, whippings, and attempted drownings from security guards, drug abuse, violence, and sexual exploitation—an occurrence that was strongly supported by this study’s original data. Children also reported being financially exploited by traders and bosses who refused to even weigh their products, and instead paid substandard and below market rates for sacks of cobalt based on visually estimated weights. The World Bank (2007: 14) noted that while some children may be paid in cash, they are “most often cheated and some are not paid but work simply to survive, receiving only basic sustenance as an in-kind payment.”

Paul, a 14-year-old orphan, told Amnesty International (2016b) he started mining at the age of 12. He told researchers that prolonged time underground made him constantly ill, saying “I would spend 24 hrs down in the tunnels. I arrived in the morning and would leave the following morning ... I had to relieve myself down in the tunnels ... My foster mother planned to send me to school, but my foster father was against it, he exploited me by making me work in the mine.” Lindberg and Andersson (2019) reported that “we see children who are not older than six, seven years carrying several kilos of heavy stone bags. Even younger children, three-four-year-olds, help their mothers wash the stones.” Higgs (2017) reported that other children serve a supportive niche for miners by selling snacks or, surprisingly, alcohol and cigarettes, using the money raised to pay for school fees, books, or uniforms. Tsurukawa et al. (2011) add that younger and smaller children are seen as particularly advantageous for cobalt mining, as they can dig in narrower and more dangerous galleries, having easier access than adults. Tsurukawa et al. (2011) even calculated that the average laptop computer has about 3 min of child labor and the average electric vehicle 104 min of child labor, as Table 6 indicates.

Faber et al. (2017) offers a fascinating glimpse at the deeper rationales driving child mining for cobalt (and copper). Faber et al. (2017)

administered surveys in 150 mining communities, and collected data from 2635 households and 15,023 individuals in the DRC. In addition, they conducted separate surveys with 1575 children, 88 traders and cooperatives, 75 schools and 137 community leaders. They estimated that from this sample, 23% of children (or 4714 children in these communities) worked in the mining sector. The two main justifications given for child mining were poverty, a means to improve livelihood, and social norms, expectations from the community about a duty to one’s family. They also noted that those households supporting child mining tended themselves on average to be poorer, to have more children, to have less education, to have an adult working in mining, and to live closer in proximity to a mine.

A final indirect way in which cobalt mining affects children is through deleterious effects on public health, including water and air pollution, something that was again strongly supported by this study’s data. CER3 stated that “I know of children who desperately need to drink or wash in water polluted by cobalt, they then say the water feels like lightning, it makes them itch all over, with some immediately collapsing. These children are trying to subsist on rivers that have no fish or living things in them anymore, they are basically bathing in pools of toxic sludge.” CER3 continued that:

*In addition to contaminated water, mining dust is also everywhere, it coats houses, crops, mango trees and legumes, even toys, which means the health implications are not limited to only miners or diggers. We looked for concentrations of cobalt and other minerals, and found very high levels in people who were not occupationally exposed, people living close to factories, mines, or processing centers. We discovered hugely increased concentrations in the urine of children. Because cobalt mining is dusty and low-tech, indirect and chronic exposure can be significant. A father or a teacher’s clothes become dirty, they go home, or they go to school, and pollute the school or their home. The same with women miners, who almost always have children with them, or nearby. Because cobalt is widespread, diffuse, and very bio-available, it gets into the body very easily, which means it is getting into children through their kitchen gardens, legumes, and books.*

This statement illustrates the multiple pathways by which pollution can harm children, including those related to activities they may need to eventually escape mining or leave mining communities, such as studying or walking to school. Van Brusselen et al. (2020) confirmed in a recent study of the effects of mining-related pollution on newborns in the DRC that “Paternal occupational mining exposure was the factor most strongly associated with birth defects.” CER6 added that “everyone who lives in, on, or close to industrial concessions and ASM deposits is at risk, including infants and children.”

The World Bank (2007: 10) emphasized how ASM mining in the DRC can involve multiple pollution sources and pathways that can all poison children, including:

- Drainage from mining sites including processing water discharge and breached tailings impoundments;
- Direct dumping of mine waste;
- Sediment runoff from ASM sites;
- Pollution from ASM dredging in riverbeds;

**Table 6**  
Estimated prevalence of cobalt child related labor for computers and electric vehicles.

	Average laptop computer	Average electric vehicle
Labor input per product	10 min	370 min
Child labor input per product	3 min	104 min
Remuneration	0.05 US\$	1.83 US\$
Fatal mining accidents	0.00000021	0.0000081

Source: Modified from Tsurukawa et al. (2011).

- Mercury pollution of land and water;
- Effluents and chemical spills from processing operations;
- Sewage and human effluent flows from ASM sites;
- Air emissions from minerals processing or diesel equipment;
- Dust emissions from sites close to villages.

