



Assessing Forced Labor in the Manganese Supply Chain of Zambia

REPORT | MARCH 2026

PRODUCED FOR

PREPARED BY



U.S. Department of Labor
Bureau of International Labor Affairs
Office of Child Labor, Forced Labor, and Human Trafficking



ICF Macro, Inc.

ACKNOWLEDGMENTS

This report presents research on forced labor in the Zambian manganese industry. ICF Macro, Inc., prepared this report in accordance with the terms of its contract with the U.S. Department of Labor. The research team would like to express sincere thanks to all the parties involved for their support and valuable contributions.

The U.S. Department of Labor provided funding for this research under contract number GS-00F-189CA and order number I605C2-22-F-00060. This material does not necessarily reflect the views or policies of the U.S. Department of Labor, nor does the mention of trade names, commercial products, or organizations imply endorsement by the U.S. Government. These studies were designed to help U.S. businesses map supply chains across multiple tiers and trace raw materials back to their sources, enabling them to detect likely risks and safeguard operations. By exposing where exploitative labor hides in global production networks, these studies contribute to efforts to strengthen supply chain resilience and level the playing field for American workers and businesses.

The ICF and an in-country research partner prepared this study.

ICF Team Members

Suteera Nagavajara, Team Lead
Holly Koogler, Lead Research Specialist
Mack Eason, Senior Research Specialist
Megan Spellacy, Senior International Trade Specialist
Andrew Korfhage, International Trade Consultant

Zambia Research Team

Charles Munene Kiura
Ibrahim Kamara

Cover photo credits: iStock by Getty Images

CONTENTS

Acknowledgments	i
Abbreviations	iv
Glossary	v
Executive Summary	vii
Purpose of Study	vii
Context	vii
Methodology and Data Collection.....	viii
Key Findings.....	viii
Conclusion and Recommendations.....	xi
I Introduction	I
1.1 Economic Overview	I
1.2 Manganese Production and Processing in Zambia	2
1.3 Labor in Manganese Extraction and Processing in Zambia	3
2 Methodology and Study Implementation	5
2.1 Research Questions.....	5
2.2 Methodology	5
3 Supply Chain Findings	7
3.1 Manganese Production in Zambia	7
3.2 Manganese Processing in Zambia.....	14
3.3 Consumption and Export	16
3.4 Domestic Mapping: State-Level and Direct Tracing Findings	16
3.5 Exports	22
4 Labor Findings	25
4.1 Characteristics of Survey Respondents.....	26
4.2 Nature of Working and Living Conditions	28
4.3 Forced Labor	45
4.4 Child Labor	48
5 Conclusion and Recommendations	49
5.1 Recommendations	50
Appendix 1: References	55
Appendix 2: HS Codes	58
Appendix 3: Export Values	59
Appendix 4: Final Research Instruments	64
Zambia Manganese Study: Worker Questionnaire	64

Zambia Manganese Study: Worker Interview Protocol Question Bank.....	94
Zambia Manganese Study: Supply Chain Key Informant Interview Protocol.....	99
Zambia Manganese Study: Luapula and Central Provinces: Labor Rights and Labor Conditions Key Informant Interview Protocol	106
Appendix 5: Indicator and Question Mapping	110

ABBREVIATIONS

ASM	artisanal and small-scale mining
c.i.f.	cost, insurance, and freight
CSO	civil society organization
EV	electric vehicle
GDP	gross domestic product
HS	Harmonized System (for trade classification codes)
ILO	International Labor Organization
KII	key informant interview
LSM	large-scale mining
MMMD	Ministry of Mines and Mineral Development
MT	metric ton
NGO	non-governmental organization
NHIMA	National Health Insurance Management Authority
PPE	personal protective equipment
ZEMA	Zambia Environment and Management Authority
ZESCO	Zambia Electricity Supply Corporation

GLOSSARY

Artisanal and Small-scale Mining: Small-scale, often informal mining operations that are typically run by individuals or cooperatives. May be licensed or unlicensed.

Community Development Agreement: An agreement between a mining company and the local community outlining benefits like employment, roads, or schools.

Cost, Insurance, and Freight (c.i.f.): A trade term indicating that the seller pays for the cost, insurance, and freight to bring goods to the port of destination. Import values are often reported as c.i.f.

Environmental Management Act: Zambian law (No. 12 of 2011) regulating environmental protection and the Zambia Environmental Management Agency's enforcement authority.

Free on Board (f.o.b.): A trade term indicating that the seller is responsible for goods until they are loaded onto the shipping vessel. Export values are often reported as f.o.b.

Harmonized System (HS) Code: Used internationally to classify traded products. Manganese products have specific HS codes (e.g., 2602 for manganese ore, 7202.11 for ferro-manganese with >2% carbon).

Landowner/Traditional Landowner: An individual or community (often under a chieftdom) with customary or legal rights to land where mining takes place.

Large-scale Mining: Industrial mining operations that are often corporate, with formal licenses, environmental clearances, and processing facilities.

Licensee: An entity (individual or company) officially holding a mining, processing, or trading license issued by the Ministry of Mines.

Manganese Concentrate: Manganese ore that has been partially processed (washed or crushed) to remove waste and increase manganese content.

Manganese Ore: Raw, unprocessed rock containing manganese.

Mineral Export Permit: A document issued by the Director of Mines authorizing the export of a specified quantity and grade of mineral product.

Ministry of Mines and Minerals Development: Government ministry overseeing licensing, inspection, and policy for mining activities.

Multi-Facility Economic Zone: Designated industrial zone offering tax incentives for mineral processing and export-oriented businesses.

Processing Facility/Wash Plant: A facility in which manganese ore is cleaned, sorted, or crushed.

Smelter/Ferroalloy Plant: A facility that uses high-temperature furnaces to process manganese ore into ferroalloys (e.g., silico-manganese).

Trading Company/Trader: Person or firm involved in buying manganese ore from miners and selling it to processors, exporters, or smelters. These include Mirama Minerals, Platinum Trading Ltd, Lonestar Mining Ltd, Mundis Import Export Co, and Royal Crystals Ltd.

Transporter/Haulage Contractor: Entity responsible for moving manganese ore from mining sites to processing facilities or export points.

Wage Arrears: Wages owed to workers that have been delayed or withheld by employers. In Zambia's manganese sector, wage arrears function as a primary mechanism tying workers to jobs, as workers cannot leave without forfeiting earned compensation.

Zambia Environmental Management Agency: National agency responsible for issuing Environmental Impact Assessments and ensuring environmental compliance.

Zambia Revenue Authority: Government agency responsible for collecting royalties, export taxes, and issuing tax-related permits.

EXECUTIVE SUMMARY

PURPOSE OF STUDY

This study examined forced labor in Zambia’s manganese industry, with particular focus on artisanal and small-scale mining (ASM) operations in Luapula and Central Provinces. The research aimed to identify the presence and characteristics of forced labor in ASM manganese mining, paying particular attention to recruitment methods, working conditions, and patterns of labor exploitation. The study also sought to map the manganese supply chain from ASM operations, identify key actors and intermediaries, evaluate their relationships and power dynamics, and determine how manganese produced with forced labor might end up in domestic and international downstream products.

CONTEXT

Zambia has significant manganese deposits, primarily in Luapula and Central Provinces. Unlike the Copperbelt, where a century of copper mining has established robust regulatory infrastructure, labor unions, and institutional oversight, these regions have no historical mining tradition. The manganese sector has consequently developed in areas lacking the enforcement capacity, worker organizing experience, and support systems that typically constrain exploitative practices in established mining regions. The sector remains largely informal, and data gathered for this study indicate the presence of forced labor in Zambia’s manganese mining operations.

Manganese extraction in Zambia surged from 66,692 metric tons in 2023 to 134,932 tons in 2024 (Zambia Ministry of Mines and Mineral Development, 2025). The Zambian government formally designated manganese as a strategic critical mineral in September 2023. According to 2024 import statistics, Zambia exported \$21.3 million worth of manganese ore and concentrates, with China as the primary destination market (69.3%) (Trade Data Monitor, 2025).

ASM in Zambia operates across a complex patchwork of land tenure arrangements. The Mines and Minerals Development Act establishes that subsurface mineral rights belong to the state, but surface land in mining areas is predominantly held under customary tenure controlled by traditional chiefs. Artisanal mining licenses (granted for plots up to 6.67 hectares in size) are reserved exclusively for Zambian citizens, and small-scale licenses require minimum 5% Zambian shareholding. In practice, however, mines are often controlled by foreign investors—predominantly Chinese and Indian—who partner with Zambian license holders through informal joint venture and subletting arrangements. These “fronting” arrangements obscure beneficial ownership and complicate regulatory oversight, including labor inspection and accountability for worker welfare.

The domestic manganese supply chain is highly fragmented and informal. Manganese extraction is generally carried out by artisanal and small-scale miners using basic tools and equipment, ranging from hand tools to small excavators. These miners sell to intermediaries who aggregate ore from multiple operations before selling to processing facilities, primarily owned by Chinese and Indian investors.

Luapula Province produces premium-grade ore with 40–58% manganese content—among the highest grades globally—but has little processing capacity due to its lower-capacity electrical infrastructure. As a result, labor in Luapula is limited to extraction phase employment (Mumba, 2021). In contrast, despite the lower grade of its manganese ore deposits, Central Province serves as Zambia’s processing hub due to its better infrastructure, including access to high-voltage power (Daily Nation Zambia, 2020).

As of 2025, however, most domestic processing has been paused due to a national energy crisis that began in mid-2024. Although artisanal extraction itself does not require grid electricity, the processing shutdowns indirectly affected ASM operations by eliminating domestic buyers, causing many smaller

mining operations to suspend work while better-resourced foreign-invested sites with access to generators or premium electricity tariffs continued operating.

METHODOLOGY AND DATA COLLECTION

This study employed a mixed-methods approach, integrating secondary data analysis, worker surveys, qualitative worker interviews, and key informant interviews (KIs) to map the artisanal and small-scale manganese mining supply chain and identify the presence and characteristics of forced labor. Primary data collection was conducted from August to November 2025 in Luapula and Central Provinces. To ensure authentic representation of workers' perspectives, the research team recruited multiple former manganese workers and industry researchers to serve as survey interviewers, bringing firsthand knowledge of industry conditions and worker experiences to the data collection process.

Researchers surveyed 127 adult ASM workers in Luapula Province (76 workers in Mansa, Kawambwa, and Chifunabuli Districts) and Central Province (51 workers in Mkushi and Serenje Districts).¹ The survey instrument drew on International Labor Organization (ILO) model questions for forced labor and ICF's previous forced labor studies. The research team initially planned to recruit the survey sample by randomly selecting mines from the government's mining database (Moses), which lists all registered sites and their operational status. However, many sites listed as active were shut down when researchers arrived due to Zambia's ongoing electricity crisis, with either no workers present or insufficient workers to meet sampling requirements. Ultimately, respondents were identified through purposive and convenience sampling at operational sites.

Qualitative interviews with 24 workers² provided deeper context on topics covered in the survey; some of these participants had also completed surveys. In addition, KIs were conducted with 19 stakeholders (government officials, industry representatives, and civil society organizations [CSOs]), comprising 14 supply chain actors and 5 labor experts selected for their sector knowledge and expertise. The worker interviews and KIs represent separate data collection activities. Worker interviews explored individual employment experiences in depth, and KIs gathered broader perspectives on sector dynamics, supply chain structures, and labor conditions from institutional actors.

The study operationalized the measurement of forced labor according to the guidelines provided in the 20th International Conference of Labor Statisticians' *Guidelines Concerning the Measurement of Forced Labour* (2018) and the ILO's *Hard to See, Harder to Count* (2024). According to these guidelines, a case of forced labor requires performing work that is both involuntary and under the threat or menace of a penalty.

KEY FINDINGS

The study found evidence of forced labor in Zambia's artisanal and small-scale manganese mining industry; **45% of respondents experienced forced labor** based on the presence of both coercion and involuntary work indicators.

Other key findings include the following:

Forced Labor Findings

- Forced labor remains a concern in ASM manganese operations. Among the 127 workers interviewed, 57 experienced forced labor in their most recent job, meeting the ILO definition through experiencing both involuntary work and coercion during the same employment stage.

¹ For a map of these districts and other manganese-producing areas of Zambia, see Section 1.2, Manganese Production and Processing in Zambia.

² Of these interviewed workers, 11 also participated in the survey.

The majority of workers (79%) experienced indicators of involuntary work, suggesting that many more workers operate under conditions that could escalate to forced labor or that constitute severe labor rights violations.

- There was notable variation in forced labor findings between Luapula and Central Provinces, with nearly half of respondents in Luapula Province (49%) experiencing forced labor, compared to 39% in Central Province. Structural factors, however, showed stronger associations than geography: workers employed by subcontractors faced a 74% forced labor rate, compared to 34% of workers employed directly by site owners. Workers without any contract experienced forced labor at a rate of 62%, compared to 35% of workers with written contracts. Age-based patterns suggest heightened vulnerability among workers with fewer alternatives, with the youngest (18–24 years, 56%) and oldest (55+, 67%) workers reporting higher rates of forced labor than middle-aged groups (42–43%).
- Employment is characterized by intermediation and informality. Nearly all respondents (99%) were employed by an employer rather than self-employed, and among those, 65% worked for mine site owners and 31% for subcontractors. The prevalence of subcontracting arrangements—affecting nearly one-third of surveyed workers—represents a significant structural vulnerability. Subcontracted workers experienced forced labor at more than double the rate of directly employed workers (74% vs. 34%), suggesting that intermediary employment relationships weaken accountability and facilitate exploitation.
- Workers face hazardous conditions with inadequate safety protections. Most respondents (81%) indicated that their work involves risks to their health or safety, including breathing dust or fumes (73%), excessive noise (41%), dangerous or sharp tools or heavy machinery (22%), and extreme heat (15%). The most common indicator of involuntary work was hazardous or degrading working conditions, experienced by 71% of employed workers, defined for this study as the failure of the employer to mitigate the risks involved in their work (respondent reports that the employer does not provide personal protective equipment [PPE] needed to perform the job safely or that the employer endangers respondent’s life by failing to take proper safety precautions).
- Manganese exposure poses particular health risks: even relatively low levels can cause severe neurological damage, including loss of motor control and Parkinson’s disease-like symptoms. In December 2024, 271 workers at a manganese processing facility in Serenje were found to have elevated blood manganese levels, with 28 diagnosed with manganese poisoning, illustrating the sector’s inadequate health monitoring systems.
- More than one-fifth (22%) of employed workers experienced onerous working hours, defined in this study as usually working more than 60 hours per week or non-stop work without breaks during the workday. Some workers reported unpaid overtime combined with threats when raising complaints about compensation.
- The study identified deceptive recruitment practices. Evidence suggests that workers are often recruited from other regions with false promises. This recruitment is generally through informal channels, such as personal networks, labor intermediaries (“bosses”) who control access to mine sites and organize work teams, or direct solicitation at public gathering points. Key informants described cases in which mine operators would park trucks in town areas and announce work opportunities, with workers boarding without documentation or formal agreements. Some mine owners deliberately recruit workers from outside the province to limit their movements and effectively confine them to work sites. According to a key informant, when workers protest abusive conditions such as non-payment of wages, their employers tell them to leave and find their own way home. Being far from home and lacking transportation resources, they are compelled to continue working to survive.
- More than three-fourths of respondents (78%) relocated to take the job, indicating significant internal migration for mining employment. This migration pattern leaves workers isolated,

reliant on employers, and, in some cases, unable to escape exploitation due to limited transport options. About half of Zambian-born respondents (49%) originated from outside the main manganese-producing provinces—including Copperbelt (20%), Eastern (7%), Lusaka (7%), and Northern (6%)—indicating that workers migrate significant distances to reach manganese mining areas. This geographic displacement heightens workers' vulnerability by separating them from family support networks and familiar surroundings.

- Wage withholding and arrears function as coercive mechanisms. Wage arrears, rather than formal debt, constitute a primary mechanism tying workers to jobs, particularly in remote locations. Workers continue working because they fear losing earnings already owed to them, creating situations in which they cannot leave.
- Dismissal threats systematically compel acceptance of exploitative conditions. Almost half (46%) of employed workers reported that they would face threats of dismissal in at least one work situation. The most common contexts were refusing to do hazardous activities, refusing overtime, or failing to meet production quotas. Workers are effectively unable to refuse unsafe conditions without risking their livelihoods. When workers rely on employers for both their jobs and their housing, the threat of dismissal puts them at great risk—refusing unfair demands can mean losing not just employment but also a place to live.
- Current monitoring systems are insufficient to prevent labor exploitation. The sector's informal nature creates significant challenges for labor oversight. According to data collection findings, government labor inspection capacity in remote mining areas is minimal, with the Ministry of Labor and Social Security lacking sufficient resources to conduct regular monitoring of dispersed artisanal operations across Luapula and Central Provinces. At the industry level, there is no comprehensive sector-wide monitoring system that could ensure that forced labor was not used in manganese production, and coordination between the Ministry of Labor and Social Security, Ministry of Mines and Mineral Development, Zambia Revenue Authority, and Zambia Environmental Management Agency remains limited. At the company level, processors and exporters generally lack proactive auditing programs or supply chain due diligence mechanisms that extend beyond basic contractual clauses to verify labor conditions at source mines.

Supply Chain Findings

- Most manganese is exported, with China as the primary destination. Transportation occurs primarily by road, with manganese shipped through ports in Durban, South Africa, and Dar es Salaam, Tanzania, to reach international markets. According to 2024 import statistics, Zambia exported \$21.3 million worth of manganese ore and concentrates, up from \$6.1 million in 2023, but down from a high of \$32.9 million in 2021. The 2021 peak reflects a temporary period of high global prices and downstream processing, followed by domestic power constraints that curtailed manganese exports. China is the primary destination market for most of Zambia's manganese ore and concentrates. Central Province historically generated \$117–\$171 million in annual export revenue through processing lower-grade ore into ferro-manganese alloys, though this was suspended by the power crisis.
- Manganese enters diverse downstream markets, including steel production and battery manufacturing. Manganese products are used in steel production (the primary use, consuming approximately 90% of global manganese), battery manufacturing for electric vehicles (a rapidly growing sector), aluminum alloys, and various chemical applications. China dominates global consumption with a 49% market share, and major end-use industries include automotive, construction, electronics, and lithium-ion batteries used in emerging clean energy technologies.
- According to the U.S. Geological Survey, both steel and battery supply chains are “vital to the U.S. economy and national security,” with manganese listed among 60 minerals critical to U.S. interests (U.S. Geological Survey, 2025). Manganese ore and high-carbon ferro-manganese alloys also appear on the National Defense Stockpile list to “provide domestic manufacturers

with emergency access to essential production inputs” in times of national emergency, and the Department of Defense has invested in increasing domestic manganese production (Library of Congress, 2023; U.S. Department of Defense, 2024). This report acknowledges the importance of manganese to U.S. interests and did not document direct links between manganese from Zambia and the production of goods for use in U.S. defense technology and manufacturing.

- Limited traceability mechanisms allow products produced with forced labor to enter all downstream markets. The mixing of manganese from multiple sources at processing facilities creates significant traceability challenges. Mills do not segregate manganese by supplier during processing, making it impossible to trace specific batches of processed manganese back to individual mines. Processors purchase from various sources, often mixing manganese from different mining sites before smelting. This aggregation obscures the origin of products produced with forced labor inputs, allowing them to enter both domestic and international markets without detection. Documentation is largely manual—handwritten notes, informal weigh slips, and phone-based communication—further complicating traceability.

CONCLUSION AND RECOMMENDATIONS

This study found that forced labor remains a concern in Zambia’s artisanal and small-scale manganese sector, driven by a complex interplay of economic, social, and structural factors. This study documented that 45% of respondents experienced forced labor, with cases identified across multiple operations in Luapula and Central Provinces. Findings suggest that despite the sector’s rapid growth and strategic importance, forced labor persists due to the highly informal nature of operations, limited government oversight in remote areas, and severe economic pressures facing workers with few alternative livelihood options. Once manganese enters processing facilities, the limited traceability mechanisms, extensive use of intermediaries, and co-mingling of manganese from multiple suppliers make it nearly impossible to distinguish between products produced with forced labor and those produced without it.

This study offers the following recommendations:

To the Government of Zambia:

- Strengthen labor inspection capacity by increasing the number of Ministry of Labor and Social Security labor inspectors in Luapula and Central Provinces, ensuring periodic visits to ASM operations, particularly in remote areas. Provide inspectors with transportation and logistical support to access remote sites, establish mobile inspection units, and focus specifically on forced labor indicators, including wage withholding, excessive working hours, and hazardous conditions without PPE.
- Improve transparency and inter-institutional coordination in supply chain monitoring, with integrated public systems between the Ministry of Labor and Social Security, Ministry of Mines and Mineral Development, Zambia Revenue Authority, and Zambia Environmental Management Authority for production traceability and identification of risk practices. Require all manganese processors and exporters to maintain records documenting the source of their ore, including identifying specific mines or mining areas.
- Accelerate formalization of the ASM sector through streamlined registration and licensing procedures for artisanal and small-scale miners. Implement simplified application processes, reduced fees for small-scale operations, mobile registration services that can reach remote areas, and clear communication about the benefits of formalization. Create intermediate categories of recognition for operations transitioning from informal to formal status.
- Integrate labor compliance requirements into the mining licensing framework. The Ministry of Mines and Mineral Development should make demonstrable labor compliance a prerequisite for license approval and renewal, requiring applicants to provide evidence of written employment contracts for all workers, registration with the National Pension Scheme Authority and National

Health Insurance Management Authority, and minimum wage compliance. License renewals should be contingent upon a clean labor inspection record, and licenses should be suspended or conditioned if repeated labor violations are documented.