Lindberg and Andersson (2019) similarly documented that they observed children collecting drinking water in yellow buckets but took water from the same pools that cobalt stones were being washed in. Cheyns et al. (2014) also confirmed, using human exposure biomonitoring, that cobalt was highly present in drinking water, uncooked food items (maize flour, washed vegetables, fish and meat), sweet potato leaves, cereals, and fish, all which affect children. Nukku et al. (2018) extensively looked at the medical impacts of cobalt toxicity and found that the differences were most pronounced for children, in whom they also found evidence of exposure-related oxidative DNA damage. Diggers exhibited substantially (2- to 11-fold) higher urinary cobalt, uranium and manganese than residents from either the control or other exposed groups. Tsurukawa et al. (2011) lastly note that because many cobalt ores contain trace amounts of uranium, cobalt mining can expose entire communities, including children, to radiation levels far in excess of safety standards.

As with gender, some caveats must be mentioned when interpreting these findings. Mining is most certainly not the only driver or factor contributing to child labor, and it may even be an activity safer or less harmful than other forms of child labor, notably child prostitution or child soldiers. The true causes behind child labor in the DRC (and indeed other parts of Sub-Saharan Africa) are complex and include structural poverty, misaligned governance priorities by the state, the perceived costs of education, lack of social services and alternative employment, cultural norms about family working, uneven patterns of rural livelihood diversification, and even aspirations for wealth (Geenen 2012; Hilson 2012; World Vision 2013). These germinate multiple drivers to inequality and thus incentives for child labor as well as a difficulty in addressing it.

## 6. Discussion: modern slavery, dependency, and selective empowerment

What are we to make of these trends? This section argues that, in addition to being issues of power, patriarchy, and child exploitation, cobalt mining connects with the conceptual framework espousing modern forms of slavery, given many miners do not have the freedom or authority to leave the sector, as well as dispossession. Although it treats these elements in turn, to help structure the narrative, these elements all interconnect—a theme that is returned to in the Conclusion.

### 6.1. Cycles of modern slavery

Although infrequent, some connections to modern slavery came out of the material directly. Sticking with the conceptual work from Bales (2016), some Congolese cobalt miners can be said to be slaves in three senses. Some or even many may make barely enough money to survive, in something known as wage slavery. However, some of those may also have no control over their lives, having lost their freedom by being bonded or enslaved to a particular mining team—making them cheap and expendable. A third way that miners can in theory be framed as slaves is when they are placed into servitude via bonded labor or debt bondage, which occurs when people give themselves, or a family forces them, into slavery as a security against a loan or debt. This aspect of slavery arose out of our material as well, with reports that mining negotiators and some family members place others into bondage. Hermes Investment Management (2017) nonetheless actively utilized this narrative of “modern slavery” when describing Congolese cobalt mining and warning potential investors of its risks.

We find the first form of slavery strongly in our material, and hints that the second and third may be occurring. For example, CER2 stated that:

*ASM miners have such few rights in the DRC they are treated little better than slaves. They toil and work their youth or adulthood away for the benefit of some government official, some mining firm, or another family member. It's a new form of African slavery, a subterranean slavery.*

This statement points not only to the occurrence of a “new form” of slavery but also the multiple beneficiaries of that slavery, including the government, mining firms, or family members. CER4 added that:

*Even the Congolese cooperatives intended to support ASM teams are not really emancipating, befitting, or protecting miners. Their profit imperative goes against the imperative of local livelihoods. The way the system works is to prevent any real empowerment of miners. It's not quite forced labor, but it does reduce them to just workers and cogs in a machine, sort of like slaves. Nobody genuinely wants to benefit the miners. The system benefits from a cheap workforce with little rights, access to information, markets, and protections.*

This statement illustrates the systemic aspects to modern slavery, as well as the likely difficulty in harnessing the power of local groups or cooperatives to combat it. CCR3 added that:

*The conditions of artisanal miners are appalling. They have a few sticks for a wall, a tarp for a roof, and they jump into deep pits with a shovel. They are viewed as expendable and disposable.*

This statement undercuts to the social dynamics of slavery, suggesting it persists because such slaves are no longer seen as human beings. CCR5, a digger, even confirmed their own predicament in terms of slavery, saying “my life is not my own, I have no choice, I am the property of my négociant (boss trader).” This does imply ASM mining can connect with the second and third forms of slavery mentioned by Bales.

In addition to direct linkages to servitude, other respondents talked about how mining creates dependencies and addictions that may be akin to slavery. CER21 explained it this way:

*Even if the arduous nature of mining doesn't kill you directly, it can indirectly lead to drug abuse or alcoholism as a coping strategy. This gets miners hooked—they do drugs or drink to dull the pain, but that just makes them more dependent on mining to pay for the drugs or alcohol. Or, family pressures make them dependent, they have external constraints that force them to mine no matter the outcome. Addiction and dependency are the twin drivers of ASM.*

As CER21 concluded, “They become enslaved to the profession.”

Granted, mining is not the sole cause of slavery, and labor exploitation in the Southeastern part of the DRC may not be as severe as other forms, such as gold mining in the East, where diggers are forced by traders or armed groups to work in the mines with profits flowing directly to militias or criminal networks (Geenen 2011). But the connections between cobalt mining, labor exploitation, and notions of modern slavery are sobering and directly mentioned in our empirical data.