- Explicitly integrate labor standards into Zambia’s mineral value chain governance and export strategies³ by aligning national mining and trade policies with international frameworks, including the Organization for Economic Co-operation and Development Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas and relevant ILO conventions. Require manganese exporters and traders to demonstrate upstream labor due diligence as a condition of export permit issuance. Support donor-funded traceability pilot programs that incorporate labor compliance indicators—not only production volumes and ore grades—to enable identification and exclusion of products produced with forced labor from export markets.
- Expand worker rights education programs and accessible grievance mechanisms in mining communities, informing workers of their rights under Zambian labor law in local languages (including Bemba). Establish multiple channels through which workers can report labor violations safely without fear of retaliation, including a national labor rights hotline, SMS reporting options, and partnerships with trusted CSOs.
- Formalize and regulate recruitment practices in the ASM mining sector to eliminate deceptive recruitment and exploitation by labor intermediaries. Require mining license holders to maintain transparent recruitment procedures and documentation as a condition of licensing. Strengthen enforcement against recruitment-related coercion, including sanctions for operators and intermediaries who engage in deceptive recruitment practices. Pilot standardized worker registration systems at the district or provincial level that document worker identities, employment terms, and employer information at the point of hire, enabling traceability and accountability throughout the employment relationship.
- Establish provincial or district-level labor grievance desks physically located in mining areas of Luapula and Central Provinces, staffed by trained officers who can receive and investigate complaints in person. Designate community focal persons in mining communities to serve as trusted intermediaries for workers who may be reluctant to engage directly with government offices. Enact and enforce explicit whistleblower protection measures to shield workers who report violations from employer retaliation, including expedited procedures for addressing retaliatory dismissals.
- Address infrastructure gaps in Luapula Province to enable local value addition and reduce workers’ dependence on exploitative employment conditions. Prioritize upgrading electrical infrastructure to support processing facilities, improving road networks to reduce isolation of mining areas, and supporting the development of processing capacity within the province to create higher-skilled employment opportunities.
- Mandate written employment contracts for all mine workers with standardized minimum terms, including wage rates, payment schedules, working hours, job responsibilities, housing arrangements (if provided), and termination procedures. Apply penalties to employers who fail to provide written contracts or include terms that violate labor law. Establish expedited procedures for workers to recover unpaid wages, including mobile labor courts and wage guarantee funds.
- Develop and disseminate standardized, simplified employment contract templates tailored to ASM operations, available in local languages (including Bemba), to reduce barriers to formalizing employment relationships. Complement enforcement measures with positive incentives for

³ These could include, for example, future iterations of the National Mineral Resources Development Policy (2022), the National Critical Minerals Strategy 2024–2028, the Ministry of Mines and Minerals Development Strategic Plan 2022–2026, and the National Export Strategy (2018).

labor formalization, such as subsidized license renewal fees, priority access to government support programs, or recognition schemes for operators who demonstrate compliance with labor standards.

To Private Sector Actors:

Downstream consumers and processors in Zambia's manganese sector, including processing facilities, traders, exporters, steel manufacturers, battery producers, and other end users, should implement robust supply chain due diligence and monitoring mechanisms to identify and address forced labor risks, such as the following:

- Move beyond contractual clauses to establish proactive auditing and monitoring programs with unannounced field visits to mine sites and intermediary operations, focusing especially on artisanal and small-scale operations. Commission independent third party audits of labor conditions, specifically assessing forced labor indicators as defined by ILO standards, including recruitment practices, wage payment systems, working hours, occupational safety conditions, housing arrangements, and workers' freedom of movement.
- Make contract renewals and commercial partnerships conditional on proven compliance with labor and human rights laws, with corrective action plans for non-compliance and de-accreditation from supply chains for serious and recurring violations. Implement direct mine-level traceability systems that can identify the specific mine or mining area of origin for all purchased manganese, working with processors and traders to establish segregated supply chains that maintain the identity of ore from extraction through processing and export.
- Create and promote safe, confidential, and accessible reporting channels for workers, including those in ASM operations and employed by intermediaries, managed by independent third parties to prevent retaliation against whistleblowers. Establish grievance mechanisms with multiple channels (hotlines, SMS, in-person reporting to trusted intermediaries) that allow workers to report labor violations safely and anonymously.
- Ensure through active verification that all workers in the supply chain receive adequate PPE and safety training before beginning work. Make PPE provision a contractual requirement for suppliers and conduct regular verification. Support training programs that educate workers about their rights under Zambian labor law and international standards.
- Review payment practices and intermediary arrangements that may lead to potential risks. Require that all workers have written employment contracts clearly specifying wages, working hours, job duties, housing arrangements, and termination procedures in languages workers understand. Address wage withholding practices by establishing direct payment verification systems and requiring documented proof of timely wage payments.
- Participate in multi-stakeholder initiatives focused on responsible sourcing of minerals and addressing forced labor in mining supply chains. Engage with sector-specific standards for manganese sourcing, contribute to regional traceability platforms, and share best practices with other companies sourcing from the region.

To Other Governments:

- Strengthen requirements for companies importing manganese and manganese-containing products to conduct due diligence on forced labor risks. Require importers to demonstrate traceability back to the mine of origin, particularly for manganese sourced from high-risk regions, including Zambia. Companies should be required to implement robust monitoring systems that can identify and address forced labor indicators throughout their supply chains.
- Provide technical assistance and capacity-building support to Zambia's Ministry of Labor and Social Security to strengthen labor inspection systems in remote mining areas. This should include funding for additional labor inspectors, training on forced labor identification,

transportation resources to access remote mine sites, and support for developing mobile inspection units capable of conducting surprise inspections in Luapula and Central Provinces. Establish joint inspection protocols between the Ministry of Labor and Social Security and the Ministry of Mines and Mineral Development to leverage complementary expertise and ensure coordinated enforcement of both labor and mining regulations at ASM sites.

- Engage with the Government of Zambia to support formalization of the ASM mining sector through bilateral dialogue and technical assistance. Support the development of registration systems for ASM operations, simplifying licensing procedures to encourage formalization, and creating incentives for ASM operations to transition to formal sector compliance with labor standards.
- Fund additional research to better understand the full scope of forced labor in Zambia's manganese sector, including studies that can access lower-resourced operations that may have been underrepresented in this research due to the energy crisis. Support CSOs and researchers conducting documentation of labor conditions and supply chain tracing in artisanal mining operations.

To Civil Society and Other Stakeholders:

- Expand the participation of miners' associations and unions in collective agreements and private socio-environmental certifications, ensuring that workers have effective representation in negotiations with mine owners, processors, and intermediaries. Support the National Union of Miners and Quarry Workers or other relevant unions to establish presence in ASM manganese operations.
- Promote independent, multilateral monitoring that includes CSOs, workers' associations, and universities in overseeing labor practices in the sector. Develop and implement monitoring frameworks that can assess forced labor indicators even in highly informal and fragmented supply chains.
- Support community empowerment initiatives and accessible reporting channels, including mobile apps and partnerships with local associations, so workers can safely report abuse. Provide legal support and advocacy services for workers facing labor violations, particularly those involving wage arrears, unsafe working conditions, and threats of dismissal.
- Conduct further research on forced labor across different regions, production scales, and intermediary arrangements in Zambia's manganese sector to inform targeted interventions. Research should specifically examine labor conditions at operations that were non-operational during this study period and at locally owned sites that may face greater resource constraints than foreign-invested operations.

Implementation of these recommendations requires coordinated efforts from all stakeholders. Improving the labor conditions in Zambia's manganese sector will require addressing both immediate labor violations and underlying socioeconomic factors, including informal employment, economic desperation driving internal migration, complex intermediary arrangements, and infrastructure gaps, while simultaneously strengthening oversight, traceability, and accountability throughout the supply chain. The sector's rapid growth and strategic importance as a critical mineral present both risks and opportunities. Without proactive intervention, expansion could exacerbate forced labor as operations scale up in remote areas with limited oversight. However, the sector's strategic importance also creates leverage for requiring improved labor standards as a condition of market access and international investment. The persistence of forced labor in this rapidly expanding sector demonstrates that economic growth alone is insufficient to eliminate exploitation.

I INTRODUCTION

Zambia has emerged as a significant manganese producer over the past decade, with production reaching 134,932 metric tons (MT) of manganese content in 2024 (Zambia Ministry of Mines and Mineral Development, 2025). Manganese mining has expanded particularly rapidly in Luapula and Central Provinces, where artisanal and small-scale mining (ASM) operations have proliferated alongside a small number of industrial processing facilities. However, the sector faces a critical inflection point: an unprecedented electricity crisis beginning in 2024 has shuttered most processing facilities (Africanews, 2024). At its peak, the crisis forced more than a dozen manganese processing plants in Central Province to suspend operations, idling more than 2,000 industrial jobs, and it has had profound impacts on both large-scale mining (LSM) and ASM manganese extraction in the country.

Despite the sector's growth and economic significance, concerns about labor exploitation persist. Zambia's mining sector has documented histories of forced labor and exploitative conditions, particularly in ASM operations, in which informal arrangements, minimal oversight, and poverty create conditions conducive to abuse. The manganese sector's characteristics—primarily ASM operations in remote locations—raise concerns about potential forced labor indicators.

This study was designed to examine labor conditions in Zambia's manganese sector among workers engaged in ASM operations in Luapula and Central Provinces. The study had two primary objectives:

- To identify the presence and characteristics of forced labor in manganese production, especially in ASM operations in areas with varying degrees of mechanization
- To map the domestic supply chain of manganese in the target regions where research found indicators of forced labor, identifying key actors and tracing how manganese produced under exploitative conditions may enter downstream markets

I.1 ECONOMIC OVERVIEW

Zambia is a lower-middle-income country with a gross domestic product (GDP) of \$26.33 billion and a per capita GDP of around \$1,300 in 2024 (Sipula, 2024; World Bank, 2025). The national economy demonstrated 4.0% growth in 2024, despite severe drought conditions that triggered a national disaster declaration on February 29, 2024. Although the drought contracted electricity generation by 31.2% and agricultural output significantly, mining and quarrying contributed 2.1 percentage points to the 8.6% GDP growth recorded in the fourth quarter of 2024, underscoring the sector's countercyclical importance during agricultural stress (Zambia Statistics Agency, 2025). In 2024, the Zambian mining and quarrying sector accounted for 17% of the country's GDP, with copper exports accounting for \$7.5 billion (65.9%) and manganese ore exports accounting for \$21.3 million (less than 0.2%) of the sector's overall exports of \$11.4 billion (PwC, 2024; Trade Data Monitor, 2025).

Copper mining accounts for a much larger proportion of Zambia's mining sector, but manganese represents a rapidly expanding subsector within the government's critical minerals diversification strategy (DLA Piper Africa, 2024). Manganese production capacity has grown from near-zero in the early 2000s to more than 640,000 MT per year installed mining capacity by 2021, though actual production remains substantially lower (International Manganese Institute, 2023). More significantly, manganese contributes to employment in provinces with limited alternatives. In Luapula Province, Zambia's poorest province with 80.5% poverty rates and 64.9% extreme poverty, manganese provides crucial income diversification beyond fishing and subsistence agriculture (Mupesen, 2021; Zambia Statistics Agency, 2023). The broader economic environment presents significant headwinds: inflation reached 16.7% in December 2024 (against a target band of 6–8%), driven by food prices and escalating electricity tariffs. The kwacha depreciated 11.4% against the dollar in 2024, adding pressure to import-

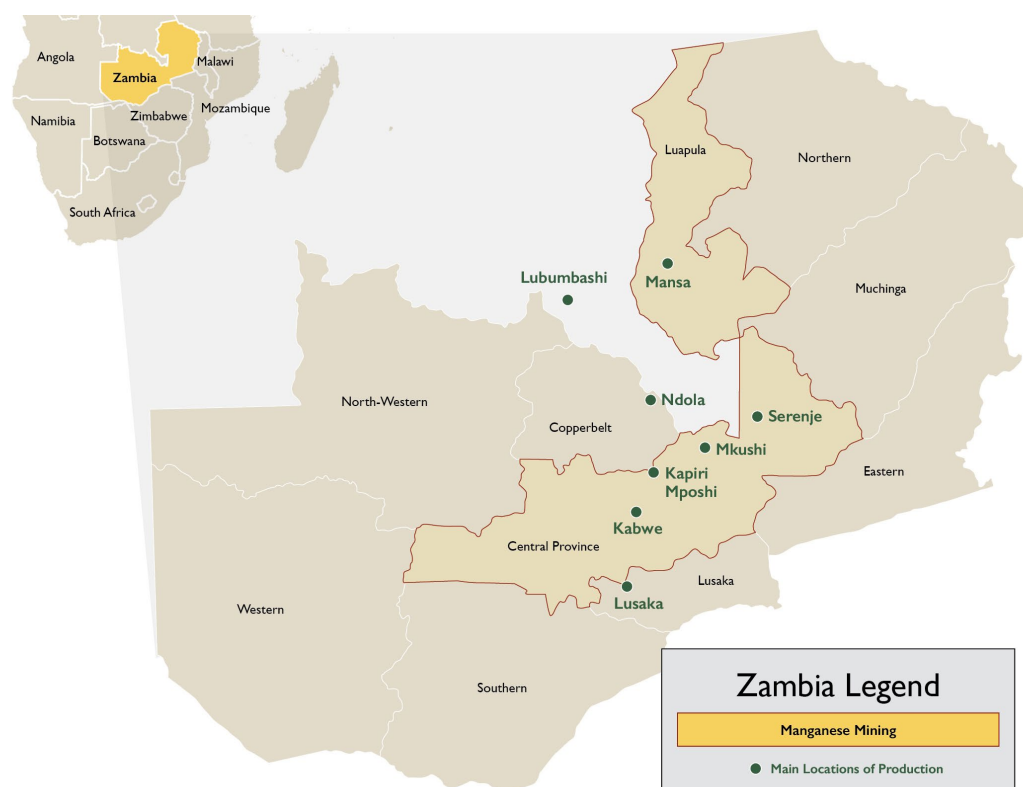
dependent mining operations (Bank of Zambia, 2025). Zambia remains at high risk of debt distress, though a Eurobond restructuring agreement was reached in March 2024.

I.2 MANGANESE PRODUCTION AND PROCESSING IN ZAMBIA

Luapula and Central Provinces (Figure 1) account for virtually all of Zambia's manganese extraction and processing. The sector exhibits a distinctive geography: Luapula Province produces premium-grade ore (40–58% manganese content) through predominantly artisanal operations, and Central Province produces lower-grade ore (28–42% manganese) through a more mixed operational profile—approximately 60% industrial-scale formal mining and processing operations alongside approximately 40% informal extraction activities, including some ASM in informal pits (International Manganese Institute, 2023; Mupesen, 2021). Central Province, however, hosts all of the country's manganese processing infrastructure. This is due in large part to the availability of high-voltage power infrastructure in Central Province and the absence of similar infrastructure in Luapula Province. This spatial geographic separation, combined with power constraints, creates a supply chain in which high-grade ore travels hundreds of kilometers for processing or, increasingly, bypasses processing entirely for direct export as raw ore (International Manganese Institute, 2023).

Serenje and Mkushi Districts in Central Province serve as Zambia's manganese processing hub (U.S. Geological Survey, 2022). Central Province hosts industrial-scale processing facilities that historically transformed manganese ore into ferro-manganese alloys for export (Daily Nation Zambia, 2020). This processing infrastructure, now largely idled by the power crisis, employed skilled workers in formal arrangements with higher wages and better safety standards than extraction operations (Daily Nation Zambia, 2023). However, Central Province also features extraction phase activities: the Kabundi Resources mine in Serenje operates as a formal mining operation, and informal artisanal digging and sorting occurs in remote areas of the province, though to a lesser extent than in Luapula.

Figure 1. Map of manganese-producing regions in Zambia



Source: ICF

The mechanization gap between provinces reflects infrastructure constraints rather than technological capability. Luapula's low-voltage power supply (insufficient for processing plants requiring 33 kV lines) forces operations to remain extraction-focused with minimal mechanization, with an estimated 70–80% of work performed manually and only 20–30% mechanized (Study KIs; Mumba, 2021). Central Province's access to high-voltage power enabled more than \$70 million in processing investments, driving higher mechanization (an estimated 60–70% of extraction operations are mechanized) alongside the processing infrastructure that distinguishes the province from Luapula (Study KIs; Mumba, 2021).

I.3 LABOR IN MANGANESE EXTRACTION AND PROCESSING IN ZAMBIA

The manganese sector's labor dynamics are shaped by the fundamental split between extraction and processing operations, and this division has been dramatically amplified by the power crisis.

Extraction operations are characterized by highly manual, labor-intensive work with minimal mechanization. The sector relies heavily on informal recruitment, with workers frequently recruited through personal networks or intermediaries ("bosses") who control access to mine sites and organize work teams. Employment relationships are overwhelmingly informal, with verbal agreements, irregular payment schedules, and minimal documentation of terms or conditions. Many workers are migrants from other provinces, creating dependencies on employer-provided housing and limited alternatives for mobility. The geographic isolation of many mining operations reduces workers' ability to access alternative employment, limits oversight by labor inspectors, and creates practical barriers to leaving exploitative situations.

The health hazards inherent in manganese extraction significantly exacerbate these difficult working conditions. Exposure to even relatively low levels of manganese can cause severe neurological damage, resulting in loss of motor control and behavioral changes similar to symptoms caused by Parkinson's disease (Evans & Masullo, 2025). The lack of adequate personal protective equipment (PPE) compounds the risk (Tychsen, 2018). A high-profile case of mass manganese poisoning at a Zambian processing facility underscores these dangers: in 2022, testing at the Southern Africa Ferro Alloys Limited smelter in Serenje District found 271 workers with elevated blood manganese levels and 28 experiencing acute neurological symptoms, including tremors, loss of balance, and speech impairment (Centre for Environment Justice, 2025). Workers reported that the company had failed to provide adequate respiratory protection between 2014 and 2021, supplying only disposable masks instead of proper PPE for smelting operations.

Although no comparable mass poisoning events have been formally documented at manganese extraction sites, several factors suggest that toxic exposure among miners may be underreported. Manganese toxicity is difficult to diagnose without specialized testing, as its symptoms—tremors, mood changes, cognitive difficulties, and impaired motor function—closely resemble Parkinson's disease, psychiatric disorders, and other neurological conditions (Brown et al., 2024). Confirming manganese poisoning requires specific blood or urine tests that rural health facilities in mining areas may lack the capacity to order or process, meaning that affected workers could be misdiagnosed or receive no diagnosis at all (Mattison et al., 2024).

Artisanal miners routinely handle and transport ore without respiratory protection, generating significant dust exposure during manual breaking, sorting, and loading. Non-governmental organization (NGO) fieldwork in Luapula Province has documented miners, including women who carry ore on their heads, reporting persistent headaches and other symptoms consistent with early manganese exposure, though these complaints have not been medically evaluated (Ozayr, 2024).

The absence of systematic occupational health surveillance in artisanal mining areas, combined with the informal nature of most extraction operations and limited access to medical facilities in remote mining communities, means that chronic exposure among miners is less likely to be formally documented until symptoms become severe.

Processing operations in Central Province historically offered more formalized employment, with written contracts, regular payment schedules, and better safety standards, although significant issues remain. In 2024, a manganese poisoning incident affecting 271 workers demonstrated ongoing occupational health challenges even in formal processing facilities (Centre for Environment Justice, 2025). The government suspended three mining licenses in Serenje and Mkushi in 2021 for safety violations, indicating persistent compliance challenges (Daily Nation Zambia, 2021).

The structural incentives for informal arrangements in the mining sector have been reinforced by regulatory gaps and limited effective oversight (Dentons, 2025). The result is a sector characterized by fragmented employment relationships: large mining license holders contract with intermediaries who subcontract additional layers of labor recruitment, creating complex chains of accountability that dilute responsibility for working conditions, payment guarantees, and safety standards.

These findings underscore the complex interplay between regulatory frameworks, economic pressures, and the precarious position of workers in Zambia's manganese sector. Understanding these dynamics is critical for interpreting the broader supply chain and assessing risks of forced labor. The following sections build on this analysis. Section 2 provides a detailed account of the study's methodology and its limitations. Section 3 presents findings on the supply chain, including a discussion of manganese extraction, processing, domestic mapping, downstream end uses, and traceability. Section 4 provides findings related to labor conditions in the sector. Section 5 provides conclusions and policy recommendations.