Admittedly, the line between perceptions and statements of modern slavery, and objective accounts of its occurrence, is porous. Labor conditions may equate less in some instances to a definition or normative understanding of modern slavery, and more to expressions from miners themselves about how they experience and feel about their everyday work.

### 6.2. Dependence

A second crosscutting finding arising from the material was that of dispossession as well as the temporal aspects of dependency and mining—and issue that indeed touches on aspects as diverse as migration, poverty, and labor dynamics. Perhaps shockingly and depressingly, the agents of dispossession in the case of Congolese cobalt mining are not always the government or military and police, although they are the most commonly identified culprits of dispossession, exploitation, or violence. Also identified as responsible for dispossession are other



community members, often exploiting other family members or minorities within communities; foreign firms, who can rely on brutal security tactics to keep mining sites secure; and local firms, who try to maximize their own profits by offering unfair wages or prices for cobalt.

This complicated multi-causal environment behind dispossession is inherently “precarious” (Sovacool 2019)—changing the dynamics of cobalt production to help liberate miners or reduce dispossession mean that an array of agents active in perpetuating it have something to lose. Such findings also expand Bernstein’s typology of dispossession to emphasize that middle class or even poor peasants and rural classes of capital can exploit and dispossesses other middle class, poor, and rural classes of capital. It lastly means that in some cases cobalt mining is a *cause* of dispossession, such as when a LSM firm takes over or privatizes a cobalt concession away from an ASM operation; but in other cases it may be a *consequence* of dispossession, such as artificially low prices for cobalt requiring miners to work longer shifts with more backbreaking work for less money.

Furthermore, there is a temporality to the dynamics of dispossession that create dependency. CER4 warned that they believed mining brought only temporary, feeble benefits but permanent, terrible costs, saying that “*when we think about mining for cobalt, resource depletion is a severe risk, TFM for example says that the Congo has 100 years left of minerals, but that permanence is not a given, mining could be inducing these terrible consequences for a very temporary benefit.*” CCR2 picked up on this theme of temporality as well, noting that:

*There is some positive impact to cobalt mining, and some development happening. But this tends to be enclaved, people living off one big company, social services directly provided by them. But these private companies collapse, and people have difficulty scraping livelihoods together after these mining industries fall apart. So in a way, cobalt mining has temporary benefits but permanent costs.*

This statement underscores that while the benefits to cobalt mining may exist, in the long-run they could become inconsequential compared to the costs.

The system of so-called subterranean slavery and exploitation perpetuates and self-sustains itself in creative but persistent ways. CER5 emphasized that mining lures communities in and then fails to give them a pathway out:

*The first impact of any new cobalt discovery or mine is a phenomenon of internal migration, people try to move closer to mines, it is a magnet or lure that brings them in. It anchors these communities near mining sites, but that magnet also ends up slowly killing them. It’s a trap.*

This statement illustrates how mining can actually attract people to become dispossessed.

Yet within this precarious system, banning mining is not an ideal solution either. CER6 remarked that:

*We need to think more holistically about the problem, to see child labor or violence not specific to mining, but a systematic feature across the DRC economy. If we focus our efforts too narrowly on purging cobalt mining from child labor, or worse, eliminating ASM mining all together, this will just shift violence or child labor into other areas of the economy. You also have added complexity that in certain circumstances children work in the mines on holidays, around school times, so if you ban artisanal mining, you end up marginalizing those who cannot afford school any other way. Mining is the largest source of economic activity after agriculture, but it also generates insecurity and conflict with the military, police, and armed non-state groups.*

Hilson and McQuilken (2016) termed this the “poverty trap” with ASM mining in sub-Saharan Africa: lack of security and tenure forces most ASM entrepreneurs to focus only on meeting daily needs, never saving or building wealth, which then makes them both more vulnerable to future shocks and largely ignored by the general public, donors, or national

planners. The consequently become “trapped in a vicious cycle of poverty” (Hilson and McQuilken 2016: 106). Pesa (2020) cautions that such inequalities become entrenched and embedded into social fabrics and even community values. Multiple actors—including investors, regulators, miners themselves, and even community members—come to see mining and its dangers as tolerable, acceptable, and even natural and normalized. The profit oriented motives of companies are taken as a given, even when they result in asymmetries of wealth, and patterns of environmental destruction become woven into mining practices. Hilson et al. (2018) also noted that in the neighboring mining regimes of Sierra Leone and Zambia, despite the challenging circumstances from ASM activities many women adapt to their surroundings and become dependent on ASM as a way to earn more money than they would from any other economic activity.

The World Bank (2007), normally sanguine about economically productive activities such as mining, even warned against this ability for ASM sites to trap communities into cycles of poverty and destitution. As they noted, “to those not familiar with the hardships and realities of ASM, the lure of winning ‘valuable rocks’ from their lands and rising above subsistence levels is very appealing, and many desperate rural and urban people still continue to flock to the ASM sites to seek their fortune. However, despite the richness of many of the ASM sites and the apparent productivity of some miners, the vast majority continue to live in poverty.” Yet, the World Bank (2007) also advocated keeping ASM activities ongoing because they provided vital jobs and livelihoods for millions of people. This leads us to our final subsection on selective empowerment.

### 6.3. Selective empowerment

Mining not only definitively exploits; there are also circumstances where it can selectively empower. Sovacool (2019) documents six identified benefits to both ASM and industrial scale cobalt mining in the DRC, including poverty reduction in some contexts, community development, and regional stability. Although tradeoffs exist, Rubbers (2020) confirms that mining can benefit mining companies, subcontracting companies, and some skilled workers. Katz-Lavigne (2020) also writes how both authorized and unauthorised/ clandestine mining do have “some positive implications in terms of local resource distribution,” including for firms, members of the security forces, traders, and investors including Chinese and overseas buyers.

In terms of child labor, some of this is undertaken by children unable to give consent, or refugees, orphans, and the vulnerable, in a full-time, grueling fashion. But other forms of child labor include mining as a family activity, and on a part time basis – children mining under the supervision of their parents, around school hours. In their report on the topic involving interviews with child miners, World Vision (2013) did note that *some* children were socially conditioned into mining in ways that did not constitute free choice and in situations where they were taken advantage of. But *other* children chose to work in mining and were not coerced. World Vision (2013) also found that in many situations, working in ASM was positively and intimately linked to participation in school (children were able to pay school fees); that greater awareness about the health impacts could lead to safer practices for child mining; and that some child miners were happy and stated to have high aspirations for the future, their career, and their contributions to the community. Hilson (2010) also convincingly argues that discussions of child labor in African ASM communities must move well beyond “superficial” diagnoses that make the situation appear worse than it is, and ignore situations where child mining is less exploitative and more acceptable to communities, especially when it may be “light work” that does not threaten health and safety, or hinder their education.

In terms of gender, women who participate in ASM mining should not be vilified, or essentialized as only being passive victims without the ability to exercise agency. Instead, mining is often a choice that has equal opportunity to “do good” alongside bad—good at raising the standing of women, at capturing income, at enabling some women to escape structures and practices of patriarchy (Buss and Rutherford

2020). Rubbers (2015) similarly noted that mining undertaken by women in the DRC opened up a new space where traditional gender roles could be challenged, where the colonial family model, ideals of domesticity, and norms of male authority could be openly debated. Bashwira and van der Haar (2020) term this ability for mining to enable “social navigation,” for women to no longer remain invisible and begin to find a degree of personal security and the start of new economic possibilities. Although they did not explore cobalt or copper mining, Buss et al. (2017) examined six artisanal mining sites across three countries—Democratic Republic of the Congo, Rwanda and Uganda—to examine the impacts of mining for tin, tantalum, tungsten and gold on gender. They noted that while mining by and large did not alleviate structural gender inequality, women’s economic roles and livelihoods pursued in these mining communities did generate crucial sources of revenue that some women did use for their basic survival, for health and education, or to improve their status within the family.

Although systems of poverty, mining, and gender inequality can mutually reinforce each other, so that ASM communities come to depend on the very processes that exploit them, lure them in and position them to then exploit others, there are potential avenues for empowerment. Breaking this trap, as the next section indicates, is possible, although it will require bold, persistent, and multi-scalar policy reforms.

## 7. Policy recommendations for more equitable and sustainable ASM cobalt mining

This section draws from its empirical data to suggest a concerted mix of policy reforms aimed at three stakeholders: the Congolese government (at all scales, including local and national); suppliers and end-user companies for cobalt; and international governments and trading bodies.

### 7.1. Local and national government officials

Rather than discuss the need for new laws and regulations, much of the empirical data suggested stronger enforcement of existing policies was more urgently needed. And then, when policy is enforced, it must avoid what Hilson (2016: 559) termed “stifling policy frameworks and the failure to make available adequate quantities of mineralized land for prospective licensees.”

For instance, the existing policy architecture within the DRC for mining is substantive, at least on paper. A 2002 Mining Code (Law no. 007/2002) authorizes ASM mining within strictly prescribed limits, including that all miners must be adults and all must have valid licenses to work only in *Zones d’exploitation artisanale* (ZEAs, or artisanal mining zones). That mining code was amended in 2018 (Law no. 018/024) to increase taxes on mining profits, double the government’s stake in new mining projects, and increase royalties (EITI 2019). The new 2018 Mining Code also stipulates stronger protections for workers, greater traceability of supply chains, enhanced accountability for disclosure of mining revenues, and fines for companies that do not respect its provisions.

However, CER1 one commented that:

*I see some troubling current trends with policy. We have a new mining code, but it is hard to know if it will change anything. On paper, it is supposed to mean that local communities surrounding the mines will get a higher percentage of mining revenues. There is also a new law about subcontracting, so that it will benefit local entrepreneurs. But there is always a discrepancy between the law and the practice.*

Their comment goes hand in hand with that of CER3 who said “the DRC doesn’t need stronger regulations, it needs the capacity to enforce them, and resources like staff, equipment, vehicles, and training.” CER20 noted something similar when they said that “the new mining law is very important, but the problem is the capability and capacity to enforce it.”