2 METHODOLOGY AND STUDY IMPLEMENTATION

2.1 RESEARCH QUESTIONS

The following research questions guided this study:

- Are there indicators of forced labor present in the manganese industry of Zambia, and how and where do these occur within the supply chain? What are the work and demographic characteristics of those experiencing forced labor indicators? How do contextual factors such as recruitment practices and working conditions shape the issue of forced labor in the sector?
- Who are the main stakeholders in Zambia involved in the sale and processing of manganese obtained through forced labor? Where are mines and processors located? What intermediate goods are produced from manganese ore? In what form and to what destination markets are Zambian manganese exports directed? Can manganese produced with indicators of forced labor be traced directly to global markets or to specific companies, and in which downstream goods is Zambian manganese most likely to be found?
- What role do manganese exports from Zambia play in international markets? What downstream products are produced with manganese in destination markets? What downstream products are at high risk of being produced with manganese from Zambia?

2.2 METHODOLOGY

This study employed a mixed-methods approach to map the artisanal and small-scale manganese mining supply chain in Luapula and Central Provinces and to identify the presence of forced labor presence and its characteristics. The research integrated secondary data analysis, quantitative worker surveys, qualitative worker interviews, and key informant interviews (KIs) with supply chain actors.

Quantitative Worker Surveys: Researchers surveyed 127 adult ASM workers in Luapula Province (76 workers in Mansa, Kawambwa, and Chifunabuli Districts) and Central Province (51 workers in Mkushi and Serenje Districts). The survey instrument drew on International Labor Organization (ILO) model questions for forced labor and ICF's previous forced labor studies, collecting workers' socio-demographic information and details about their work and working conditions. The research team initially planned to recruit the survey sample by randomly selecting mines from the government's mining database (Moses), which lists all registered sites and their operational status. However, many sites listed as active were in fact shut down when researchers arrived, with either no workers present or not enough workers to meet sampling requirements. Ultimately, some respondents were selected through this initial sampling method, and others were identified through purposive and convenience sampling at operational sites. Trained field enumerators administered interviews using handheld tablets on the SurveyCTO platform.

Qualitative Worker Interviews: Qualitative interviews with 24 workers provided deeper context on topics covered in the survey. Some interview participants had also completed surveys. Interviews took place at mine sites and in workers' communities. Trained qualitative researchers conducted interviews in English or Bemba, a local language. Where workers consented, interviews were audio recorded.

Key Informant Interviews: KIs targeted supply chain actors and labor experts. Researchers interviewed 14 supply chain actors and 5 labor experts selected for their industry knowledge and expertise, including government officials, industry representatives, and civil society representatives.

Data Collection and Analysis: Data collection tools and guides were adapted from ICF's global research instruments for the Zambian manganese context. All instruments and consent forms were translated into Bemba. Interview notes and transcripts were translated into English and transcribed for coding and analysis. Researchers analyzed quantitative data using Stata 15 and thematically coded

interview notes and transcripts. This report triangulates qualitative and quantitative results to identify key findings and conclusions.

2.2.1 Measuring Forced Labor

This study uses the definition of forced labor contained in ILO Convention 29: “The term forced or compulsory labor shall mean all work or service which is exacted from any person under the menace of any penalty and for which the said person has not offered himself voluntarily.” The study operationalizes this definition of forced labor according to the guidelines provided in the 20th International Conference of Labor Statisticians’ *Guidelines Concerning the Measurement of Forced Labour* (2018) and the ILO’s *Hard to See, Harder to Count* (2024). According to these guidelines, a case of forced labor requires performing work that is both involuntary and under the threat or menace of a penalty. *Hard to See, Harder to Count* (2024) describes three employment stages: recruitment stage, employment stage, employment separation stage. For this study, a worker must have experienced both involuntariness and coercion during the same employment stage to be classified as a case of forced labor.⁴

2.2.2 Training and Preparation

To ensure authentic representation of workers’ perspectives, in-country research partners recruited multiple former manganese workers and researchers to serve as members of the survey interviewer team, bringing firsthand knowledge of industry conditions and worker experiences to the data collection process. In addition, current manganese workers and miners were brought in to speak with the research team during instrument review and training phases, providing critical input on contextualization and terminology used in the survey to ensure that questions were culturally appropriate and easily understood by respondents. This approach helped bridge potential gaps between researchers and the worker community while enhancing the validity and accessibility of research instruments.

Two five-day training sessions were held for the supply chain-focused and labor-focused field teams in August 2025. The trainings covered key areas, including study objectives, data collection methods, respondent mobilization, tools review, interview techniques, data quality assurance, and ethical research considerations. Pilot data collection took place in Mansa District. A debriefing session followed the pilot, to discuss field experience and lessons learned. Minor revisions to the questionnaire were made following the debrief to improve question clarity.

The design, tools, and consent forms were approved by ICF’s independent Institutional Review Board and by the Excellence in Research Ethics and Science Converge Ethics Committee in Zambia. Researchers were trained to adhere to strict ethical guidelines, including obtaining informed consent, maintaining confidentiality, and ensuring data security. Research activities complied with 45 Code of U.S. Federal Regulations Part 46 on the Protection of Human Subjects. Verbal informed consent was obtained from all respondents before proceeding with the interview. All personal identifying information was redacted before data analysis.

2.2.3 Data Collection

Data collection began in August 2025 and continued until November 2025. A total of 127 surveys and 24 qualitative interviews with workers were administered. A total of 19 key informants were interviewed using semi-structured interview guides tailored to each respondent’s expertise and role.

2.2.4 Challenges, Limitations, and Lessons Learned

Risks of Advance Notification: The team initially contacted mine managers in advance to confirm operational status. This approach proved problematic, as advance warning allowed managers to brief

⁴ See Appendix 4 for the full text of the worker instrument used in this study and Appendix 5 for a mapping of questions to indicators.

workers and stage conditions before researchers arrived. At several sites, only workers wearing PPE were present during visits. Some workers later confirmed that colleagues without PPE had been instructed to leave before the research team's arrival. This pattern led researchers to abandon advance notification, even when it required additional travel to locate active operations.

Non-Probability Sampling Approach: Data collection employed purposive and convenience sampling rather than probability sampling. Although this approach enabled a more diverse respondent pool given field constraints, it means that the findings cannot be statistically generalized to the entire manganese industry. Quantitative data establish the presence of forced labor in the study areas, and qualitative data provide deeper insight into its characteristics and mechanisms.

Sample Composition: The rate of forced labor found among interviewed workers is likely a lower bound of forced labor rates in the sector more broadly due to the sample composition. The power crisis and its cascading effects on the manganese sector during fieldwork resulted in widespread operational shutdowns that shaped the accessible research sample. Although artisanal extraction itself does not require grid electricity because ASM operations rely primarily on manual labor with hand tools, the crisis affected ASM operations indirectly but severely. The shutdown of processing facilities in Central Province eliminated the primary domestic buyers for ASM-produced ore, causing many smaller mining operations to suspend work due to the collapse in market demand. Operations that remained active during fieldwork were predominantly those with sufficient resources to weather the market disruption: foreign-invested sites with access to diesel generators or the resources to pay the Zambia Electricity Supply Corporation's (ZESCO) premium electricity tariffs, sites that had export links or other connections with foreign processing facilities, or larger operations with the capital reserves to continue extracting and stockpiling ore while awaiting market recovery. Key informants consistently reported that smaller, locally owned, and informal operations—precisely those least accessible during the crisis—exhibit weaker labor protections, less oversight, and higher vulnerability to exploitation. As such, this study's finding that 45% of workers interviewed for this study, most of whom were working at relatively better-resourced sites, experienced forced labor suggests that rates of such treatment may be higher across the broader sector, particularly at less established operations in which workers face greater risks.

Government Authorization Requirements: Government approval from relevant ministries was required before field data collection could begin. The authorization process proved slow and required persistent follow-up. The Occupational Health and Safety Institute declined to provide a detailed interview, citing absence of health research clearance, despite this study not constituting health research in the traditional sense. Such clearances can require up to two months to obtain, highlighting the need for adequate lead time in government approval processes.

Limited Access to Government Data: Requests for relevant data from government entities, including the Zambia Development Authority, received no response, despite multiple follow-up attempts.

3 SUPPLY CHAIN FINDINGS

3.1 MANGANESE PRODUCTION IN ZAMBIA

3.1.1 Historical Overview

Zambia's manganese sector exported less than 1 MT of manganese ore per year prior to 2007, and it grew to exporting more than 100,000 MT of ore annually by the 2020s, while also developing a manganese alloy processing sector. By 2024, Zambia had become Africa's largest ferro-silico-manganese exporter, by both value and volume (Trade Data Monitor, 2025). That year it exported more than \$110 million in ferro-silico-manganese, in addition to \$21.3 million worth of manganese ore and concentrates and \$13.9 million of ferro-manganese (Trade Data Monitor, 2025).

Table 1. Zambian manganese production (MT), year on year

Year	Gross weight (MT)	Manganese content (tons)	Year-over-year change
2015	130,000	45,000	Baseline
2016	120,000	40,000	-11.1% content
2017	131,000	58,000	+45% content
2018	159,000	70,000	+20.7% content
2019	257,000	113,000	+61.4% content
2020	186,000	82,000	-27.4% content
2021	270,000	120,000	+46.3% content

Source: U.S. Geological Survey, January 2025, <https://pubs.usgs.gov/myb/vol3/2020-21/myb3-2020-21-zambia.pdf>

Production data from the U.S. Geological Survey show dramatic fluctuations between 2015 and 2021, with manganese content ranging from 40,000 tons to 120,000 tons annually (see Table 1).⁵ The 61% surge in 2019 reflects multiple factors: formalization of previously informal operations, new mine commissioning, and improved data collection. The 2020 contraction (-27%) resulted from COVID-19 disruptions, market volatility, and operational challenges. Recovery in 2021 was robust (+46%), driven by operationalization of new processing facilities and increased global demand.

Data from Zambia's Ministry of Mines (Table 2) show even more dramatic year-to-year variation, with production dropping from 65,370 MT in 2011 to just 3,985 MT in 2013, then recovering to 171,066 MT by 2023. These extreme fluctuations likely reflect inconsistencies in data collection and reporting across artisanal operations rather than actual production volatility alone.

Table 2. Zambian manganese production in MT, 2011–2023

Year	Manganese production (MT)
2011	65,370
2012	6,820
2013	3,985
2014	110,535
2015	72,652
2016	4,590
2017	118,004
2018	4,448
2019	24,871
2020	42,405.97
2021	132,240.5
2022	158,674.6
2023	171,066.2

Source: Zambia Ministry of Mines, October 2025

Zambia's manganese supply chain is marked by a sharp divide between where ore is extracted and where value is added. As mentioned previously, high-grade ore produced mainly in Luapula Province must travel to Central Province for processing due to power infrastructure constraints. This spatial disconnect creates long transport routes, uneven economic benefits, and multiple points at which traceability breaks down, especially at aggregation yards, roadside depots, and border warehouses in which ore is blended and documentation is weak.

The supply chain is further constrained by governance and operational challenges. Fragmented regulatory oversight, with no integrated system linking licenses, production reporting, environmental compliance,

⁵ The U.S. Geological Survey has not published manganese production data for 2022–2024 as of November 2025. Data from the Ministry of Mines and Minerals Development run to 2023 and show a steady increase in production through the years.

and export declarations, allows some operators to bypass obligations related to safety, environmental management, labor conditions, and community development.

Inconsistencies in export data, manual documentation, and limited coordination between regulatory agencies weaken transparency and reduce Zambia's ability to capture value or demonstrate responsible sourcing. These structural weaknesses have direct implications for labor conditions, as the same governance gaps that allow production under-reporting and tax avoidance also enable exploitation of workers whose employment relationships remain undocumented and whose rights remain unenforced.

3.1.2 Regional Dynamics: Two Distinct Mining Regions

Zambia's manganese sector operates across two geographically and economically distinct regions—Luapula Province and Central Province—each characterized by different ore grades, infrastructure capacities, and production models. Understanding these regional differences is essential for comprehending the labor patterns and supply chain dynamics documented in this study.

3.1.2.1 Luapula Province: High-Grade Extraction Without Processing

Luapula Province serves as Zambia's primary source of premium-grade manganese ore while simultaneously being the country's poorest region. This combination of valuable mineral resources and severe economic deprivation creates conditions in which mining provides crucial income to workers with extremely limited employment alternatives.

Luapula Province produces premium-grade ore with 40–58% manganese content—among the highest grades globally—through predominantly artisanal and small-scale operations across Mansa, Samfya, Chipili, Milenge, and Chifunabuli Districts. The province's primary large-scale operation is Musamu Resources' Luongo Mine, Zambia's first wholly Zambian-owned large-scale manganese operation (Mupeseni, 2021). In addition to this operation, Luapula Province also features numerous artisanal mining sites that provide income to thousands of workers.

Despite these high-quality ore deposits, Luapula has little processing capacity due to a low-voltage electrical supply insufficient for industrial processing facilities. This forces all value addition to occur outside the province, in areas normally capable of high-voltage processing, relegating Luapula to extraction phase employment characterized by manual labor and minimal value capture (Mumba, 2021).

3.1.2.2 Central Province: Processing Hub Facing Resource Depletion

In contrast to Luapula, Central Province—specifically Serenje, Mkushi, and Kapiri Mposhi Districts—serves as Zambia's manganese processing hub. The province produces lower-grade ore (28–42% manganese content) but has attracted more than \$70 million in Chinese processing investments since 2019 due to its strategic location along the Great North Road and TAZARA railway, plus access to the high-voltage power infrastructure necessary for ferro-alloy production (Daily Nation Zambia, 2020).

This processing capacity has historically allowed Central Province to capture more value from manganese production and provide more diverse employment opportunities, including higher-skilled technical and processing jobs alongside extraction labor.

Reports nevertheless indicate possible depletion of manganese reserves in Central Province due to decades of extraction. A government representative explained that remaining reserves are increasingly low grade:

“The manganese that we have in Central Province is not standard and of high quality. Most of it has more iron content [...] there are a few places that are hopeful we still have a lot of manganese, but as it is, most of it has been gone. [...] Most of it is below 40%.”

—Mining bureau representative

This depletion is shifting the mining focus toward Luapula Province, which possesses higher-grade reserves. However, without corresponding investment in Luapula's processing infrastructure, this shift risks concentrating employment in the lowest-value extraction activities rather than enabling integrated mining and processing operations.

3.1.3 Impacts of the 2024–2025 Energy Crisis

On July 3, 2024, ZESCO implemented a load shedding program that severely escalated power rationing across the country. ZESCO was forced to implement this policy because an El Niño-driven drought reduced usable water at the Kariba Dam, the country's primary energy source, to just 2.4% of its capacity by late 2024. With hydropower accounting for more than 80% of Zambia's total generation, this drastic depletion of water reserves caused electricity output to plummet from a normal 3,777 MW to roughly 1,019 MW, making it impossible to meet national demand without severe rationing (Phiri, Kennedy & Clayton, Freddie, 2024; Xinhua, 2025).

To limit the impact on residential customers and essential services, ZESCO's load shedding program cut power to many major industrial operations, including more than a dozen manganese processing facilities in Central Province (Chabaya, 2024; Sipula, 2024). Some copper mining companies were able to import power from nearby countries, but most manganese processors lacked the operating capital to do so (Reuters, 2024).

The shutdown of these manganese processing facilities devastated the region's employment base and fundamentally altered the sector's economic structure (World Bank et al., 2025). Further, key informants indicated that it has effectively reversed Zambia's evolution from raw ore exporter to value-added ferro-alloy producer. Processing facilities that previously employed skilled workers to produce ferro-manganese and other refined products have been forced to shut down, pushing the sector back toward lower-value raw ore extraction and export. This regression has several implications for labor conditions:

- **Employment Shifts:** Workers who previously held processing jobs have been displaced, either losing employment entirely or shifting to lower-paid and more dangerous extraction work.
- **Increased Pressure on Extraction:** With processing capacity offline, operations have redirected labor toward activities such as stockpiling, manual sorting, and crushing raw ore, often without adequate dust control or waste management systems, as these improvised operations occur outside approved environmental management plans.
- **Supply Chain Disruption:** The inability to process ore domestically has disrupted supply chains and payment flows, contributing to the wage arrears and delayed payments documented throughout this report. When processing facilities cannot operate, mines cannot sell refined products, which in turn delays payments to workers.
- **Long-Term Structural Concerns:** If power supply remains unreliable, processing investments may not return to Zambia, permanently shifting the country toward lower-value extraction activities with fewer employment benefits and less value capture.

The power crisis has thus compounded the regional disparities between Luapula Province and Central Province. Luapula never developed processing capacity and remains focused on extraction, and Central Province's processing capacity—previously its economic advantage—has been rendered inoperable. The combined effect is to concentrate employment opportunities in the lowest-value, most hazardous segments of the manganese supply chain, with direct consequences for the labor conditions documented in this study.

3.1.4 Extraction Methods and Operational Practices

Artisanal and small-scale miners rely heavily on manual labor for breaking, sorting, and loading ore. This labor-intensive model employs large numbers of workers, including community members who sort ore by hand for piece-rate compensation. This sorting work exposes workers to dust and potential manganese poisoning, as workers typically lack protective equipment.

Many operators access machinery through subcontracting and partnership arrangements rather than owning equipment outright. Field visits revealed that the most active mines are either owned by local Zambians in partnership with foreigners or operated entirely by foreign entities. This pattern underscores the importance of partnerships for capital injection and equipment access:

“Sometimes we go into mining contracts with some people who own the equipment [...] we subcontract them to mine on our behalf.”

—Mining association representative

After extraction, manganese ore undergoes basic processing to remove impurities and separate material by grade. In the washing stage, operators use settling and filtration methods without chemical additives:

“We don’t add any chemicals to that production [...] we use the filtration method [...] that water [...] mixed with the manganese as waste maybe will remain there [...] then the water will go [...] sometimes back to the river. [...] This will be normal water.”

—Manganese miner and trader

However, even without chemical additives, the discharge of sediment-rich water into rivers can degrade local ecosystems and affect downstream communities. The crushing and screening process separates ore by size and removes waste rock before material is sold to processors or exporters.

3.1.4.1 Ownership and Control Dynamics of Mines

Discussions with stakeholders revealed a pronounced gap between legal ownership and operational control, particularly in Luapula Province. Although Zambian citizens hold mining licenses, actual operations are often conducted by other parties:

“[...] different people own the mines, but the mining is done by other people. [...] As for the artisanal miners, most of them are not registered [...] most of them don’t even understand the process [...].”

—Mining journalist

Foreign participation at the small-scale level is often structured through partnerships or fronting arrangements. Zambian law requires foreign small-scale operators to partner with local citizens, but in practice, this requirement creates blurred ownership structures:

“Small-scale mining operations, by law, require that as a foreigner you actually partner with a local [...] the alliance of ownership gets very blurred there, and the aspect of fronting is still quite a challenge.”

—NGO representative

These arrangements complicate accountability, obscure beneficial ownership, and create opportunities for tax avoidance, under-reporting of production, and unregulated subcontracting. They also weaken labor oversight, as regulators often cannot determine who is actually responsible for day-to-day operations and worker welfare.

Miners use both agents and direct buyers to bring ore to market:

“Sometimes we involve agents who have a better market, sometimes we go direct to processors.”

—Mining company representative

This flexibility in marketing channels creates multiple points of traceability failure, particularly at aggregation yards and roadside depots in which ore is co-mingled and documentation is weak.

3.1.5 Land Tenure and License Ownership Structures

Zambia's manganese ASM sector operates across multiple, overlapping land tenure and licensing regimes that create significant complexity for regulatory oversight.

The Mines and Minerals Development Act No. 11 of 2015 establishes that “surface natural resources are for locals, but underneath natural resources are for the State,” creating inherent tension between community surface rights and state-controlled subsurface mineral rights. This framework generates conflicts when communities discover manganese deposits on their land but lose control once commercial operators obtain mining licenses from the state.

Mining licenses in Zambia fall into three categories with distinct ownership requirements:

- Artisanal licenses (approximately 6.67 hectares): Reserved exclusively for Zambian citizens; no foreign ownership permitted. These require no prior exploration and can be issued directly upon consent from existing license holders in the area.
- Small-scale mining licenses: Require minimum 5% Zambian shareholding. Prior to the 2015 Act, the requirement was 51% Zambian ownership, but this threshold proved unworkable as Zambian partners could not provide matching capital.
- Large-scale mining licenses: No citizenship restrictions; open to any investor following exploration and licensing procedures.

A government official from the Ministry of Mines explained the licensing distinctions:

“An artisanal is simply a very small license, about 6.67 hectares, which does not need you to cut out exploration before you have it. [...] It's only given to Zambians, by the way, the artisanal, no foreigners. So for small-scale, there's minimum 5% of the Zambia shareholding. [...] For large-scale, it doesn't matter. Anyone can own it.

—Ministry of Mines official

In customary areas, where the majority of Luapula Province's manganese deposits are located, traditional chiefs exercise significant control over land access. Mining operations require a chief's consent before they can begin, regardless of whether a state-issued license has been obtained. As one government official noted:

“The chiefs play a major role as the big custodians of the land. They have to give consent to a mining right, whether at exploration stage or mining stage, depending on which mining right someone wants to have. You can't start mining without consent from the chief.”