This gap between policy and enforcement has also been a consistent theme in the literature reviewed. Amnesty International (2016a: 20)

concluded that “there is a significant lack of capacity within governmental agencies to monitor and enforce safeguards and improve conditions for artisanal miners.” As an example, the Ministry of Labor is tasked with ensuring effective compliance with the national labor code, including inspecting sites for human rights violations or child labor, but they employed only 20 inspectors for the entire mining region of the southern DRC. As a second example, in 2011 the DRC developed a national plan to eliminate the worst forms of child labor by 2020, but the plan was not yet officially adopted as of 2019. Similarly, insufficient mining licenses (or ZEAs) have been granted to artisanal operators; CER10 suggested that licenses have been granted for less than “1% of active ASM sites.”

Moreover, national policies need recalibrated to better help ASM miners. One option is the creation of joint ventures or “hybrid” mining operations that involve both ASM and LSM activities, so they work the same concession together. CER21 called this an “everybody wins” solution, as ASM teams get to access surface cobalt while LSM operations tap the deeper, harder to access reserves. This “coexistence” strategy for ASM and LSM has already been implemented in at least one other country, Ghana, for gold (Aubynn 2009).

A final suggestion was for local and national planners to begin to better appreciate gender considerations in mining. As CER17 said, “women are invisible not just within many mining communities, but at the national policy level, which remains run mostly by men.” Gender and diversity training for local and national planners could help remedy this gap, especially given we concur with Buss et al. (2017: 2) who write that “any efforts aimed at improving, restructuring or regulating ASM must also addressing gender issues in design and implementation.”

### 7.2. Cobalt suppliers and end-user manufacturers

For those involved further downstream in the cobalt supply chain, such as processing and refining, as well as those making end user electronics products, such as computers, phones, and batteries, the data led to a collection of recommendations.

One was for better disclosure of information about cobalt supply chains and public accountability, including what CER15 called “traceability schemes that follow a product from stone to phone.” Several respondents suggested that all cobalt supply and electronics firms adhere to the Organization for Economic Cooperation and Development (OECD) due diligence guidance for minerals and metals. Relatedly, industry associations or even individual companies could conduct more frequent audits and visits to mine sites to ensure compliance with such guidelines (Callaway et al. 2018). They could use their individual or collective supply chain leverage to increase transparency about contracts and subcontracts, including revealing ownership structures, joint venture partners, and the disclosure of payments to governments (Callaway et al. 2018).

Hilson et al. (2017) warn however that traceability and formalisation efforts have often resulted in a scarcity of permits awarded, exorbitant costs for miners to legalize their operations, and extremely lengthy and bureaucratic processes for registration throughout Sub-Saharan Africa. Such concerns would need to be addressed (somehow) in the DRC for it to work. Hinton et al. (2003) concur, noting that any strategy of formalisation or legalization for ASM must understand that many miners will elect to work outside of a regulatory framework if obvious benefits exist to doing so, and that many miners do not have the resources or skills (even basic literacy) to participate meaningfully. Formalisation can also negatively interact with some of the trends observed above concerning patriarchy and gender inequality, as well as dispossession and exploitation. Byemba (2020) writes how in other parts of the DRC, formalisation processes in the 3TG ore sector have created opportunities but also constraints and challenges for all actors in the supply chain, especially women. They note that women often take worse paying jobs once formalisation begins—taking less profitable positions on the supply chain. They also note that formalisation can create gender conflict, and even conflict within gender, with some women seizing opportunities in

the formal supply chain at the expense of excluding other women.

Another stream of suggestions centered on what CER18 called “ensuring that mining companies give back more to communities, with broader benefit impact agreements.” This can legally require that the LSM sector helps cross-subsidize the ASM sector, all the more so given that many contracts and concessions that used to belong to ASM teams have been shifted to joint ventures with foreign firms. This would help ensure cobalt production offers significantly greater revenues and local benefits to affected communities, and, as CER5 indicated, starts to “hedge against social protest movements that cobalt is such a curse it ought to be left in the ground, such as the emerging media campaign around ‘ne touche pas à mon cobalt’ (don’t touch my cobalt).” There could be promising scope to include women in particular in schemes to help build capacity, especially things like financial literacy. An ongoing trend in the Congolese gold mining sector and the establishment of Village Savings and Loans Associations is apt in this regard (Reichel 2020).

A final set of suggestions revolved around minimizing the amount of cobalt found in batteries and modern devices. This strategy focuses on different battery chemistries that use less cobalt. The standard batteries used for phones and electric vehicles consist of nickel-cobalt-manganese, or NCM, and lithium batteries, such as lithium-cobalt-oxide (LCO), lithium-iron-phosphate (LFP), and lithium-manganese-oxide (LMO). A NCM battery with a 1–1–1 ratio has the highest cobalt usage but the lowest energy density; a NCM battery with a 8–1–1 ratio has the lowest cobalt usage but the highest energy density; however it also has greater cell degradation and additional production costs. Moores (2018) terms this the classic battle between the benefits of an existing supply chain verses energy density of the battery, or in other words, a contest among the three criteria of supply chain security, performance of the battery, and cost. In 2018, the most popular configurations for EV batteries were NCM 5–2–3 (5 parts nickel, 2 parts cobalt, 3 parts manganese) and NCM 6–2–2, as Fig. 8 indicates (Moores 2018). Many talk about the “holy grail” of a NCM 8–1–1 battery but development is happening at a slower pace than expected (Moores 2018). Nickel-cobalt-aluminum, or NCA, batteries also exist alongside various lead batteries, but these are declining in market share compared to NCM.

Tying this discussion of batteries back to the DRC, CER3 indicated that “the last thing you want to do is decrease or ban ASM cobalt mining, but even with improvements in efficiency, and batteries that rely on less cobalt, the overall growth in the market should ensure cobalt demand still rises.” Rawles (2018) calls this strategy “intentional cobalt reduction,” noting that Tesla managed to reduce average vehicle cobalt consumption by 60% over a 6 year period between the Roadster and Model S, and the Model 3; CER19 called it “cobalt substitution.” Rawles (2018) adds that

even if cobalt density decreases by 60% for all batteries, the fact that demand is expected to increase fourfold by 2026 will more than offset these improvements. CER2 suggested that this means:

*The NCM 8–1–1 battery will likely take 10–15 years before it becomes commercialized. You cannot make an EV or a lithium ion battery without cobalt and without the DRC. From a chemistry perspective, there is a move to 8–1–1, but even then you still need 10% cobalt, you always need it as a stabilizer ... Even though the industry is developing cobalt alternatives, it will forever be dependent on cobalt, as even solid state batteries still use a NCM or NCA cathode. We are wedded to cobalt for all batteries for the foreseeable future, this fact is inescapable. We will need cobalt. Even if you reduce it, we will need it, until at least 2030, likely later.*

This statement suggests that even with improvements in battery design and more efficient resource use in the manufacturing batteries, global supply chains will remain dependent on cobalt for at least the next decade. Thus, outright banning or substituting for cobalt is not deemed feasible in the near-term, even with possible technological innovations and improvements in battery design.

### 7.3. Intergovernmental and trading bodies

A final set of suggestions centered on what international governments and intergovernmental bodies (such as the OECD or International Labor Organization) could do to improve the equity and safety of DRC cobalt mining. CER3 framed their recommendations as follows:

*The corruption and rights abuses associated with cobalt mining in the Congo is in actuality a global problem. Foreign companies, especially the Chinese who buy ASM cobalt, need to change their governance too. These international firms still purchase ASM cobalt throughout their supply chain, and they need a radical shift in their corporate governance to ensure mining is more accountable and sustainable. This will not happen internally—it needs forced by external governance bodies.*

This statement indicates that policy solutions, challengingly, must not be confined to the DRC or even Africa alone.

Such efforts, however, should not ban ASM cobalt or classify it as a conflict mineral. CER14 made this point clearly, and said:

*Cobalt is absolutely not a conflict mineral, there is no conflict here in Katanga. An association with armed groups or military campaigns is absent. Granted, the mining sector has a corruption and human rights problem, but not a conflict problem. International bodies do not have any*

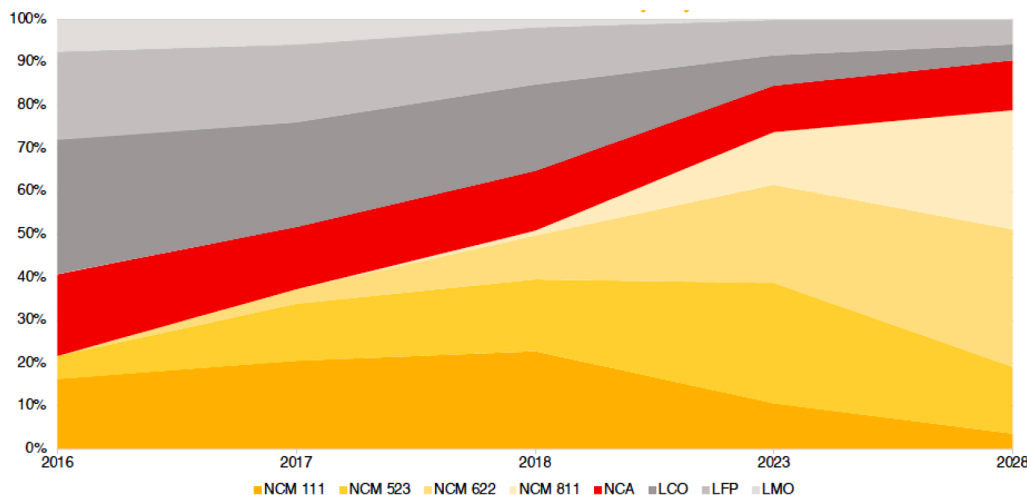


Fig. 8. The cathode chemistry for major batteries, 2016–2028. Source: Moores (2018). Note: NCM=nickel-cobalt-manganese. NCA=nickel-cobalt-aluminum. LCO=lithium-cobalt-oxide. LFP=lithium-iron-phosphate. LMO=lithium-manganese-oxide.