—Government official

This dual authority structure—state mineral rights and chiefly land control—creates layered obligations for miners. In addition to formal licensing fees, ASM operators often face informal levies from multiple traditional authorities. A journalist-researcher who investigated the sector documented the fee structure:

“The village headman also [...] will charge you [...] as much as 50 kwacha per tonnage that you mine or that you sell. [...] Then you have to pay the chief also because the chief has also come up with a levy [...] even as much as 200 kwacha per [MT].”

—Journalist

Some chiefs have advocated formal community benefit-sharing arrangements. Chief Mwewa in Chifunabuli has proposed “golden share” or partnership models in which communities provide land access in exchange for equity stakes or equipment provision, rather than the current informal fee arrangements.

3.1.5.1 Gap Between License Ownership and Operational Control

Field research revealed a pronounced gap between formal license ownership and actual operational control, particularly in Luapula Province. Although Zambian citizens hold the legal mining licenses, actual mining operations are often conducted by other parties through a variety of arrangements:

Subletting Arrangements: License holders lease their mining rights to foreign operators—predominantly Chinese and Indian investors—for a percentage of production revenue. A journalist familiar with Zambia’s manganese sector explained:

“What happens, the arrangement there is that, for instance, I’ll go and get the papers from the Ministry of Mines. I’ll go and register the mine from the Ministry of Mines. Then I’ll sublet the mine to the Chinese or the Indians for a certain period of time. And then those guys will be giving me a percentage per sale that they make. So that’s how most of the mines are operated.”

—Journalist

Joint Venture Partnerships: Zambian license holders partner with foreign investors who provide capital and equipment in exchange for majority revenue shares. A manganese trader explained a typical arrangement:

“If we don’t have enough financial muscle, we bring on board some other people, like the Indians or Chinese or other foreign investors [...] they help us in terms of production. Once the production is done, either we share by percentage. [...] Is it 50-50 or 60-40 or 70-30 or 80-20. It depends on how long we’re trying to work together and how much money the investor has.”

—Manganese trader

In documented cases, Zambian license holders retained as little as 35% of production value, while foreign partners controlled operations and took 65%.

Fronting Arrangements: In more problematic cases, Zambians obtain licenses that foreign investors control entirely, with the Zambian partner serving only as a nominal director to satisfy legal requirements. A government official from the Mkushi Mining Bureau described the pattern:

“Even the Chinese are involved in the mining. You find there’s a Zambian and a Chinese. But mostly Zambian, they’re just used for getting licenses. On the licensing aspect, they will use your NRC [National Registration Card]. They will use you to get in the offices to get documents and all that. But the Chinese, they will put in the capital.”

—Government official

3.1.5.2 Unlicensed and Informal Operations

Beyond the formal licensing system, a substantial number of ASM operations function without any mining license. A mining association representative estimated “about 100” artisanal operations in Luapula Province, with “many” additional unlicensed operators. Illegal mining takes several forms:

- **Unlicensed Extraction on Discovered Deposits:** When community members discover manganese outcrops, they often begin extraction immediately, rather than pursuing formal licensing. As one representative noted: “When they see the deposit, they right away start mining [...] they feel they are not duty bound to get the mining license.”
- **Extraction under Exploration Licenses:** Some license holders engage workers to mine during what should legally be the exploration phase only.
- **Contested Land Claims:** Miners who begin extraction on apparently unclaimed land frequently encounter competing claims from community members who assert ancestral ownership rights.

Government formalization efforts are underway, but significant portions of the sector remain informal, with many operators reportedly unaware of or unable to afford the licensing process.

3.2 MANGANESE PROCESSING IN ZAMBIA

3.2.1 Foreign Investment in Processing Infrastructure

Foreign direct investment in Zambia's manganese processing sector has been dominated by Chinese and Indian firms seeking to secure critical mineral supply chains. Approximately \$70 million was deployed in processing infrastructure between 2019 and 2021, though this represents modest investment compared to Zambia's multi-billion-dollar copper sector (Daily Nation Zambia, 2020; International Manganese Institute, 2023). Investment focused predominantly on establishing ferro-alloy production capacity in Central Province (Lusaka Times, 2019).

The most significant foreign-invested facilities include the following:

- **Hu-Cheng Mining Co. Ltd.** operates a smelter in Kapiri Mposhi District representing a \$15 million Chinese investment commissioned in July 2019. With 40,000 tons per year processing capacity, it is Zambia's largest manganese processing facility. Hu-Cheng appears to be a privately owned company.⁶
- **PLR Projects Zambia Limited** is a private Indian firm operating open-pit mines and a ferro-alloy plant in Pensulo village, Serenje. Phase 1 (9 MVA capacity) became operational in May 2017, with Phase 2 adding 10 MVA capacity. The facility produces ferro-silicon, ferro-manganese, and silico-manganese for export to Dubai, Japan, South Africa, Kenya, and Tanzania.
- **Southern Africa Ferro Alloys Limited** is a private Indian investment established in 2011 operating two 6 MVA furnaces in Serenje District with processing capacity for ferro-manganese, silico-manganese, and ferro-silicon production.

Major foreign direct investment projects are notably absent from Luapula Province, despite its high-grade ore deposits. Foreign investors concentrate in Central Province due to access to 33 kV power lines necessary for industrial processing. This geographic concentration reinforces inequalities in value capture, with processing employment and higher-skilled jobs located away from where most ore originates. Foreign investors also establish joint ventures with local license holders in situations in which artisanal and small-scale licenses are issued only to Zambian citizens. Foreign investors provide equipment and capital under revenue-sharing arrangements that effectively bind the Zambian partners to supply the foreign investor's processing facility.

A mining company representative explained the financial dependency:

"If we don't have enough financial muscle, we bring on board the Indians or Chinese [...] they help us in terms of production."

—Company representative

Because processors control testing and grading, they are able to make purchasing decisions about which mines supply them and at what price. This concentration affects not only market fairness but also the integrity of production and export data, as processors are often the first actors to record "official" figures. Weak beneficial ownership transparency makes it difficult to track who profits from the manganese supply chain or assess risks of political exposure.

⁶ Hu-Cheng's registration in Zambia lists no parent company, and Hu-Cheng itself does not appear on the list of Chinese State-owned Assets Supervision and Administration Commission.

3.2.2 Processing Technologies and Methods

Manganese processing involves capital-intensive smelting to produce silico-manganese and ferro-silicon-manganese alloys. Manganese ore and silica (quartz) are fed into furnaces operating at approximately 1,000°C, with iron added as needed to achieve desired alloy composition:

“We have the furnace that burns to about 1,000 or so degrees [...] and then of course either adding silica or ferro, depending on what you want at the end [...] There is a specific percentage of iron content [...] that will tell you [...] this is qualified to be a ferro silico manganese, or this one is just silico manganese [...] before smelting, everything [...] is added in the same batch [...] you batch it together [...] and as the combustion goes on, you keep on adding bit by bit [...] to control the matter in the furnace.”

—Company representative

Once tapped from furnaces, molten alloy is separated from slag and guided into sand “portals,” where it cools and solidifies. After several hours, large alloy blocks are lifted by crane and broken manually in stages to meet client size specifications:

“During the separation, the lava for silico manganese goes straight into the sand, and the lava for slag will go to the cooling tower [...] by evening [...] there is a team of people that come to first break it into [...] 200 mm to 300 mm [...] then other people [...] break that into smaller particles [...] depending on the clientele. [...] It’s not an easy job.”

—Company representative

This manual breaking process exposes workers to additional hazards and represents labor-intensive work even within technologically advanced processing facilities.

Zambian manganese undergoes minimal domestic processing before export, with value addition largely limited to basic beneficiation and alloy production.

“What they are mining is actually called manganese ore [...] they are able to crush into concentrates [...] this is what they are selling, but not alloy [...] we don’t do alloys, and we don’t do final products.”

—Academic expert

This limited processing reflects systemic constraints, including inadequate infrastructure, lack of appropriate technology, and insufficient research on manganese grades and processing requirements.

Processing that does occur domestically is concentrated in Serenje and, to a lesser extent, in Mkushi, Kapiri Mposhi, and Kabwe, which are all located along high-voltage power lines capable of supporting energy-intensive furnaces. These facilities produce ferro-manganese and silico-manganese alloys through smelting processes that combine manganese ore with silica, iron, and other materials at temperatures around 1,000°C. One processor described the operation:

“We had the furnace and the 1,000 or so degrees [...] and then of course either adding silica or ferro, depending on what you want at the end.”

—Processing company representative

After tapping from the furnace, molten alloy is separated from slag, cooled in sand molds, and manually broken into size specifications required by clients.

These processing operations represent relatively basic value addition, with most material then exported in these semi-processed forms rather than incorporated into finished products domestically.

3.3 CONSUMPTION AND EXPORT

3.3.1 Domestic Consumption

Domestic consumption of Zambian manganese remains minimal (International Manganese Institute, 2023). The limited local use occurs primarily in two sectors: steel manufacturing and copper processing. Local steel companies purchase silico-manganese or ferro-manganese to use as a catalyst during steel production. As one processor explained:

“Most of the steel companies [...] they get to use it as a catalyst [...] they buy scrap metal [...] and during that time [...] they need to get [manganese] just to make the steel.”

—Manganese processor

Some manganese is also sold to copper mines in the Copperbelt for furnace operations.

The absence of a domestic iron and steel industry limits opportunities for greater local manganese consumption. A Ministry of Mines official acknowledged this gap:

“For the future plans [...] when we develop an iron and steel industry [...] we’ll be able now to use the manganese [...] but unfortunately, that has not happened.”

—Government representative

Battery manufacturing, which historically provided a potential domestic outlet for manganese, has shifted away from manganese-based technologies. Key informants indicated that a new battery plant in Chibombo (Sunvolt) may potentially take up Zambian manganese production, but operations appear to be in early stages, and the facility’s actual manganese consumption remains unclear.

3.4 DOMESTIC MAPPING: STATE-LEVEL AND DIRECT TRACING FINDINGS

3.4.1 State-Level Mapping in Focal Provinces

The manganese supply chain involves a layered set of actors who perform distinct functions from extraction to export. These actors differ in their ownership structures, degrees of formality, access to capital, and influence over pricing and market access. Table 3 summarizes the core segments of actors observed during fieldwork and KIs.

Zambia’s supply chain is characterized by Zambian dominance in extraction and foreign dominance in processing, logistics, and export. Artisanal and small-scale miners in Luapula form the extraction base but rely heavily on foreign-funded intermediaries for equipment and market access. Processing and laboratory testing, concentrated in Central Province, are controlled almost entirely by foreign investors, enabling them to set prices and quality standards. Transport and export functions further consolidate foreign influence, and Zambian actors retain limited control over value addition.

Table 3. Segmentation of actors along Zambia’s manganese supply chain

Segment	Actors in manganese	Core functions	Observed characteristics (from KIs)
1. Artisanal producers	Individual miners, community diggers	Manual extraction, hand sorting	Use hand tools; paid per bucket/MT; rely on informal labor, including women and youth; limited safety controls
2. Small-scale Zambian operators	Zambian-owned license holders	Operate small pits; subcontract equipment; sell raw ore	Depend on hired excavators; limited capital; partner with foreign investors for financing

Segment	Actors in manganese	Core functions	Observed characteristics (from KIIs)
3. Foreign-financed middlemen	Chinese/Indian partners working under Zambian licenses	Provide equipment, capital, and off-take agreements	Blurred operational ownership; fronting arrangements; strong influence over pricing and volume decisions
4. Processors (smelters and crushers)	Mostly Chinese and Indian-owned plants in Central Province	Crush ore, smelt alloys, and conduct lab testing	Central Province concentration; depends on 33 kV electricity
5. Transporters	Mainly foreign-owned fleets; Zambian-subcontracted drivers	Move ore from mines to plants and borders	Dominated by Indian/Chinese fleets; loose loading; dust and spillage; limited road monitoring
6. Export consolidators/traders	Licensed exporters, processors, agents	Purchase, consolidate, and export	Control documentation; interface with Zambia Revenue Authority and international buyers
7. Destination markets	Buyers in South Africa, China, India, and the European Union	Receive ore or ferro-alloys	South Africa is a major ore importer; Asia is the dominant market for alloys

3.4.1.1 Supply Chain Visibility

Researchers found traceability of manganese ore and alloys between these supply chain actors to be limited, a finding confirmed by civil society and community partners consulted for this study. Manganese mining provides essential income in rural areas like Luapula Province, but communities often have minimal visibility into how the supply chain functions, how revenues are distributed, or how environmental and labor risks are managed. This exposes workers and residents to unregulated practices while reducing opportunities for accountability and inclusive development (KIIs, 2025).

In Luapula Province, where most extraction occurs, the majority of mining is conducted by artisanal and small-scale operators working with minimal formal organization. Community members frequently participate as casual laborers, often sorting ore by hand without protective equipment.

Despite their central role in production, communities receive limited information about licensing decisions, land use plans, or environmental requirements. Many respondents noted that they were unaware of who truly controls mining operations due to fronting arrangements and shifting partnerships. This weak visibility produces confusion about obligations, limits the ability to demand compliance, and allows operators to move between sites with minimal community consultation (KIIs, 2025).

Civil society organizations (CSOs) face similar constraints. Although some groups monitor mining impacts or advocate for better governance, their ability to track manganese flows systematically is limited by the lack of aggregated public data on production volumes, export figures, ownership, and environmental compliance. CSOs also lack dedicated mechanisms to access real-time information from the Ministry of Mines, the Zambia Revenue Authority, or the Zambia Environment and Management Authority (ZEMA), forcing them to rely on fragmented or outdated sources. A recurring theme in interviews was that manganese receives far less policy attention and public scrutiny compared to copper, despite its rapid growth (KIIs, 2025).

For these reasons, CSO and community assistance with direct tracing was limited, although study researchers were able to document information about actors at each stage of the processing supply chain, as identified in the following sections.

3.4.1.2 Luapula Province: Major Mining Operations

Mining companies operating in Luapula Province include, but are not limited to, the following:

- **Musamu Resources, Luongo Mine:** Zambia's first wholly Zambian-owned large-scale manganese mine is located in Chipili District. The \$300 million project contains an estimated 40 million tons of manganese ore averaging 43 percent purity, based on internationally

recognized mineral reporting standards. The mine aims to produce 1 million tons annually by 2027. Commissioned in 2024 by President Hichilema, it is currently ramping up from small-scale production while operating on generators pending full electrical connection. The project represents a breakthrough in domestic ownership patterns, which foreign investors have dominated.

- **Mathkat Mining Limited:** This more than \$3 million investment Mansa-based, Zambian-owned company operates 7 loaders and 10 tipper trucks, producing 3,000 tons monthly (36,000 tons/year). This demonstrates emerging middle-tier Zambian investors integrating mining with agriculture (using mine water for 10-hectare irrigation).
- **MMRP Mining Limited:** This Zambian-owned joint venture with Brigade Construction in Chief Chisunka's Chieftdom in Mansa involves a planned \$15 million investment targeting 1,500 MT monthly production with an expected 5,000 jobs at full operation.
- **Genesis Procurement Limited:** This Genesis Group member has more than 200 employees and operates earth-moving equipment worth ~\$2 million. They are a major supplier to GFE MIR, one of the world's largest mineral procurement companies. The Genesis Group is a private Indian-owned company with operations in Zambia, Botswana, Malawi, South Africa, and Zimbabwe.
- **Green Core Enterprises:** This is a private Indian-owned Mansa area operation with a 240,000-MT capacity.

3.4.1.3 Central Province: Major Mining Operations

Mining companies operating in Central Province include, but are not limited to, the following:

- **Kabundi Resources Limited:** This wholly state-owned subsidiary at Serenje has 240,000 tons/year target capacity. It has an LSM exploration license covering manganese, cobalt, copper, zinc, and limestone. It opened in May 2020 following K18.6 million Phase I investment. It employs 150+ at the mine site; attached community infrastructure includes resettlement housing, a school, and a health center.
- **Hu-Cheng Mining Co. Ltd.:** A \$20 million manganese smelter in Kapiri Mposhi District. It is the country's largest at 40,000 ton/year processing capacity. It produces steel alloy plates for sheets and machinery. Completed in July 2019; requires a 33 kV power line from ZESCO. Currently idle due to power crisis. Hu-Cheng appears to be privately owned.⁷
- **PLR Projects Zambia Limited:** This Indian privately-owned firm has open-pit operations and a ferro-alloy plant in Pensulo village, Serenje. Phase 1: 9 MVA capacity became operational in May 2017; Phase 2: additional 10 MVA. It produces ferro silicon, ferro manganese, and silico manganese. Holds 4 large-scale licenses totaling 2,609 km². Supplies 150 tons monthly to Kafue Steel and exports to Dubai, Japan, South Africa, Kenya, and Tanzania. Manasa Open Pit envisaged at 200,000 MT annual capacity.
- **Liaoning San He Mining Investment Co. Ltd.:** Chinese firm operating Kampumba and Kabanga Manganese Mines in Kapiri with 10,000 t/yr capacity. Liaoning appears to be privately owned.⁸
- **ASM:** Multiple operations supply Central Province processors, using excavators often provided by processing companies to ensure feedstock.

⁷ Hu-Cheng's registration in Zambia lists no parent company, and Hu-Cheng itself does not appear on the list of Chinese State-owned Assets Supervision and Administration Commission.

⁸ Liaoning's registration in Zambia lists no parent company, and Liaoning itself does not appear on the list of Chinese State-owned Assets Supervision and Administration Commission.

3.4.1.4 Manganese Processing in Zambia

The companies identified in Table 4 have experience processing manganese in Zambia, either converting ore into alloys or preparing manganese ore for export. Some processing companies in Zambia also hold export licenses with the Ministry of Mines and Mineral Development (MMMD), though a list of these licensees does not appear to be publicly available from MMMD. As noted in Table 4, some of the identified processing facilities have recently closed due to the energy crisis in Zambia.

Table 4. Operational status of manganese processing companies in Zambia

Company name	Location	Ownership	Type of processing	Operational status (2025)	Sources
Smelters, ferro-alloy producers					
Amar Ferro Alloys Ltd	Serenje (Central)	Privately held (evidence of commercial ties to India)	Ferro-alloy smelting	Unable to confirm operational status	—
Champion Minerals Ltd	Serenje (Central)	Privately held	Ferro-/silico-alloy smelting	Operational	Critical Minerals Strategy; KILs
ChiMetal (Z) Ltd	Serenje (Central)	Unknown	Alloy smelting	Closed	MMMD; Zambia Extractive Industries Transparency Initiative; KILs
Jaswin Alloys Manufacturing Ltd	Serenje (Central)	Unclear ownership structure (evidence of commercial ties to India)	Alloy processing	Unable to confirm operational status	—
Omax Ferro Alloys Ltd	Serenje (Central)	Part of the privately held Shree Ramdeet group of companies, based in India	Ferro-alloy production	Paused indefinitely	ZEMA enforcement notice; KILs
Serenje Ferro Alloys Ltd	Serenje (Central)	Unknown	Ferro-alloy processing	Paused indefinitely	Critical Minerals Strategy
Southern Africa Ferro Alloys Ltd	Makeni, Lusaka	Privately held Indian company	Ferro-/silico-alloy smelting	Operational	Company contact
United Alloys (Z) Ltd	Serenje (Central)	Privately held Indian company	Alloy smelting	Closed	MMMD notices
Ore washers/crushing and screening plants					
Apex Mining Zambia Ltd	Mkushi (Central)	Unknown	Ore washing/crushing	Licensed revoked	MMMD
Datong Industry Corporation Ltd	Mkushi (Central)	Unknown ownership structure (evidence of commercial ties to China)	Crushing, washing, ore upgrading	Closed by government	Mkushi Town Council
Donzhong Investments Ltd	Mkushi (Central)	Unknown	Ore upgrading	Closed	Mkushi Town Council
Goodrock Zambia Ltd	Mkushi (Central)	Part of the privately run GoodEarth/GoodRock Group, based in India	Crushing/washing	Closed by government	ZEMA