*justification for classification in this way, it would also be unfair to those actually suffering from conflict minerals.*

Others talked about the necessity of not banning ASM for cobalt. CER4 supported this argument by stating:

*We need to be careful about eliminating ASM cobalt from the supply chain. Doing so would lead to greater human insecurity and even violent conflict, fatal shootings, beatings, and overall human misery. It could collapse a lifeline that these miners use to support their communities.*

CER5 added that:

*Artisanal mining cannot be banned. It is a critical lifeline for thousands of families. These people need to make a living and have no alternatives. Some sort of embargo or compulsory certification system will only aggravate social problems.*

Katz-Lavigne and Hönke (2018) agreed with this point when they noted a “conflict minerals narrative” does not apply to cobalt, and that international efforts, such as the Dodd-Frank act in the United States, create a potential boycott of cobalt from the DRC where no conflict exists. Instead, and ironically, Katz-Lavigne and Hönke (2018) argue that Dodd-Frank only had the unintended consequence of increasing the vulnerability of ASM miners and their communities. Amnesty International (2016a) also note that both the United Nations Guiding Principles on Business and Human Rights (UNGP) and OECD offer more appropriate benchmarks that can be utilized to ensure that ASM mining “does not harm.” In particular, the OECD’s Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas (OECD Guidance) offers generally accepted recommendations “to help companies respect human rights and avoid contributing to conflict through their mineral purchasing decisions and practices.”

## 8. Conclusion

The global economy, and the increasingly digital and digitized lifestyles many of us in fully industrialized countries are becoming accustomed to, currently depends on critical metals such as cobalt to make computers, phones, batteries, and cars function. It is also now an essential material input into future low-carbon transitions that will depend on mitigating climate change through the massive deployment of smart meters, heat pumps, electric vehicles, solar panels, wind farms, fuel cells, and energy storage systems, which all will require cobalt and copper.

But the way this cobalt is currently mined, in the world’s leading producer with also the world’s leading amount of reserves, only serves to exploit some of the very vulnerable groups seeking to provide it. In this way, slavery, environmental degradation, patriarchy, and climate change all become linked; all are driven by the logics of exploitation of either resources or wealth, or natural ecosystems or people (Bales 2016). They become entrapped into forms of “modern slavery,” and precariously vulnerable to cycles of “dispossession” and “gendered” structures of norms, identities, and relations. Subterranean slavery and patriarchy come to support future sustainability transitions. In some ways, the people mining cobalt become almost as disposable as the products they help to make.

For example, ASM cobalt miners, who provide roughly 20% of national supply in the DRC and thus about 12.9% of global cobalt supply, often have tenuous legal standing, lack any sort of protection, and are constantly exploited by government institutions, the police, and even other bosses, traders, and local communities as they operate at the bottom of a hierarchy of Congolese power relations.

Women and girls, who are socially stigmatized away from mining, in reality often take the worst jobs—digging in the rain or heat, carrying, sorting, or hauling water—for less pay or status than their male

counterparts, all while they must also continue to raise a family and meet domestic norms of maintaining household. Women and girls, some as young as 12, also become exploited as prostitutes and sex workers to serve the mining communities, or locked into domestically abusive and polygamous relationships. They are additionally exposed to the ever-present risks of theft, violence, and abuse in mining camps.

Child labor is rife at both types of ASM mines (some of which coexist with LSM concessions), all the more so because artisanal miners often try to sneak in and steal minerals, fuel, and batteries from the industrial sites. Children, many orphans, are often beaten, sexually abused, chased by dogs, or imprisoned while doing so. Some reported the deaths of their friends, and drawings of children in waterlogged pits. Despite that, children still operate illegally on concessions in broad daylight, and the site visits undertaken for the study found children everywhere. The International Labor Organization notes that the types of work they perform can be classified as the “worst” type of child labor because it is dangerous, unpleasant, unhealthy, and unfair. Children, too, reported being exploited by mining interests, mining traders, or even other family members.

All three sets of vulnerable groups—miners, women and girls, children—develop respiratory diseases, heart diseases, or cancer, and have extremely high levels of toxic metals in their body. Taken together, the power relations, exploitation, and labor issues make a compelling case that *some* forms of ASM cobalt mining meets the definition of modern slavery, or as one respondent put it, “subterranean slavery.” These heartbreaking patterns are a blunt disjuncture to the aesthetically pleasing, clean, high-tech gadgets that we depend on their cobalt for. And for that, the responsibility and complicity for condoning, and benefiting from, the dispossession of these cobalt mining communities is collective.