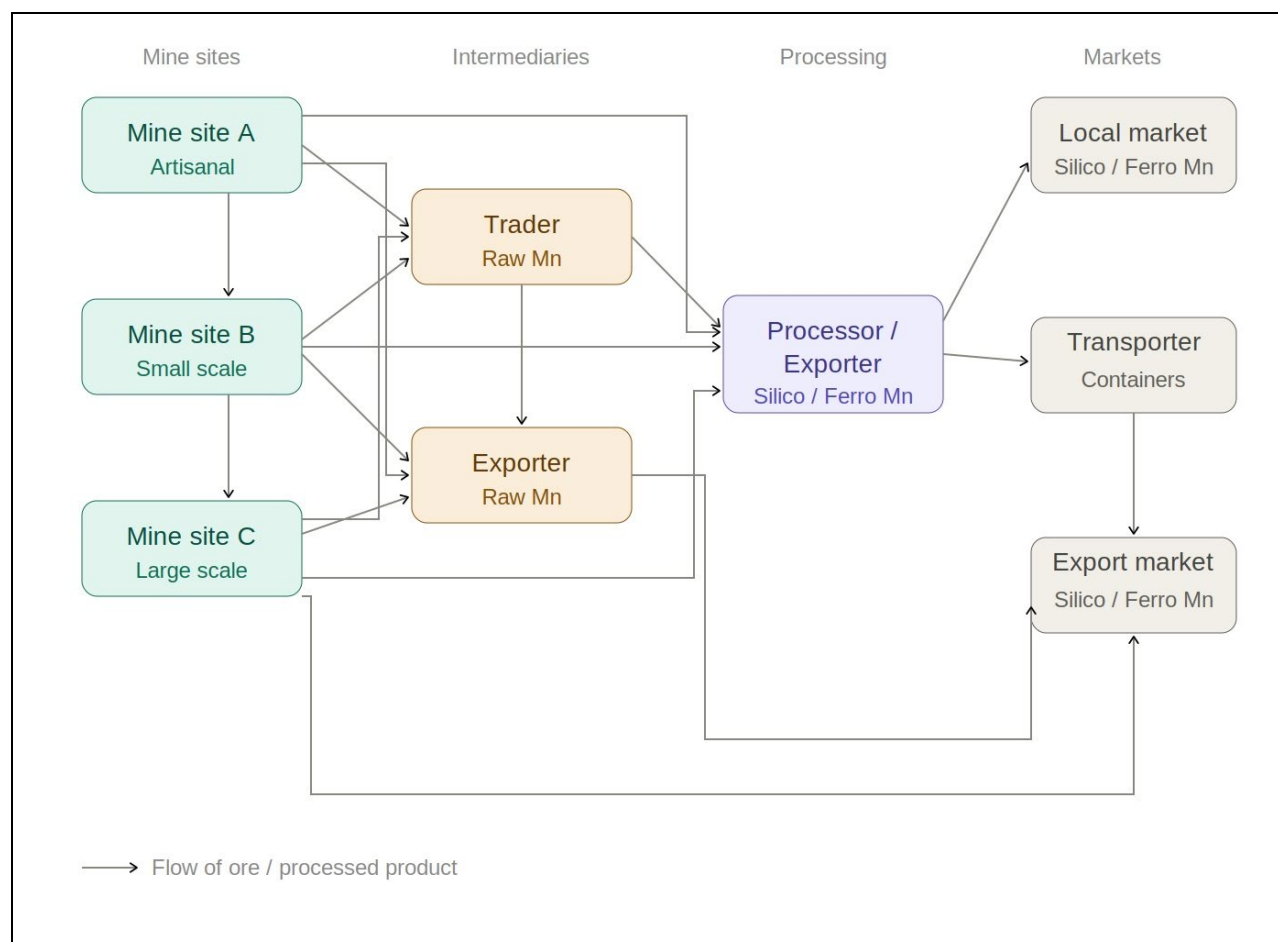
Company name	Location	Ownership	Type of processing	Operational status (2025)	Sources
Jazzman Chikwakwa	Mkushi (Central)	Former Zambian politician and businessman	Small-scale processing/trading	Closed by government	Company contact
Lijing Industry Co. Ltd	Mkushi (Central)	Privately held Chinese company	Small-scale processing	Closed	Mkushi Town Council
PLR Projects Zambia Ltd	Serenje (Central)	Part of PLR Projects India, a privately held company	Crushing, smelting, and screening	Operational	Company contact
ZAMZINC Industry Co. Ltd	LS-MFEZ (Lusaka)	Privately held company (evidence of commercial ties to China and Tanzania)	Metal/alloy processing, possible washing	Operational	Company information desk

Source: ICF

3.4.2 Traceability Challenges

Traceability is one of the weakest points in Zambia's manganese supply chain, especially between extraction sites and aggregation points (Figure 2).

Figure 2. Domestic manganese supply chain flow



Mn=manganese
Source: ICF

Although most production is licensed at the source, ore identity quickly becomes obscured once it leaves the mine. Blending at roadside depots, private yards, community loading points, and even some processing facilities makes it difficult to verify origin, grade, or production conditions. Government officials noted that the planned Lobito Corridor, a major rail-and-port transport route linking Zambia and the southern Democratic Republic of the Congo to Angola's Atlantic port of Lobito, could shorten export routes and reduce handling points where traceability fails, but this infrastructure remains under development (KII, 2025).

The absence of a digital chain-of-custody system further undermines traceability. Documentation is largely manual, such as handwritten notes, informal weigh slips, and phone-based communication. Loose loading practices, in which ore is transported in unsealed, unlabeled bulk, create inconsistencies and opportunities for discrepancies in recorded volumes. Miners and traders acknowledged that once manganese is loaded onto trucks, tracking its origin becomes impossible (KII, 2025).

"After we mine, we sell it [...] sometimes we involve agents [...] once it is on the truck, you can't know which ore is whose."

—Mining association representative

Processors typically conduct laboratory testing for grade and moisture content, but these checks focus on commercial value rather than verifying origin. A government respondent highlighted this structural gap:

"We don't have a system that follows the manganese from the ground to the furnace; it only becomes formal when it reaches the plant."

—Government representative

Key informants emphasized that direct tracing of Zambia's manganese into export markets is complicated by in-country shipping logistics primarily controlled by foreign-owned processors and operators, who manage grading, packaging, customs documentation, and freight forwarding. Miners and traders described selling to intermediaries or directly to processors who also act as exporters. Because processors control weighing, testing, and purchasing, they also control the key data points that determine value (KII, 2025).

These mismatches were evident in the field team's comparison of Zambia's export statistics with importer records from China, India, and regional partners. Interviews indicated that incomplete or inconsistent documentation at loading sites, weighbridges, and border posts, combined with ad hoc blending before export, undermines the reliability of recorded export volumes, and creates openings for informal flows, under-declaration, and grade manipulation (KII, 2025).

Miners lack independent mechanisms to verify grade or moisture content, so buyers' laboratory assessments determine final prices. Respondents described a recurring pattern in which processors strategically downgrade ore quality or adjust weight measurements, reducing the amount paid to producers. Limited access to certified testing facilities exacerbates miners' dependence on buyers' assessments (KII, 2025).

Transport practices further influence the integrity of export data. Ore is typically transported in loose bulk loads without sealed bags or labeling, increasing the likelihood of losses, substitution, or blending during transit. Government officials noted that loads pass through multiple checkpoints and weighbridges, yet procedures vary, and enforcement is inconsistent (KII, 2025).

Manganese is transported almost entirely by road, often using foreign-owned fleets that control both intra-land movement and cross-border logistics. The dominance of foreign trucking and export companies places much of the supply chain under private, external control, reducing Zambia's leverage in price formation and export decision-making (KII, 2025).

3.5 EXPORTS

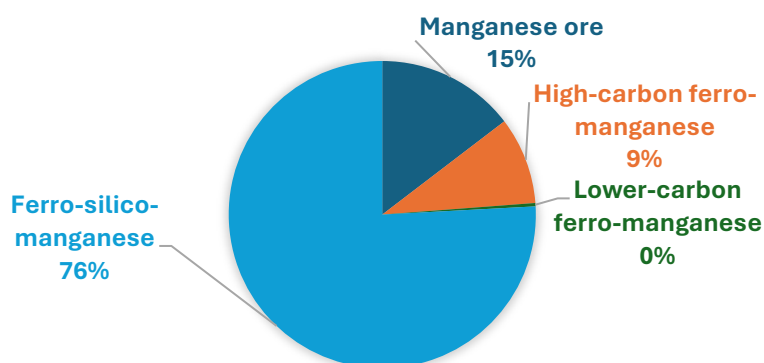
In 2024, Zambia exported manganese in the form of manganese ore (defined as both raw ore and concentrates) and three different kinds of manganese alloys (Trade Data Monitor, 2025).

For export purposes, manganese/iron alloys (ferro-manganese) are classified by carbon content. High-carbon alloys contain more than 2% carbon, and lower-carbon alloys contain less than 2%. Of the two varieties, Zambia has historically exported far more high-carbon ferro-manganese, exporting nearly 26 times more high-carbon alloy than the low-carbon version in 2024. At the same time, Zambia exported nearly eight times more ferro-silico-manganese (a manganese/iron alloy smelted with silicon) than the two ferro-manganese alloys combined, making it by far the country's dominant manganese export (Trade Data Monitor, 2025).

As shown in Figure 3, Zambia's 2024 exports, as reported by importers, consisted of 75.8% ferro-silico-manganese, 14.6% manganese ore, 9.2% high-carbon ferro-manganese, and 0.4% lower-carbon ferro-manganese, by value. Together, these exports totaled \$145,930,521 (Trade Data Monitor, 2025).

Figure 4 presents both a global comparison of major manganese ore and alloy exporters and the primary destination markets for Zambian manganese exports in 2024.

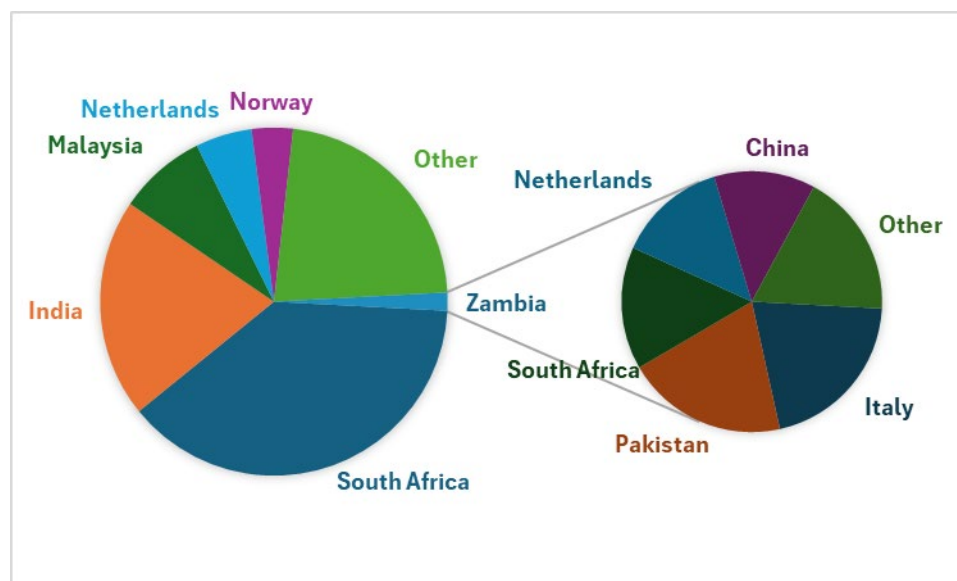
Figure 3. Zambia exports of manganese ore and alloys, by value, 2024



Source: Trade Data Monitor, 2025. Harmonized System (HS) codes: 2602, 7202.11, 7202.19, 7202.30; cost, insurance, and freight (c.i.f.) as reported by importers

Figure 4. Top manganese ore and alloy export markets, by value, 2024

Left: manganese ore and alloy exporting countries; Right: importers of Zambian manganese ore and alloys

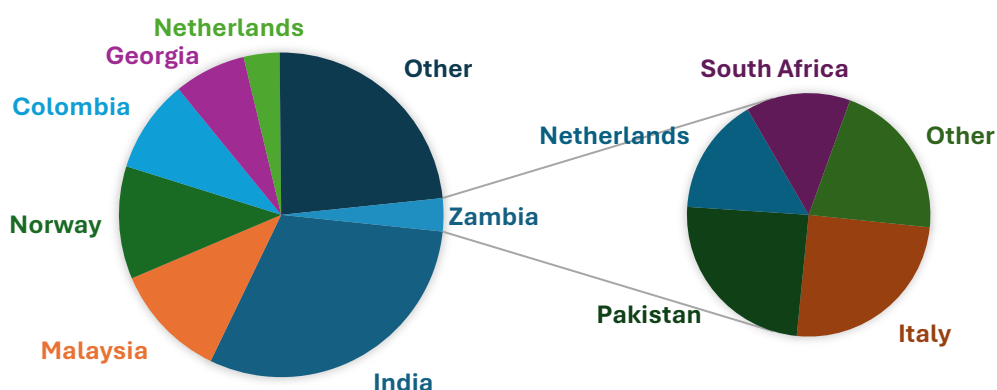


Source: Trade Data Monitor. HS codes: 2602, 7202.11, 7202.19, 7202.30

Zambia exported more ferro-silico-manganese by both value and volume than any other African country in 2024 (Figure 5). It ranked among the world's top 10 exporters, by both value and volume, although its shipments were only about 10% of those from the global leader, India. In 2024, the top destinations of Zambia's manganese alloys (ferro-manganese and ferro-silico-manganese), by value, were Italy (24.4%), Pakistan (23.6%), the Netherlands (16%), and South Africa (13.6%) (Figure 5) (Trade Data Monitor, 2025).

Figure 5. Top ferro-silico-manganese export markets, by value, 2024

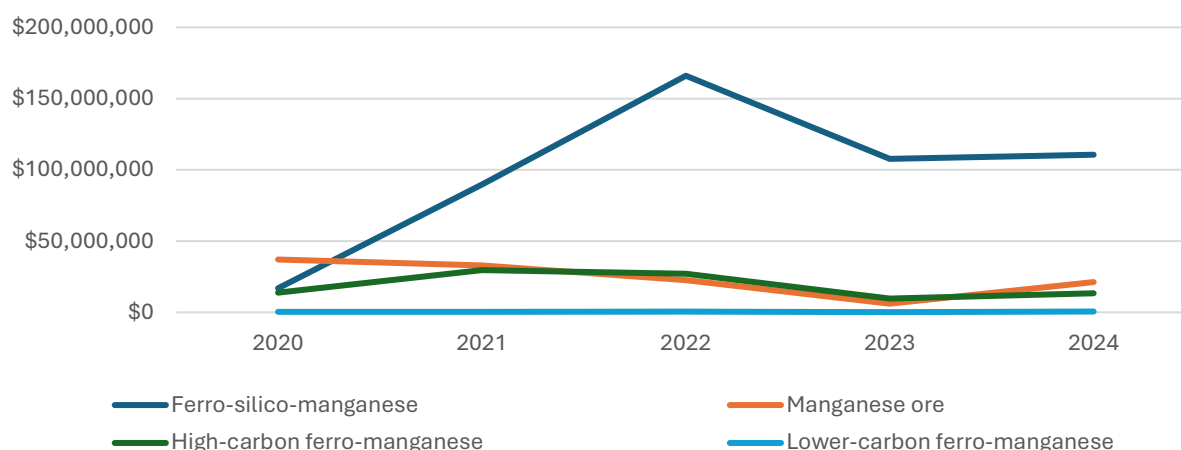
Left: ferro-silico-manganese exporting countries; Right: importers of Zambian ferro-silico-manganese



Source: Trade Data Monitor. HS code: 7202.30

Zambia's ferro-silico-manganese exports have surged in recent years, increasing tenfold in value between 2020 and 2022 (from \$16,894,136 to \$166,039,542), and remaining Zambia's dominant manganese export by value ever since, as shown by Figure 6 (Trade Data Monitor, 2025).

Figure 6. Zambia manganese exports, by value, 2020–2024

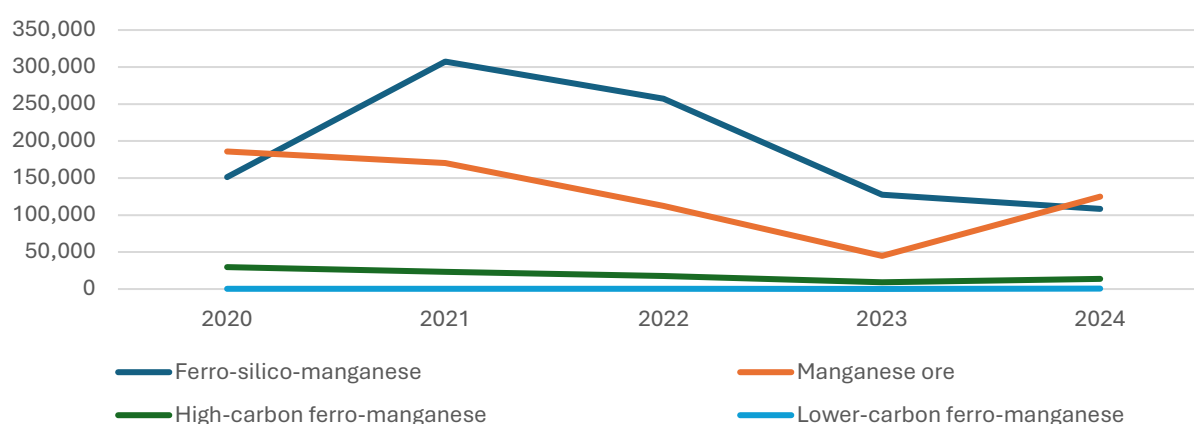


Source: Trade Data Monitor. HS codes: 2602, 7202.11, 7202.19, 7202.30

However, key informants emphasized that the 2024–2025 power crisis had significantly reshaped export flows by disrupting the processing of ferro-silico-manganese and other alloys in Central Province. Energy shortages forced more than 15 smelters in Central Province to shut down, prompting exporters to pivot aggressively toward raw ore to maintain revenue. Interviewees across the provinces reported noting a significant increase in raw ore shipments during periods when smelters were offline (KII, 2025).

This shift reduced Zambia’s potential earnings from higher-value alloys and increased the influence of foreign buyers specializing in raw ore. The power-induced collapse of alloy production also stalled planned expansions in beneficiation capacity, keeping Zambia locked into lower-value export segments (KII, 2025). The trend is more evident in export volumes (Figure 7), as the lower value of manganese ore obscures its relative rise in the value-focused data noted in Figure 6 (Trade Data Monitor, 2025).

Figure 7. Zambia manganese exports, by volume (MT), 2020–2024



Source: Trade Data Monitor. HS codes: 2602, 7202.11, 7202.19, 7202.30

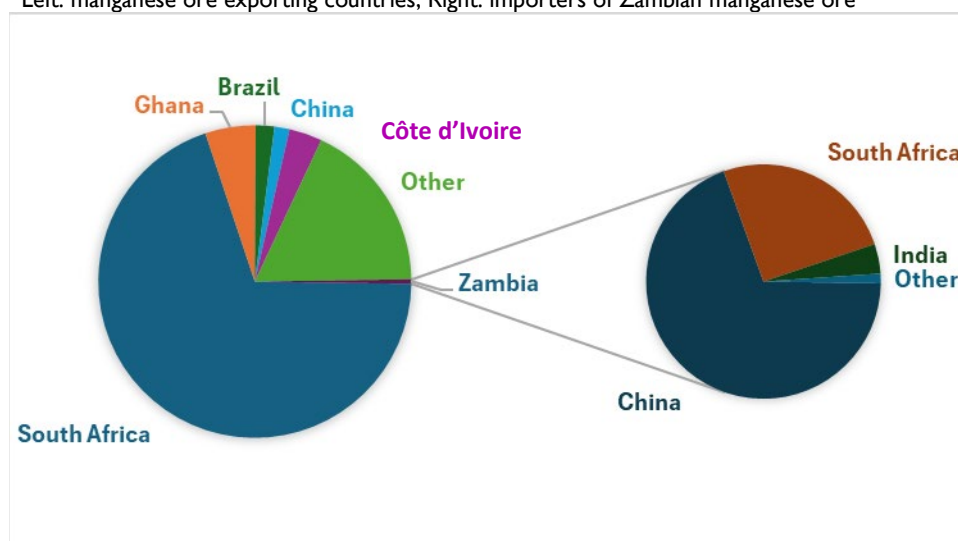
Despite the recent increase in exports of manganese ore, Zambia accounts for very small amount of the world’s exports—only 0.2% of the world’s total in 2025. Zambia’s second largest export destination for manganese ore, South Africa, dominates the sector, exporting 83.5% of the world’s total, followed by Ghana (6.7%) and Brazil (2.3%) (Trade Data Monitor, 2025).

With its own enormous domestic manganese industry, South Africa imports very little ore, but Zambia is its dominant supplier, providing 99.75% of South Africa's imports in 2024, or 53,642 MT, according to South Africa import records (Trade Data Monitor, 2025). Raw ore imports have a high likelihood of being re-exported, because South Africa processes only around 2% of its manganese ore domestically, and exports more ore than it produces (SSY Global, 2025). Compared to its own production of 7.2 million MT and overall exports of more than 21.1 million MT, the portion of ore that South Africa imports from Zambia is tiny (around 0.8% of South Africa's production and around 0.3% of its exports) (Trade Data Monitor, 2025).

In contrast to South Africa, China does not import a large proportion of its manganese ore from Zambia, despite being its top export destination. Zambia's manganese ore represents less than 0.4% of China's imports (Trade Data Monitor, 2025). Most of China's manganese ore comes from South Africa (52.1%), and China is South Africa's top manganese ore export destination (68.7%) (Trade Data Monitor, 2025). Figure 8 depicts the global distribution of manganese ore exports alongside the specific destination markets for Zambian manganese ore.

Figure 8. Top export markets by percentage for manganese ore, by value, 2024

Left: manganese ore exporting countries; Right: importers of Zambian manganese ore



Source: Trade Data Monitor. HS code: 2602

China is home to several industries that rely on large amounts of manganese, with steel being the largest of those. Despite a slight decline in steel production over recent years, China is projected to be the world's largest producer of steel at 964 million tons in 2025 (Reuters, 2025). China's steel exports have also surged recently due to an oversupply for domestic consumption, with export volumes reaching 110 million tons in 2024 (IISS, 2025). The production of steel alloys containing manganese requires significant quantities of high-quality manganese.

Manganese is also critical to China's fast-growing electric vehicle (EV) industry, which uses manganese to stabilize EVs' lithium-ion batteries. Manufacturers worldwide produced 17.3 million EVs in 2024 (a nearly 25% increase over 2023), and more than 70% (12.4 million) of these vehicles were made in China. This demand is expected to grow as EV adoption accelerates worldwide, making manganese one of the most strategically important minerals for clean energy technologies (IEA, 2025).

4 LABOR FINDINGS

This study identified forced labor as a significant concern in Zambia's artisanal and small-scale manganese sector. Among 127 workers surveyed (76 in Luapula and 51 in Central Province), 45% (57 workers)

experienced forced labor, meeting the ILO definition by experiencing both involuntary work and coercion during the same stage of employment. Rates of forced labor varied by employment arrangement: workers employed by subcontractors faced a 74% forced labor rate, more than double the 34% rate among those employed directly by site owners, and workers without any contract experienced forced labor at 62%, compared to 35% among those with written contracts. The even higher proportion of workers experiencing indicators of involuntary work alone (79%) suggests that exploitative conditions extend well beyond confirmed forced labor cases. The following sections detail how these patterns manifest across recruitment, working conditions, wages, and coercive practices in the sector.

This section begins by presenting the demographic characteristics of survey respondents. It then explores workers' reports of recruitment pathways, types of contracts, working and living conditions, exposure to occupational hazards, provision of safety equipment and training, earnings and payment systems, and work schedules, drawing from both qualitative and quantitative data. The section then presents findings regarding the presence of forced labor, presenting quantitative indicators of involuntary work and coercion, and discusses how these manifest in the sector. Finally, the section addresses the presence of child labor.

Missing responses ("don't know" and "refused") are excluded from the denominator for all estimates. Each row presents both an estimate and the numerator, denoted by "n," associated with the estimate. The denominator, denoted by "N," is included at the bottom of tables in which all rows have the same denominator, and it is presented in the final column of the row in tables in which rows have varying denominators (due to question filters).

4.1 CHARACTERISTICS OF SURVEY RESPONDENTS

Respondent demographic characteristics are provided in Table 5. Respondents ranged in age from 18 to 63 years old, with an average age of 35 years. The vast majority (94%) of respondents were male, with only 6% female, reflecting the male-dominated nature of manganese mining work.

Most (97%) were born in Zambia, and 3% were born in India. About half of Zambian-born respondents were born in the main manganese-producing areas of Luapula (24%) and Central (25%), and the remaining were originally from outside the main manganese-producing areas, including Copperbelt (20%), Eastern (7%), Lusaka (7%), Northern (6%), Southern (5%), Muchinga (3%), and Western (3%). More than three-fourths (78%) of respondents relocated to take their job in manganese mining.

Nearly one-fifth (17%) of respondents had not completed primary school (only some primary education), 15% completed primary school, and more than two-thirds (68%) completed some schooling beyond primary school, with 31% having some secondary education and 37% having completed secondary school or higher.

Table 5. Respondent background characteristics

	%	n
Age (years)		
18–24	13%	16
25–39	54%	69
40–54	28%	36
55+	5%	6
Sex		
Male	94%	120
Female	6%	7
Education		
Some primary	17%	22
Completed primary	15%	19

	%	n
Some secondary	31%	39
Completed secondary or higher	37%	47
Country of birth		
Zambia	97%	123
India	3%	4
Relocated for job		
Yes	78%	99
No	22%	28
Number of respondents (N)		127

These findings resonate with those from qualitative worker interview respondents, which show that workers originated from various parts of Zambia, with the majority from other provinces (13 participants), followed by Luapula Province (8 participants) and Central Province (3 participants). This distribution reflects the internal migration patterns associated with employment in manganese mining, in which many workers relocate from other regions to mining sites in Luapula and Central Provinces. Most workers relocated to Central and Luapula Provinces primarily for employment in manganese mining, and a few moved for farming or other personal reasons. Their movement was often motivated by the search for better livelihood opportunities, job opportunities, or income replacement after losing work in other areas.

Table 6 shows the primary manganese activities of survey respondents, which align with the stages of manganese production described previously in Section 3. The primary work activity was driving or transportation related to the mine (18% of respondents). This was followed by sorting or crushing (13%); servicing or repairing machinery (10%); drilling, blasting, and trenching to access ore (9%); washing and gravity separation (7%); ore excavation (7%); supervising (5%); and security (4%). Respondents reported a wide variety of other primary activities, including pump operator, welder, fuel attendant, and inventory officer. The occupational distribution in this sample likely overrepresents skilled and semi-skilled positions, such as drivers, machinery operators, and supervisors, relative to the sector overall, in which manual sorting, crushing, and excavation typically comprise a larger share of the workforce. This skew reflects the sample's concentration at better-resourced, foreign-invested operations that remained active during the power crisis; smaller and locally owned sites, in which manual extraction labor predominates, were disproportionately shut down during the fieldwork period and thus underrepresented in the sample.

Nearly all respondents (99%) were employed by an employer, referred to as “employed” in this report, and only 1 respondent (1%) was self-employed. About two-thirds (65%) were employed by site owners (65%) and one-third (31%) by subcontractors.

Table 6. Job characteristics

	%	n	N
Primary manganese activity			
Driving or transportation	18%	23	127
Sorting and/or crushing	13%	16	127
Servicing and repairing machinery	10%	13	127
Drilling, blasting, and trenching to access ore	9%	11	127
Washing and gravity separation	7%	9	127
Ore excavation	7%	9	127
Supervising	5%	6	127
Security	4%	5	127
Other work related to manganese	28%	35	127

	%	n	N
Works for employer or self			
Employer	99%	126	127
Self	1%	1	127
Boss is...			
Site owner	65%	82	126
Subcontractor	31%	39	126
Other	4%	5	126

Regarding supervisory responsibilities, one-third (33%) of respondents indicated that they were the boss of other workers, suggesting a mix of entry-level and supervisory positions among the sample. All respondents reported still having their jobs at the time of the survey, with job start dates ranging from 2008 to 2025. About a third of workers (32%) had started their current position in 2024, with an additional 14% starting in 2025, indicating relatively recent entry into the workforce at their current sites.

4.2 NATURE OF WORKING AND LIVING CONDITIONS

4.2.1 Recruitment

The survey explored the pathways to respondents' jobs to determine whether deceptive recruitment occurred. Recruitment into Zambia's manganese mining sector is characterized by informality, lack of regulatory oversight, and reliance on social networks. Labor experts confirmed that job vacancies are rarely advertised. As one government official observed:

"I think there is no [...] I've never seen an advert, apart from Kabundi Resources, who advertise. These other mines just employ anyone who goes there. As long as you can dig or you can sort out the manganese, they employ just like that. There is no advert, per se."

—Government representative

This informal, unregulated recruitment system operates largely without worker registration, formal contracts, or job-related identity records. The informality appears driven by both economic desperation among workers seeking employment and employers' desire to minimize administrative burdens and regulatory compliance.

4.2.1.1 Recruitment Channels

Survey data revealed that nearly half (47%) of respondents received help obtaining their manganese mining jobs, primarily from friends (60% of those helped) or family members (32%). Qualitative interviews reinforced the central role of social networks in connecting workers to employment opportunities. Most workers reported hearing about jobs from friends, relatives, or former coworkers. In many cases, these networks functioned as informal recruitment channels, with acquaintances encouraging individuals to apply or directly linking them to employers.

Workers also pursued self-initiated pathways, personally inquiring about vacancies at mining sites. Only one participant mentioned learning about a vacancy through an advertisement (shared on WhatsApp), suggesting minimal use of formal advertising channels.

Some key informants reported that certain mine owners prefer recruiting workers from outside the province to minimize workers' movements between the site and their homes, effectively confining workers to work sites:

"[The mine owner] actually got these people from far places so that they just concentrate on working [...] they are confined to a work site."

—CSO representative

Despite the overall informality, many workers noted being interviewed either in person or by phone before hiring, suggesting that some vetting procedures exist. However, cases of workers being hired without any interview process were also reported.

Key informants described concerning recruitment practices at some operations, in which workers were randomly selected from public spaces with no documentation or accountability:

“We had a challenge backwards [before] where one of the mines would just park a very big truck by a town area [...] and make an announcement that there is work opportunity at the mine, and people would just flock into that. The aged, the pregnant, the women, the children. [...] They all get into the truck.”

—CSO representative

“We have also witnessed cases where a person comes into town and takes people out into the field, and an accident happens. And there is no one that the family can even engage because they don’t know who employed these people.”

—CSO representative

4.2.1.2 Contracts and Deceptive Recruitment

Zambian law requires employers to maintain records of employment contracts. The Employment Code Act of 2019 (Part III, Section 22) mandates written contracts for employment lasting six months or more. However, compliance with these legal requirements varies widely across the manganese sector.

According to the survey, almost half (48%) of employed workers had written contracts, 36% worked under verbal agreements, and 17% had no contract at all (Table 7). The relatively high proportion of written contracts, compared to other ASM settings, may be because mainly larger and better-resourced operations have been able to continue operating during the power crisis, as noted in Section 2.2.4, Challenges, Limitations, and Lessons Learned.

Table 7. Recruitment among employed workers

	%	n	N
Contract/agreement			
Written contract	48%	60	125
Verbal agreement	36%	45	126
None	17%	21	126
Conditions of job do not match promises	30%	34	113
Conditions not matching promises¹			
Earnings	79%	27	34
Living conditions	38%	13	34
Hazards (including lack of PPE)	35%	12	34
Work tasks	24%	8	34
Hours	24%	8	34
Nature of the job	9%	3	34
Job location	3%	1	34
Legality of work	3%	1	34
Employer	3%	1	34
Other	12%	4	34

¹ Multiple responses possible

Qualitative findings presented a less formal picture. Most interviewed workers reported operating under verbal agreements not backed by any records, or no agreements at all. Only a few reported having written contracts. Key informants consistently described employment arrangements as highly informal:

“The typical is that there are no contracts.”

—Government representative

Among workers who did have written contracts, few reported being allowed to read and keep copies, suggesting low compliance with labor law provisions requiring workers to receive and retain employment documentation. Workers also noted that contracts are almost always written in English, and their ability to understand terms depends entirely on whether someone explains the contents to them. One government representative explained:

“When they explain [...] I think they do understand, unless when they are not explained to. That’s when they just sign [...] because it was not explained to them.”

—Government representative

More than one-quarter (30%) of employed survey respondents indicated that the conditions of their job did not match what they were promised before taking the position. Among those experiencing unmet promises, the most common area of discrepancy was earnings (79%), followed by living conditions (38%), hazards (including the failure to provide promised PPE) (35%), work tasks (24%), and hours worked (24%). Workers reported being told they would receive PPE regularly (e.g., every six months), but these promises were not consistently fulfilled, with some workers going nearly a year without receiving new safety equipment.

Qualitative interviews reinforced these findings. A few workers reported that promises made during recruitment had been fulfilled, but most described significant discrepancies between their contracts or agreements and actual working conditions.

“At first, I was promised that they would pay, they’ll keep on paying me every month, 5,000 Kwacha [\$221]. But for the 5,000 Kwacha, I’ve never received it up to now. I’m just receiving this salary in half, 1500 [\$66], 2300 [\$102] [...] I’ve never received a full 5,000 [\$221] salary, nothing.”

—Manganese worker

“Yes, I feel I was tricked because the explanation I was given when I came here differs from what is happening now. For example, I receive less money than I was promised. Living conditions are also very poor. We sleep in tents, which is okay, but the sanitation I am exposed to is very bad. We get water from the pits, obviously mixed with silica, which may not be safe for us as workers.”

—Manganese worker

Key informants confirmed awareness of these issues:

“We are aware of cases where people have worked, and they expected certain things, which were not honored.”

—Government representative

Labor experts observed that the challenges are particularly acute at locally owned artisanal and small-scale mines:

“The challenge now is with the artisan and small-scale miners for our local people, mainly owned by Zambians. This is where you find that the people are not working with any form of social or any form of contract. So, there isn’t, you can’t even call them workers because today they’ll come, tomorrow they won’t.”

—CSO representative

Most qualitative interviewees said that they would not have taken jobs in manganese mining if they had known about the poor and unsafe conditions. Their reasons included lack of protective gear, health dangers, and broken promises about pay and safety equipment:

“If it were something known from the beginning, you wouldn’t find yourself in these situations because you would know that this would put your health at risk.”

—Manganese worker

“No, I would not have taken it. Before starting, they said we were going to be receiving PPE such as safety boots and work suits, but I have never received that.”

—Manganese worker

A smaller number said that they would still have taken the job, mainly because of poverty, unemployment, and lack of other options:

“Because of poverty and the need to provide for my family, I would have, since it is better than being unemployed.”

—Manganese worker

One worker emphasized that accepting the work was a matter of circumstance rather than choice, saying that they had already “found themselves in it” and could not leave despite the risks:

“Taking the job, like I earlier stated, was only circumstantial [...] you literally have no option but to continue because there isn’t much you can do.”

—Manganese worker

4.2.1.3 Link Between Fragmented Ownership Structures and Vulnerability to Deceptive Recruitment

The fragmented and opaque ownership structures in Zambia’s manganese ASM sector contribute directly to workers’ vulnerability to forced labor. When mining operations are controlled by foreign investors through informal subletting or fronting arrangements, with Zambian license holders serving only as nominal owners, accountability for labor conditions becomes difficult to determine. Workers may be recruited by subcontractors operating on behalf of undisclosed foreign principals, employed under verbal rather than written agreements, and have no clear recourse when wages are withheld or working conditions become abusive.

The widespread occurrence of unlicensed operations exacerbates these risks. Workers at informal sites operate entirely outside regulatory oversight, with no formal employment relationships, no access to labor inspections, and no mechanism for reporting violations. Key informants reported that ASM operations are often subjected to a kind of informal layered “taxation” by traditional authorities, village headmen, and intermediaries—all of which reduce already thin profit margins and create pressure to reduce labor costs through exploitative practices.

Workers are recruited into Zambia’s manganese sector through varied channels that reflect the fragmented ownership landscape. At sites in which foreign investors operate through joint venture or subletting arrangements with Zambian license holders, recruitment may be conducted by either the nominal Zambian owner, the foreign operator, or third-party subcontractors. This creates confusion about who serves as the actual employer and who bears responsibility for labor conditions.

At unlicensed or informal operations, recruitment often occurs through word-of-mouth networks in surrounding communities. Artisanal miners may recruit family members and neighbors for manual sorting work, paying piece rates per MT of ore sorted. One researcher described this practice at larger operations:

“The way most of these bigger mines operate is such that [...] they will engage these villagers, the boys and girls, some of them, those which are actually underage, women and underage children, to sort the rocks [...] I will just tell you, you go in the pit, start sorting the stones and start buying them. And then I will be buying from you. For every [MT] that you sort, I buy it at, for instance, 10 kwacha [\$0.44].”

4.2.2 Hazardous Work

Most survey respondents (81%) indicated that their work involves risks to their health or safety (Table 8). The most common was exposure to dust or strong fumes (73%), reflecting the pervasive nature of airborne particulates in manganese mining and processing operations. This finding aligns with

qualitative observations from throughout the supply chain, with dust exposure occurring at extraction sites, during transport of loose ore, and at processing facilities.

Nearly half (41%) of respondents reported excessive noise as a hazard, likely associated with the use of heavy machinery, drilling, and blasting activities common in manganese extraction. Twenty-two percent described risks from working with dangerous or sharp tools or heavy machinery. Extreme heat was reported by 15% of respondents, particularly relevant for those working near smelting operations, and 10% reported carrying unreasonably heavy loads. Other hazards included dangerous chemicals, sharp rocks and particles underfoot, poor sanitary conditions, water accumulation in mining pits, electrical hazards such as exposed cables, risks during blasting operations, and security threats including robberies and armed attacks at mining sites. One respondent specifically noted the lack of PPE as a hazard in itself, underscoring how the absence of safety measures compounds existing dangers.

Table 8. Exposure to hazards

	%	n	N
Work involves risks to health or safety	81%	103	127
Type of risk to health or safety¹			
Dust or strong fumes	73%	93	127
Excessive noise	41%	52	127
Dangerous or sharp tools or heavy machinery	22%	28	127
Extreme heat	15%	19	127
Carrying unreasonably heavy loads	10%	13	127
Dangerous chemicals	7%	9	127
Tunnel collapse	1%	1	127
Other	12%	15	127
Ever hurt or sick because of job	32%	40	127
Main types of injury or illness¹			
Injury or swelling in hands	25%	10	40
Malaria	25%	10	40
Dust, smoke, or chemical damage to lungs	18%	7	40
Injury to knees or legs	15%	6	40
Injury to ankle or feet	10%	4	40

¹ Multiple responses possible

Labor experts described varying perceptions of risk across different roles in the sector. Some perceived the physical risks of manganese work as limited, especially for those engaged only in washing or sorting, and others highlighted substantial health, safety, and environmental hazards stemming from the lack of protective equipment, training, and regulatory oversight:

“Manganese [...] when you open it up [...] forms like a pollutant [...] acid rain [...] people may be getting sick, and we don’t have evidence to affirm it.”

—CSO representative

A government representative described challenges in accessing artisanal and small-scale miners for training and service provision:

“Most of these artisanal and small-scale miners [...] were not formalized [...] so, it became a challenge even when it comes to offering occupational health and safety services. Because of this, you know, when they are not formalized, they are not organized; they are found everywhere. Today they are here, the following day they are relocated to another place.”

—Government representative

4.2.2.1 Work-Related Injuries and Illnesses

One-third (32%) of survey respondents reported experiencing job-related injuries or illnesses (Table 8). This rate may underestimate the true rate of occupational health problems, as workers in informal employment situations may not recognize or report chronic conditions, and some injuries may not manifest until after employment ends.

Among those who reported work-related health problems, the most common issues included injury or swelling in hands (25%); dust, smoke, or chemical damage to lungs (18%); injury to knees or legs (15%); and injury to ankles or feet (10%). One-fourth of respondents reported malaria, reflecting the health challenges that workers face in mining regions due to environmental conditions and inadequate housing. While not directly caused by mining operations, malaria risk is exacerbated by poor living conditions at remote mine sites.

The reported causes of injuries and illnesses included exposure to dust and fumes, falling rock, working with dangerous tools, carrying heavy loads, accidents from machinery, slipping, and exposure to mosquitoes.

Labor experts attributed work-related injuries to the conditions of work and lack of PPE:

“If you are hammering rocks, you have blisters [...] you have all sorts of injuries in your hands. If you don’t have shoes, you are stepping on rocks, and rocks are falling on you, you have all sorts of cuts and everything.”

—Government representative

Six percent of employed workers reported that their employers require them to work when seriously sick or injured. While this percentage is relatively low, it represents a serious violation of worker rights and may also discourage workers from reporting injuries or illnesses.

4.2.2.2 Manganese-Specific Health Risks

Manganese exposure poses documented health risks that are particularly relevant to mining operations. Research on occupational and environmental exposure to manganese mining has identified neurological toxicity as the primary health concern. Studies have reported cognitive impairment, muscle weakness, gait instability, tremors, impaired motor control, hearing loss, memory problems, and Parkinson’s disease-like symptoms among exposed populations. Psychiatric symptoms, including emotional instability, disorganization, manic symptoms, and hallucinations, have also been documented (Brown et al., 2024). Respiratory effects, although less commonly reported for manganese than for other mining metals, have also been documented (Brown et al., 2024). Children face disproportionately increased risks from manganese exposure (Brown et al., 2024).

The survey incorporated a validated Parkinson’s disease screening tool (Duarte et al., 1995). Nine percent of respondents reported one of these indicators, 2% reported two indicators, 3% reported three indicators, 1% reported four indicators, and 2% reported five indicators.⁹ Eighty-three percent reported no indicators, and none met the threshold for a likely Parkinson’s diagnosis. However, the absence of symptoms does not guarantee safety, as manganese-related illnesses often develop gradually with prolonged exposure.

Workers interviewed for this study clearly recognized dust as a primary hazard. When asked about the most dangerous aspects of manganese mining work, one worker stated:

⁹ Ten percent reported having trouble rising from a chair, 6% poor balance, 6% feet freezing in doorways, 4% arms and legs shaking, 3% handwriting smaller than previously, 3% face less expressive than previously, 2% voice softer than previously, and 1% shuffling footsteps.

“Well, dust. There’s too much dust here. And manganese itself, it has got a very high toxicity. Yes. So, it needs to be, when you are working there, you need to protect yourself.”

—Manganese worker

The labor-intensive nature of artisanal operations amplifies exposure risks. At artisanal sites, many miners rely on picks and shovels, with community members, including women and sometimes children, engaged to sort ore by hand after excavators break the rock. A journalist researcher described how this production model creates extensive dust exposure:

“Most people just use picks and shovels [...] [larger operators] break the rocks [...] then engage these villagers [...] to sort the rocks [...] every ton that you sort, I buy it from you at 10 kwachas [\$0.44] [...] they basically just work without any protective clothing [...] some of them are even getting now affected [...] getting manganese poisoning.”