However, hopelessness, victimization and dejection are not the only pathways forward. There are situations and circumstances where ASM cobalt mining can enhance gender security, facilitate family education and livelihood, and create opportunities for empowerment. The study also identified how capacity building and stronger enforcement of national mining laws, and broader sharing of royalties and community benefits, including joint ventures with ASM entities, can improve the health, safety, and volume of ASM cobalt mining. Those involved further downstream in the cobalt supply chain, such as processing and refining, as well as those making end user electronics products, such as computers, phones, and batteries, can improve supply chain accountability and sustainability and pursue efforts to reduce the amount of cobalt in batteries (which would not necessarily be mutually exclusive with less ASM cobalt mining). The United Nations, ILO, and OECD all have strong guidelines to help benchmark best (and worst) practice within the mining sector.

Given that modern slavery, dispossession, and gendering exist within a noxious nexus, piecemeal interventions or isolated policy solutions will do little to ameliorate them. Research efforts and future responses need to better recognize the holistic nature in which labor inequality, exploitation, and gender relations and structures co-create the lived experiences of cobalt mining. As a minus, it means that while mining may open new horizons, at the moment those recede before most people can ever reach them. As a plus, it means that multiple intervention points exist to make cobalt mining more inclusive, equitable, and sustainable.

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## Appendix I: Frequency coding of interview results

Power and exploitation						Gender				Child labor		
Foreign firms	Government	Police/military	Local firms	Community members	Drudgery and manual labor	Increased domestic workloads	Degraded health	Prostitution	Drudgery and manual labor	Physical abuse	Degraded health	
<b>Expert interviews</b>												
CER1	1	1	1	1	1		1	1	1	1	1	
CER2	1	1	1	1	1		1	1	1	1	1	
CER3		1	1					1		1	1	
CER4		1		1	1		1		1	1		
CER5	1	1	1	1	1		1		1	1	1	
CER6	1	1	1	1	1		1		1	1	1	
CER7	1	1	1	1	1				1			
CER8		1	1		1		1	1	1	1	1	
CER9	1	1	1				1		1	1	1	
CER10	1	1					1		1		1	
CER11	1	1	1		1		1	1	1	1	1	
CER12	1		1		1		1	1	1	1	1	
CER13	1		1				1					
CER14	1	1		1	1		1		1	1	1	
CER15	1	1	1	1			1		1			
CER16		1	1		1			1		1		
CER17	1	1	1									
CER18	1	1	1			1		1	1	1	1	
CER19	1	1	1			1		1	1	1		
CER20	1	1	1		1		1	1	1		1	
CER21	1	1		1	1				1			
CER22	1	1		1	1		1	1	1	1	1	
CER23	1	1	1		1		1	1	1		1	
<b>Community interviews</b>												
CCR1		1	1	1	1		1	1	1	1	1	
CCR2	1	1	1				1		1		1	
CCR3	1		1	1	1		1	1	1	1	1	
CCR4	1	1	1	1	1		1		1	1	1	
CCR5	1	1		1					1	1	1	
CCR6		1	1	1	1				1	1	1	
CCR7	1	1	1	1			1		1	1	1	
CCR8	1	1	1	1		1	1	1	1	1	1	
CCR9		1	1						1			
CCR10	1	1	1	1		1				1		
CCR11	1	1	1	1		1	1	1	1	1	1	
CCR12	1	1	1	1		1	1	1		1	1	
CCR13	1	1	1	1					1			
CCR14	1	1	1	1	1					1		
CCR15	1	1	1			1	1		1	1		
CCR16	1	1	1			1		1	1	1	1	
CCR17	1	1	1			1	1	1	1			
CCR18	1	1	1		1		1				1	
CCR19	1	1	1				1				1	
CCR20	1	1	1			1						
CCR21	1	1	1			1	1	1	1		1	
CCR22	1	1	1						1	1		
CCR23	1	1	1		1		1		1		1	
CCR24	1	1	1				1	1	1	1	1	
CCR25		1	1		1		1			1		
CCR26	1	1	1			1						
CCR27	1	1	1			1		1			1	
CCR28	1	1	1			1	1	1	1	1	1	
CCR29	1	1	1	1		1	1	1			1	
CCR30		1		1			1	1		1	1	
CCR31	1	1	1	1		1		1		1	1	
CCR32		1		1		1			1		1	
CCR33	1	1	1	1			1		1		1	
CCR34	1	1	1		1							
CCR35	1	1	1	1			1				1	
CCR36	1	1	1	1		1	1	1			1	
CCR37	1	1	1	1		1	1	1	1	1	1	
CCR38	1	1	1	1			1				1	
CCR39	1	1	1	1			1			1	1	
CCR40							1				1	
CCR41	1	1	1			1	1		1		1	
CCR42	1										1	
CCR43	1	1	1			1					1	
CCR44	1	1	1	1		1	1	1	1	1	1	
CCR45	1	1	1		1		1	1	1	1	1	
CCR46	1	1	1	1		1	1	1	1	1	1	
CCR47	1	1	1	1		1			1	1	1	
CCR48	1	1	1	1		1		1	1		1	

Source: Author

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