—Mining journalist

Despite the documented risks of manganese exposure, systematic medical surveillance is largely absent in Zambia’s artisanal and small-scale manganese mining sector. Key informants generally felt uncertain about specific manganese-related diseases among workers, with several noting that they had not received formal reports of manganese toxicity:

“So far I haven’t heard anything, any related health issues from mines.”

—Government representative

Some labor experts acknowledged observing clear work-related symptoms, such as skin damage, coughs, and injuries, but could not confidently attribute these to manganese exposure specifically rather than general mining conditions.

“You have all these [...] cough [...] blisters [...] all sorts of injuries in your hands [...] cuts [...] that would be related to the activity, but I’m not so sure about chemically associated with the manganese itself.”

—Government representative

This study located a number of media reports on manganese poisoning (see, e.g., Makanday Centre for Investigative Journalism, 2024; Makanday Media, 2023, 2024; Sinkala, 2023), but these were neither denied nor confirmed by relevant officers interviewed, stating that bosses in the headquarters or other departments were better placed to respond to questions related to manganese poisoning. This uncertainty reflects a broader gap in health monitoring infrastructure. Unlike LSM operations in which workers undergo pre-employment and periodic health screenings, comparable systematic testing appears absent in the manganese ASM sector:

“For the manganese mines, I’m not aware of what they’ve even put in place, or if they check for those certificates before one is employed.”

—International NGO representative

4.2.2.3 Management of Illness and Injuries and Access to Medical Care

Formal mechanisms for managing work-related illness and injury exist in Zambian law, including registration with workers’ compensation schemes and the National Health Insurance Management Authority (NHIMA). However, these systems are unevenly implemented and often ineffective for ASM workers.

Labor officers explained that inspections require registration with workers’ compensation to support workers when injuries occur:

“We make sure that they register with workers’ compensation for the safety and protection of the workers.”

—Government representative

However, several participants described significant challenges with national health insurance implementation and limited practical coverage for workers:

“Each and every company is supposed to register its workers with NHIMA [...] but workers [...] say, ‘NHIMA does nothing [...] they won’t attend to us.’”

—Government representative

“If you’re not covered with NHIMA, if you’re not covered with workers’ compensation [...] you’ll fend for yourself.”

—Government representative

Workers further reported challenges with access to medical care when they needed it, with some indicating that they hardly get adequate time to recuperate even when it has been recommended by health workers.

“We get harassed. Even when you are not feeling well, you present a sick note, but they do not follow the days on the sick note. They will give you days of their choice. For example, if the number of days on the sick note is four, they will only allow you to rest for two days. If you do not report for work after two days, then money will be deducted from your salary, and they will pay you any amount they want.”

—Manganese worker

Geographic barriers compound these access problems. Workers in remote mining areas face substantial travel distances to reach medical facilities. One informant estimated that miners in their district must travel 50–65 kilometers to access care, as no clinics exist at mine sites:

“They don’t have [medical care] there [...] to the hospital it’s about 50 kilometers [...] if we use the other route, it’s about 65 [km].”

—Government representative

The combination of absent medical surveillance, ineffective insurance coverage, and limited geographic access to healthcare creates a system in which manganese-related health problems are likely to go undetected, unreported, and untreated. Workers who develop chronic conditions from manganese exposure may not receive timely diagnosis or appropriate care, and the true extent of occupational disease in the sector remains unknown.

4.2.2.4 Employer Failure to Mitigate Risks

The prevalence of hazardous conditions reflects both the inherent dangers of manganese mining and processing operations and systematic failures by employers to implement adequate safety measures. Working in manganese mining is inherently hazardous, and employers have an obligation to mitigate risk wherever possible. The failure to mitigate risk constitutes an indicator of involuntary work with regard to hazardous or degrading working conditions, as discussed in Section 4.3.3 on forced labor indicators.

As shown in Table 9, 66% of employed workers indicated that their employer endangered their lives by failing to take proper safety precautions. This extraordinarily high rate suggests that even when some protective equipment is provided, broader safety measures and workplace protocols are often inadequate or absent. Half (52%) reported that their employers did not provide the training needed to perform their jobs safely. This lack of safety training leaves workers unprepared to recognize hazards, use protective equipment properly, or respond to emergencies. One-fourth (26%) reported that their employers did not provide the PPE needed to perform the job safely. This figure likely understates the problem, as it reflects only those who explicitly identified lack of PPE as an issue, not the overall quality or appropriateness of equipment provided.

Table 9. Mitigation of risk among employed workers

	%	n
The employer endangers the respondent's life by failing to take proper safety precautions	66%	83
The employer does not provide the training needed to perform the job safely	52%	66
Employer does not provide the PPE needed to perform the job safely	26%	33
Number of respondents (N)		126

All respondents were asked what types of protective gear they generally wear while working, whether provided by the employer or procured themselves. Hard hats or helmets (73%) and respirators or dust masks (72%) were the most commonly worn items, followed by gloves (63%). Nearly half of workers wore coveralls or protective clothing (46%) and earplugs or hearing protection (48%). Fewer workers reported wearing work boots (35%) or goggles or other eye protection (17%). Notably, 19% of respondents reported not wearing any PPE.

The relatively high rates of hard hat and respirator use may reflect recent efforts by some larger operators to improve safety practices, or workers' self-procurement of basic equipment. However, the low usage of eye protection (17%) and work boots (35%) is concerning, given the reported hazards of sharp particles and rocky terrain. The inconsistent PPE provision and usage patterns suggest that safety measures are neither systematically enforced nor adequately resourced across the sector.

These findings mirror qualitative interviews with workers, in which many indicated that they had not received any training on occupational safety and health, nor were they issued with complete and quality PPE.

"No. I must provide that myself or work without safety clothing. No helmet, no safety boots, no work suits, and no earplugs."

—Manganese worker

Some workers reported that PPE was only provided during visits from the Ministry of Labor officers. This suggests that certain employers viewed PPE primarily as a compliance measure rather than a critical safeguard for worker safety.

"No. I work without protective clothing. No helmet, earplugs, and no overalls. Safety boots are not provided. We only see these things when people from the Department of Labor are doing inspections. Once they go, they grab them back."

—Manganese worker

Some workers who were issued PPE complained about the quality, insufficiency, and delayed replacement of worn-out PPE. Others reported receiving rubber gum boots in place of quality safety boots.

"[...] After that they gave us helmets, gloves, and work suits. They refused to give us safety boots. When we asked about it, they said that whoever wanted such should go and buy for themselves. [...] We used PPE most of the time but sometimes in very bad condition as we waited for another one. [...] Sometimes we would use damaged PPE for months waiting until they give you another one."

—Manganese worker

4.2.2.5 Environmental Management and Safety Failures

Environmental management failures in the manganese supply chain have direct implications for occupational safety, supply chain integrity, and community well-being. Although Zambia's environmental regulations require environmental impact assessments, site-specific management plans, and periodic monitoring, key informants described inconsistent enforcement and highly variable compliance across the sector.

“Zambia Environmental Management Authority inspects. At some point, ZEMA closed one of the local mines I was working at, for not complying with the regulations. ZEMA is the only one I know.”

—Manganese worker

At extraction sites, particularly in Luapula Province, artisanal and small-scale operations often lack the capacity to implement environmental controls. Respondents noted that many pits operate with minimal oversight, limited waste management, and no structured land rehabilitation plans. Several described shallow open pits left uncovered, informal washing points near rivers, and community members sorting ore without protective equipment—practices that increase dust exposure, runoff risks, and contamination of water sources.

“[...] The environmental aspect does not only affect workers but also communities. We’ve been to Mwale village where there was a mine that had an exploration license. So, in the process of opening up for exploration, the community had been left like that. And the people are living just next to the pits. [...] In other areas, people will just dig anywhere and everywhere. And most of these people say they cannot afford geological reports, the information. So, it’s more like on a trial-and-error basis that they are opening these areas. So, you find that most of these mining areas have dangerous pits. And the pits are left unattended. So, during the rainy season, they’re a hazard.”

—CSO representative

Water management practices vary widely. Some operators use basic settling ponds to manage wastewater, and others discharge directly into waterways. One miner described their method:

“We don’t add any chemicals [...] we use the filtration method [...] then the water goes back to the river.”

—Manganese miner and trader

Even when chemical-free, repeated discharge of sediment-rich water can degrade local ecosystems and affect downstream communities that may rely on these water sources.

Processing plants pose more severe environmental risks due to high temperatures, dust emissions, slag disposal, and effluents produced during ferro-alloy production. Transport creates additional environmental and occupational exposure risks. Loose loading of raw ore into open trucks—now common following the decline of bagging practices—leads to dispersal of manganese dust along major transport corridors. Respondents noted visible dust trails, spillages at loading points, and limited controls at weighbridges and checkpoints. These issues pose health risks for nearby communities and truck drivers, while complicating traceability as spilled or repackaged ore may re-enter the chain informally.

Power shortages have introduced new environmental and safety challenges. When smelters shut down, companies shifted labor to activities such as stockpiling, manual sorting, or crushing, often without adequate dust control or waste management systems. These improvised operations occur outside the environmental management plans approved by ZEMA, increasing unmonitored environmental impacts and worker exposures.

Across the supply chain, interviewees highlighted weak coordination between regulatory agencies. ZEMA conducts periodic inspections, but limited staffing, wide geographic coverage, and the rapid proliferation of manganese sites constrain the effectiveness of oversight. As a result, many operations proceed with outdated, incomplete, or poorly implemented environmental plans. Companies that comply with environmental regulations expressed frustration that non-compliant operators continue to function with limited consequences, undermining fair competition and creating uneven safety standards across the sector.

4.2.3 Work Schedules

Extended working hours are common among manganese mining workers in Zambia. Although the Employment Code Act No. 3 of 2019 limits the standard work week to 48 hours, survey data reveal that many workers regularly exceed this threshold. On average, respondents work 48 hours per week, with 10% working 49 to 60 hours, and 17% working more than 60 hours weekly (Table 10).

Table 10. Average hours worked

	%	n
Weekly hours		
Fewer than 40	14%	18
41–48	59%	75
49–60	10%	13
More than 60	17%	21
Days per week		
5 or fewer	5%	6
6	77%	98
7	18%	23
Number of respondents (N)		127

More than three-quarters (77%) of respondents reported that they generally work 6 days per week, and 18% of respondents reported regularly working 7 days per week. Only 5% of workers have a 5-day work week or work fewer days, indicating that most manganese workers have extremely limited time off for rest and recovery.

This schedule creates cumulative fatigue and leaves workers with minimal opportunity to recuperate from the physical demands and hazardous conditions of mining work. Long work weeks of six or seven days restrict workers from meeting family obligations, continuing their education, or pursuing other income sources.

Four percent of employed workers reported having to work nonstop without breaks during the workday. This finding may understate the problem, as it captures only those workers who must work completely without breaks, not those whose break periods are inadequate or irregularly provided.

4.2.3.1 Variations in Working Hours by Payment System

Labor experts reported that working hours in artisanal and small-scale manganese mining are often unregulated and vary significantly, depending on whether workers are paid by time or by output. The legal standard is 8 hours per day or 48 hours per week, but actual hours frequently diverge from this requirement.

Workers on time-based payment arrangements typically work shifts of 8 to 10 hours per day. However, those paid on piece-rate systems often work substantially longer hours, starting early in the morning and continuing until physically exhausted to meet production targets or maximize earnings.

This pattern reflects how piece-rate compensation systems can incentivize workers to extend their hours beyond safe or sustainable levels, effectively shifting the burden of productivity demands onto workers themselves rather than requiring employers to maintain adequate staffing levels or reasonable production targets.

4.2.3.2 Overtime Work

Overtime work varied considerably across mining sites. Some workers reported occasional or regular extended hours, and others said that they rarely or never worked beyond normal time. Overtime was primarily linked to production demands, equipment breakdowns, or late truck arrivals for loading operations:

“Mostly it is when some machines were down, affecting work, so when they are repaired, you get to do some overtime to recover, and we are always paid for that.”

—Manganese worker

Labor experts confirmed that overtime is common in the sector, particularly when production demands are high. Practices regarding overtime compensation varied widely, with some workers receiving payment and others working extended hours without additional compensation. Among workers who reported receiving overtime pay, the terms and calculation methods were often unclear:

“They add a K240 [\$11] to the full salary for overtime [...] I don’t know how they compute it; I just see the money reflecting on payday.”

—Manganese worker

Other workers reported unpaid overtime and faced threats when they raised complaints about compensation:

“We did overtime at least once a week and they never paid us [...] when we asked about it, we were shouted at and threatened to be fired.”

—Manganese worker

Labor experts confirmed that unpaid overtime is a common problem in the sector:

“Overtime [...] is common and they don’t [get paid].”

—Government representative

4.2.3.3 Ability to Refuse Overtime

Workers’ experiences with their ability to refuse overtime varied dramatically across mining sites. Although a handful of workers could decline overtime freely, many described implicit or explicit pressure to comply, driven by power imbalances, job insecurity, and economic precarity.

At some mining operations, overtime appeared genuinely voluntary, with workers describing that they could decline without facing consequences:

“Yes, if you want, you can refuse to work overtime and they allow.”

—Manganese worker

However, these accounts represent a minority of workers’ experiences. More commonly, workers described environments in which overtime was effectively compulsory, and refusal risked dismissal or other negative consequences:

“No one could turn down overtime. If you turn down, they will say you are not obedient, so they will fire you.”

—Manganese worker

Government officials confirmed that dismissal for refusing overtime is a real and documented problem in the sector.

Even when overtime is not explicitly mandatory, economic pressures often compel workers to accept additional hours. Some workers explained that they continued working overtime primarily because of low wages and the need to supplement inadequate base pay, rather than from genuine choice:

“[...] we have never had an instance where someone says ‘I wouldn’t work.’ [...] I think working overtime is a way to boost up their income.”

—Manganese worker

Labor experts highlighted a fundamental problem underlying overtime violations: many workers do not understand their rights, particularly when they lack written contracts or formal guidance. Without knowledge of legal working hour limits and overtime protections, workers cannot recognize when their rights are being violated:

“These are people who don’t even understand that they are entitled [...] to work so many hours [...] so these things will just go on, and nobody even knows.”

—Government representative

This lack of awareness compounds the power imbalance between employers and workers.

4.2.4 Earnings and Debt

Interviewed workers described monthly earnings ranging from as low as K1,400¹⁰ [\$62] to about K11,000 [\$486], with salaries typically fixed but subject to fluctuation based on attendance, overtime, or payment delays:

“Like, personally [...] for me I’m paid 7,000 [\$309].”

—Manganese worker

“My basic is 2,500 [\$110]. It only changes going down, not going up. If you miss one or two days, then you lose part of your salary.”

—Manganese worker

Several workers reported limited understanding of how their pay was calculated:

“Yes. I don’t know. I don’t know the calculations.”

—Manganese worker

Workers also noted that formal deductions for statutory contributions—including the National Pension Scheme Authority, NHIMA, and the Zambia Revenue Authority—are made, though the lack of transparent calculation methods makes it difficult for workers to verify whether deductions are appropriate.

4.2.4.1 Piece-Rate Payment Systems and Quotas

Some workers, particularly those in casual or piecework roles, were paid strictly by output rather than receiving fixed salaries:

“We each have to sieve one ton to get the K100 [\$4]. If we sieve it the two of us, then we each get K50 [\$2].”

—Manganese worker

Labor experts confirmed that piece-rate arrangements are common in artisanal operations, with pay based on buckets or heaps of manganese collected. Targets are often expressed in buckets or tonnage, sometimes reaching up to 10 tons per group.

“They could produce [...] a 10-[MT] manganese, and the money given to them was not comparable to what they had produced. I felt like [the workers] were doing it out of desperation [...] and maybe because [...] they didn’t understand the value.”

—Government representative

Mine owners often favor piece-rate systems, believing that they motivate workers to set higher daily targets, especially when attendance fluctuates:

“When they are selling by buckets [...] people want to earn more money, and so they will work as much as possible and set a target so that they can earn more.”

—CSO representative

One-tenth (10%) of employed workers had a target or quota imposed by their employer. Among those with quotas (n=13), two-thirds (69%) considered them unreasonable for an individual working alone to achieve. The consequences of failing to meet targets included threats of dismissal, fines or salary

¹⁰ For context, the Zambian minimum wage for general workers is approximately \$114 per month.

deductions, loss of withheld wages, and verbal warnings. A government representative explained that failure to meet targets can mean no pay:

“They don’t get paid. You just have to meet the target. That’s the agreement.”

—Government representative

Eight percent of employed workers reported being fined at work for violations or failure to meet production targets. Workplace fines further erode already inadequate earnings and can contribute to debt relationships with employers or force workers to remain in exploitative situations to recover lost income.

4.2.4.2 Workers’ Perception of Wage Fairness

More than 80% of employed workers (82%) said that their earnings were insufficient to meet basic needs. Most key informants and workers agreed that wages in the sector are generally unfair, typically below minimum wage, and not aligned with the physical demands or risks of the work:

“Low wages, payments below minimum wages [...] they’re not paid on time, and there’s nothing written down [...] no gratuity [...] no medicals [...] nothing like that.”

—Manganese worker

Several workers expressed dissatisfaction due to heavy workloads, multitasking requirements, and pay inequities between supervisors and subordinates:

“No. My pay is low. [...] Because I do a lot of work [...] this place has no mechanic, so I have to be the mechanic for the machine that I am using and whatever else I am using. [...] Even when I am working from the washing plant, whatever fault develops, the maintenance work is still on me.”

—Manganese worker

“No. I am not paid fairly. We have contacted people from the Labor Department, but they have not been very helpful.”

—Manganese worker

Many workers compared their pay unfavorably to the value of manganese production and profits generated by mining operations:

“You know, manganese has got money. It is an expensive mineral even though they pay us peanuts.”

—Manganese worker

“Looking at the production of the company, I would say the money that we are paid is not enough. The company makes a lot of money as compared to what we are paid.”

—Manganese worker

Some linked perceived unfairness to intermediaries or local contractors who handle wages on behalf of foreign investors:

“I have seen that in manganese there is too much unfairness by employers, especially middlemen who are mostly our fellow Zambians. Investors from outside Zambia are just okay, but the middlemen who hijack these opportunities [...] tend to mistreat workers in ways such as unfair wages, lack of incentives, such as leave days.”

—Manganese worker

When asked whether they would have taken their jobs knowing about the unfair pay and demanding work conditions, most workers said that they would not have. However, some accepted the work as the only available option while continuing to seek alternatives:

“[...] Because I’ve taken the job while I’m looking for a better option somewhere else. [...] I would say my job, I’m using it as a layby.¹¹ I can’t just sit and be inactive.”

—Manganese worker

Wage-related concerns represent one of the strongest and most consistent themes across all interviews, with respondents linking unfair pay directly to lack of formalization, absence of written contracts, and power imbalances between workers and mine owners.

4.2.4.3 Payment Timing and Wage Arrears

Workers receive wages through various channels, including cash payments, mobile money transfers, and bank deposits, depending on the employer and type of employment. Some larger or more formal operations use bank transfers, but many workers, especially casual or contract workers, are paid in cash or through mobile money platforms such as Airtel Money. Several workers described a shift from cash to mobile payments over time, often linked to compliance requirements:

“They asked us to buy SIM cards because they needed to start deducting NAPSA [National Pension Scheme Authority] [...] that was when we started getting paid through mobile money.”

—Manganese worker

Labor experts reported that workers are typically paid either monthly, after production is sold, or daily for casual labor, depending on mine size and arrangements. Payment timing is often attached to when mine owners receive payment from buyers or smelters, creating inherent delays in the payment chain. Some workers reported regular, on-time salaries, but most experienced frequent and extended delays. Payment delays were often attributed to administrative inefficiencies or delays in transfers from foreign employers:

“They pay us the money, but they delay paying. [...] Sometimes we go for about a month without getting paid. We are supposed to be getting our salaries every first of the month, but sometimes we go up to the next month.”

—Manganese worker

Labor experts confirmed that delays are common and linked to the production-sale-payment cycle:

“Apart from probably not being paid appropriately, it’s also an issue of delayed payment [...] the employer would say that after production, they have to go and sell. When they get paid, that’s when they come and pay.”

—Government representative

The 2024–2025 power crisis exacerbated these structural vulnerabilities in the payment system. When processing facilities shut down, mine owners lost their primary buyers and revenue source, directly contributing to the wage arrears documented throughout this study. With processors unable to operate, this production-sale-payment cycle broke down entirely at some operations, leaving workers trapped—continuing to work in hopes of eventually receiving owed wages while lacking the resources to leave remote mining sites.

One labor expert reported witnessing workers complaining to authorities about delayed payments:

“They came to see the district commissioner to complain or demonstrate about the delayed payments.”

—International NGO representative

This pattern of withheld wages creates an involuntary attachment, in which workers continue working simply because they fear losing earnings already owed to them. Experts explained that when employers

¹¹ In the context of the passage, “layby” refers to a temporary, stop-gap, or holding position, a job used as a placeholder to keep the speaker occupied and financially sustained while they actively look for better, long-term employment.

delay payment for extended periods, workers may feel compelled to remain on site, particularly if they live far away:

“You may be forced to stick around because you are owed [...] if you leave, what guarantee is there that you are going to get your money?”

—Government representative

One expert described a recent case in which an unpaid worker remained on site longer than he intended, hoping to eventually receive his wages:

“[...] he was owed some money [...] the employer kept assuring, ‘you’ll be paid.’ He ended up staying there for some time [...] until he ran out of food.”

—Government representative

In some cases, workers were left waiting indefinitely for unpaid wages, creating ongoing frustration and fear of retaliation for speaking up:

“I’ve tried to engage them several times. But we just reached a point where we don’t, we will not talk about it. [...] We’re just trying to survive and look for other greener pastures. I’ve just kept quiet. Sometimes, when you speak up, you’ll be seen as someone trying to be controversial.”

—Manganese worker

4.2.5 Threats of Dismissal

After respondents were asked about workplace practices, they were asked follow-up questions about the anticipated consequences for failing to meet employer demands. For example, respondents were asked what would happen if they refused to do hazardous activities. The most common anticipated consequence for refusal was the threat of dismissal. Almost half (46%) of employed respondents reported that they would face threats of dismissal in at least one work situation: refusing hazardous work (40%), rejecting conditions that differed from promises (15%), refusing overtime (14%), failing to meet quotas (3%), or refusing to work while seriously ill or injured (3%).

One worker characterized the coercive nature of working conditions:

“You cannot refuse. If you refuse, you’ll be replaced.”

—Manganese worker

Another emphasized the impossibility of refusing exploitative conditions:

“No, you have to do what they say always. If you refuse, then they fire you from the company.”

—Manganese worker

Fear of dismissal forces workers to accept unsafe conditions. For those who migrated from other provinces, losing a job means losing housing and income in remote areas with few alternatives. Geographic isolation, economic precarity, and lack of transport make dismissal a powerful tool for coercion.

Labor experts confirmed that threats are common, especially when workers demand payment or question poor conditions:

“The threats are [...] when they have not been paid [...] the person will threaten them like ‘we are doing you a favor, and if you are not interested you can leave.’”

—CSO representative

In some cases, intimidation extended beyond employment:

“[Workers] are also threatened that [the owner] has a license [...] [the owner] can chase [workers] out of the village.”

—CSO representative

4.2.6 Living Conditions

Three-quarters (75%) of employed workers live in employer-provided housing (Table 11), reflecting the remote location of many manganese mining sites and the limited availability of alternative accommodations in these areas. However, these accommodations are often inadequate. Nearly one-third (32%) of those living in employer-provided housing rated their housing quality as “bad.” Almost half (46%) said that the conditions were harmful to their health. This perception may relate to specific health hazards such as dust exposure, proximity to mining operations, or other environmental factors not captured in general quality ratings. Forty-two percent felt unsafe in their housing. One worker said:

“Who feels safe sleeping in the bush? You can’t feel safe. Previously, we had some issues with lions that were loitering around. It was scary.”

—Manganese worker

One-third (33%) reported lacking access to clean water. Some workers described having boreholes, wells, or even tap and mineral water provided by employers, and others relied on unsafe sources such as streams, pits, or water from washing plants:

“We fetch water from the pit at the site [...] this may be mixed with silica which is very dangerous to us.”

—Manganese worker

The reliance on water from mining pits—potentially contaminated with silica or other mining byproducts—poses serious health risks that compound the occupational hazards that workers already face.

Sanitation facilities across sites were generally basic, with most interviewed workers reporting the use of pit latrines, either dug by the company or constructed within the camps. In a few cases, facilities were described as well-cemented, though many others noted poor or rudimentary conditions, including mud floors and shared usage among multiple workers. The sharing of sanitation facilities among multiple workers, combined with basic construction and maintenance, creates conditions that can contribute to disease transmission.

Few respondents (7%) reported that their employers deduct the cost of housing from worker earnings.

Table 11. Living conditions among workers living in employer-provided housing

	%	n	N
Lives in employer-provided housing	75%	95	126
Quality of accommodations is “bad”	32%	30	95
Lacks access to clean water	33%	31	95
Conditions are harmful to health	46%	43	93
Feels unsafe in housing	42%	40	95

Workers who lived in employer-provided accommodation typically described that housing as consisting of tents or container structures located within or near the mining sites. Most said that this arrangement was a requirement, especially for those coming from distant places:

“You have to live here. There is nowhere else.”

—Manganese worker

Sleeping arrangements varied; some workers slept alone in a tent, and others shared with family or coworkers. Accommodation was generally basic, with minimal comfort and security:

“You’re staying in the tent [...] they are not safe to say it is secured, if an animal were to invade, it would still enter into the tent.”

—Manganese worker

Forty-two percent of those living in employer-provided housing felt that they could not live somewhere else and still work at their job, either because their employer would not let them (18%), there was no alternative due to remoteness (15%), or they could not afford alternative housing (9%). This geographic isolation and lack of housing alternatives effectively tie many workers to their employers, even without formal contractual obligations. Workers living in employer-provided housing are particularly susceptible to exploitation because they may lose their housing if they lose their jobs, creating an additional layer of dependency.

Most interviewees said that they would not have taken the job had they known about the poor housing and unsafe living conditions. Their concerns included insecurity, lack of electricity, and exposure to snakes and other dangers associated with sleeping in tents.

“No, I wouldn’t have. Madam, sleeping in a tent is risky; this is a bush, there are snakes here, and other things. Additionally, this place has no power, so you can be in danger.”

—Manganese worker

“[...] but I think that at my age, privacy is quite important. I would have first maybe looked at how private I’ll be in that environment.”

—Manganese worker

However, a few interviewees said that they would still have accepted the job due to economic necessity or proximity to the mine. Many workers feel deceived about living conditions, but limited economic alternatives constrain their ability to refuse hazardous work or leave unsatisfactory employment situations.

4.3 FORCED LABOR

The study explored the two components of forced labor described in Section 2.2.1, Measuring Forced Labor: involuntary work and coercion.

4.3.1 Involuntary Work

Most employed workers (79%) reported having experienced at least one indicator of involuntary work (Table 12), which “refers to any work undertaken without the free and informed consent of the worker” (International Labour Organization, 2024, p. 4).

The most common indicator of involuntariness was hazardous or degrading working conditions, experienced by 71% of employed workers. A circumstance giving rise to this form of involuntary work is “hazardous work conditions posing serious risks to health and safety” (ILO, 2024, p. 11), defined for this study as the failure of the employer to mitigate the risks involved in their work (respondent reports that the employer does not provide PPE needed to perform the job safely or that the employer endangers respondent’s life by failing to take proper safety precautions). The other circumstance giving rise to this form of involuntary work is “work while seriously debilitated by sickness or injury” (ILO, 2024).

More than one-fifth (22%) of employed workers experienced onerous working hours or work schedule. Circumstances giving rise to this form of involuntary work include “onerous working hours leaving little or no rest or recovery time” (ILO, 2024, p. 11), defined for this study as usually working beyond 60 hours per week,¹² and “non-stop work without breaks during the workday” (ILO, 2024, p. 11).

Twenty-two percent of employed workers experienced deceptive or fraudulent recruitment, which “relates to the failure to deliver what has been promised to the worker, either verbally or in writing, at

¹² Zambian law does not specify a maximum number of overtime hours per week. Sixty hours per week has been chosen as threshold for onerous working hours based on ILO Convention No. 30, which allows up to 10 working hours per day (Article 4).

the time of recruitment” (ILO, 2024, p. 10). Among survey respondents, deceptive recruitment most frequently occurred in relation to earnings, living conditions, and hours.

Less common forms of involuntary work included degrading work-related living conditions among workers required to live in employer-provided housing (5%), recruitment debt to the employer (3%), inability to terminate employment (2%), and forced recruitment (1%).

Table 12. Respondents experiencing indicators of involuntary work among employed workers

	%	n
Experienced at least one indicator of involuntary work	79%	99
Hazardous or degrading working conditions	71%	89
Onerous working hours or work schedule	22%	28
Deceptive or fraudulent recruitment	22%	28
Degrading work-related living conditions among workers required to live in employer-provided housing	5%	6
Recruitment debt to employer	3%	4
Inability to terminate employment	2%	2
Forced recruitment	1%	1
Number of respondents (N)		126

4.3.2 Coercion

Overall, 51% of workers in this study experienced at least one indicator of coercion (Table 13).¹³

The most common indicator of coercion, experienced by 46%, was abuse of vulnerability, referring to “situations in which employers take advantage of workers’ vulnerable position [...] to coerce them under threat of dismissal, deportation or denial of rights or privileges to perform work or accept work conditions they would otherwise refuse” (ILO, 2023, p. 10). The ILO notes that “forced labor is more likely in cases of multiple dependency on the employer” (ILO, 2023, p. 10), a condition that applies to manganese workers, many of whom migrated for this work and rely on employer-provided housing. In this study, abuse of vulnerability most often took the form of threats of dismissal.

The next most common form of coercion was withholding of wages, experienced by 4% of employed workers, defined as “the deliberate and systematic withholding of wages” (ILO, 2024, p. 17). Workers reported that they risked losing withheld wages if they refused employer demands or failed to meet production expectations.

Three percent of employed workers experienced restrictions on workers’ movement, defined as circumstances in which an employer or recruiter “imposes some form of constraint—physical or legal—on workers’ freedom of movement, thereby coercing them to remain in or at work” (ILO, 2024, p. 16).

One percent of employed workers experienced threats of or actual physical or sexual violence to compel them to perform work activities they would otherwise have refused.

¹³ “Involuntary work, in and of itself, is a necessary but insufficient condition for forced labor” (ILO, 2024, p. 9). Most survey questions investigating involuntary work were followed by a question to determine the presence of coercion. For example, interviewers asked, “Does your employer require you to work when you are seriously sick or injured?” and if the respondent responded in the affirmative, the interviewer then asked, “What would happen if you refused to work while sick or injured?” For this study, a worker must have experienced both involuntary work and coercion during the same employment stage (recruitment, employment, or separation) to be classified as a case of forced labor.

Table 13. Respondents experiencing indicators of coercion among employed workers¹

	%	n
Experienced at least one indicator of coercion	51%	64
Abuse of vulnerability	46%	58
Withholding of wages	4%	5
Restrictions on workers' movement	3%	4
Physical or sexual violence	1%	1
Number of respondents (N)		126

¹ Multiple responses possible

4.3.3 Forced Labor Findings

As mentioned previously, a worker is considered to have experienced forced labor if they reported at least one indicator of coercion and one indicator of involuntary work during a stage of employment (recruitment, employment, or separation). Overall, 45% of workers experienced forced labor. Indicators of both coercion and involuntary work were often present across multiple stages. Specifically, 14% of workers reported both during recruitment, 41% during employment, and 2% during separation.

Patterns across demographic and occupational characteristics reveal important nuances (Table 14). Age did not show a consistent trend, but the youngest workers (18–24 years) and the oldest workers (55 and older) reported higher rates of forced labor—56% and 67%, respectively—than middle-aged groups, which were 42% to 43%. This may indicate heightened risk among workers with fewer alternatives, such as those entering the workforce or nearing retirement. Education differences were notable but lacked a clear pattern. The rate of forced labor among respondents who completed only some primary school was 18%, compared to 63% among those who completed primary school, and 48% among those who had education beyond the primary level.

Geographic variation was evident, with nearly half of respondents in Luapula (49%) experiencing forced labor, compared to 39% in Central. Two of the four respondents born in India experienced forced labor. Agreement type showed pronounced differences. Workers with written contracts experienced a 35% rate of forced labor, compared to 51% for those with verbal agreements, and 62% for those with no agreements at all. This pattern strongly suggests that formalized agreements may reduce—but not eliminate—the risk of exploitation. Employer type also mattered significantly. Respondents working for subcontractors faced a 74% rate of forced labor, more than double the 34% experienced by those employed directly by site owners. This points to subcontracting as a major structural driver of abuse.

Taken together, these findings highlight that forced labor is not confined to a single demographic or region but is shaped by structural factors such as contract formality and subcontracting arrangements. However, these results should be interpreted with caution due to the small sample size, and further research is needed to better understand the relationships between demographic and work characteristics and forced labor in manganese mining.

Table 14. Percentage experiencing forced labor among employed workers by worker characteristics

	%	n	N
Experienced forced labor	45%	57	126
Age (years)			
18–24	56%	9	16
25–39	43%	29	68
40–54	42%	15	36
55+	67%	4	6

	%	n	N
Sex			
Male	45%	54	119
Female	43%	3	7
Education			
Some primary	18%	4	22
Completed primary	63%	12	19
Beyond primary	48%	41	85
Province of work			
Luapula	49%	37	75
Central	39%	20	51
Type of contract			
Written	35%	21	60
Verbal	51%	23	45
None	62%	13	21
Boss type			
Site-owner	34%	28	82
Subcontractor	74%	29	39

4.4 CHILD LABOR

The workers' survey explored the presence of child labor in manganese mining worksites. Respondents were asked whether people under age 18 work at the place where they work. Seven percent of respondents reported that people under age 18 work at their worksites, and 4% indicated they did not know whether children work at their sites.

The actual percentage of worksites with working children may be higher due to underreporting. Respondents may underreport child labor for several reasons: they may discount youth who work part-time or alongside their parents, they may fear repercussions for acknowledging illegal practices, or they may not be aware of children working in other parts of large mining operations. The survey question specifically asked about children working “at the place where you work,” which may not capture children engaged in peripheral mining activities, such as collecting ore from dump sites, informal sorting or crushing operations near mining areas, or domestic work supporting mining households.

Child labor in manganese mining is particularly concerning, given the hazardous nature of the work, including exposure to dust and fumes, heavy loads, dangerous machinery, and extreme heat. With 81% of workers reporting health and safety risks, any child involvement constitutes hazardous child labor under Zambian law and international standards. Neurotoxic effects of manganese pose additional risks for developing children.

KIIs confirmed child labor in the sector, with notable variation by province. In Central Province, cases were described as few and mostly linked to remote illegal operations:

“There are some [...] at the moment [...] very few. But [...] deep down the Serenje District [...] you find that there are some children under 18 years who are involved [...] in the illegal mining.”

—Government representative

One worker described how informal mine operators recruit young people from small market centers in Luapula to load ore into trucks:

“They just come and get people to load [trucks] [...] mostly youths. [...] They are not given [PPE] to wear. They work in their own clothes. Even if you are barefooted you are free to participate. They allow.”

—Manganese worker

Respondents emphasized that child labor is more prevalent in Luapula Province, attributing this to high poverty levels, remote locations, informal mining operations, and limited government oversight.

“[...] Luapula has higher rates because of it being too remote, too rural [...] people are being exploited, and we found a lot of children there.”

—International NGO representative

One respondent described the dramatic impact on schools near mine sites:

“[...] in a classroom where there are about 35 children [...] someone announces that a buyer has come [...] the teacher will remain with maybe 2 or 3 children, and the others will flock out and go to the mine [...].”

—CSO representative

Education challenges and perceptions of mining as more profitable also play a role:

“[...] [low] quality of education makes children see manganese work to be more profitable [...] teacher-pupil ratio is not up to date [...] they may not see the value of education [...].”

—CSO representative

Respondents also noted social factors such as the lure of quick money and social media influence:

“[...] they just want to do something entrepreneurial [...] quick money [...] social media [...] they become like models [...] attracting even the young ones [...].”

—International NGO representative

Children participate in a range of activities, depending on the mining site and their age. In Central Province, this includes digging and sorting in informal pits. In Luapula, children’s involvement is broader, including both direct mining activities and support roles:

“[...] children are working as a unit [...] children that are carrying the bags [...] children that are fetching water [...] children that are cooking [...] small children [...] taken because the parents don’t have anywhere to leave them.”

—CSO representative

“Children were selling food on the sites [...] drinks, fritters, dried cassava [...] boys [...] involved in selling [...] others even just working [...].”

—International NGO representative

The narratives reveal that children’s presence at mining sites reflects the socioeconomic challenges of working families. Some children accompany their parents because families have no other childcare options, while others work to supplement family income. Poverty was consistently mentioned as the main driver pushing children into mining.

5 CONCLUSION AND RECOMMENDATIONS

This study found that labor exploitation remains a significant issue in Zambia’s artisanal and small-scale manganese sector, with substantial implications for affected workers and the broader global manganese, steel, and battery industries.

The study identified 57 cases of forced labor among 126 employed workers (45%) in manganese mining operations across Luapula and Central Provinces. The even higher percentage of workers (79%) experiencing involuntary work indicators suggests that exploitative conditions are pervasive throughout the sector. The prevalence of intermediary-based employment arrangements, extensive use of labor contractors and subcontractors diluting accountability, and economic pressures on workers who migrated from other provinces have entrenched exploitative labor practices in the contractor-based portions of the supply chain. Migrant workers often arrive based on false promises and become trapped

by wage withholding and lack of transport. Remote locations and poor infrastructure make leaving nearly impossible without employer assistance. As one Ministry of Labor representative noted, workers who complain are told to leave and find their own way home—an impossibility for those without resources.

Investigation into the manganese supply chain revealed that all manganese-containing downstream products, both domestically consumed and internationally exported, are at risk of being produced with forced labor. Although extraction occurs primarily through artisanal and small-scale operations dispersed across Luapula and Central Provinces, extracted ore flows through a complex network of intermediaries, transporters, and processing mills before reaching end users in steel production, battery manufacturing, aluminum alloys, and chemical applications. Manganese from various sources is mixed at processing facilities, making it impossible to trace specific batches back to individual mines. Processors purchase from multiple intermediaries, each aggregating ore from dozens of small operations, creating layers of separation between extraction and the final processed product. The sector's highly informal nature means that most formal documentation begins only at processing, obscuring ore origin and allowing products produced with forced labor inputs to enter domestic and international markets without detection.

Combating labor exploitation requires coordinated action by government, industry, and civil society. Priorities include stronger enforcement in remote artisanal sites, supply chain monitoring beyond contractual clauses, unannounced inspections, improved traceability, and expanded social protections. Infrastructure investment and formalization of artisanal operations are critical to reduce dependency on exploitative intermediaries.

Despite Zambia's manganese sector doubling production in 2024 and its designation as a critical mineral for the clean energy transition, economic growth has not eliminated exploitation. The 2024–2025 power crisis halted domestic processing and eliminated 2,300 skilled jobs, driving increased reliance on informal extraction with heightened health risks. Without systemic reforms to address poverty, informal employment, and opaque supply chains, the sector's expansion risks entrenching labor exploitation rather than eradicating it.

5.1 RECOMMENDATIONS

This study offers the following recommendations:

To the Government of Zambia:

- Strengthen labor inspection capacity by increasing the number of Ministry of Labor and Social Security labor inspectors in Luapula and Central Provinces, ensuring periodic visits to ASM operations, particularly in remote areas. Provide inspectors with transportation and logistical support to access remote sites, establish mobile inspection units, and focus specifically on forced labor indicators, including wage withholding, excessive working hours, and hazardous conditions without PPE.
- Improve transparency and inter-institutional coordination in supply chain monitoring, with integrated public systems between the Ministry of Labor and Social Security, Ministry of Mines and Mineral Development, Zambia Revenue Authority, and Zambia Environmental Management Authority for production traceability and identification of risk practices. Require all manganese processors and exporters to maintain records documenting the source of their ore, including identifying specific mines or mining areas.
- Accelerate formalization of the ASM sector through streamlined registration and licensing procedures for artisanal and small-scale miners. Implement simplified application processes, reduced fees for small-scale operations, mobile registration services that can reach remote

areas, and clear communication about the benefits of formalization. Create intermediate categories of recognition for operations transitioning from informal to formal status.

- Integrate labor compliance requirements into the mining licensing framework. The Ministry of Mines and Mineral Development should make demonstrable labor compliance a prerequisite for license approval and renewal, requiring applicants to provide evidence of written employment contracts for all workers, registration with the National Pension Scheme Authority and National Health Insurance Management Authority, and minimum wage compliance. License renewals should be contingent upon a clean labor inspection record, and licenses should be suspended or conditioned if repeated labor violations are documented.
- Explicitly integrate labor standards into Zambia’s mineral value chain governance and export strategies¹⁴ by aligning national mining and trade policies with international frameworks, including the Organization for Economic Co-operation and Development Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas and relevant ILO conventions. Require manganese exporters and traders to demonstrate upstream labor due diligence as a condition of export permit issuance. Support donor-funded traceability pilot programs that incorporate labor compliance indicators—not only production volumes and ore grades—to enable identification and exclusion of products produced with forced labor from export markets.
- Expand worker rights education programs and accessible grievance mechanisms in mining communities, informing workers of their rights under Zambian labor law in local languages (including Bemba). Establish multiple channels through which workers can report labor violations safely without fear of retaliation, including a national labor rights hotline, SMS reporting options, and partnerships with trusted CSOs.
- Formalize and regulate recruitment practices in the ASM mining sector to eliminate deceptive recruitment and exploitation by labor intermediaries. Require mining license holders to maintain transparent recruitment procedures and documentation as a condition of licensing. Strengthen enforcement against recruitment-related coercion, including sanctions for operators and intermediaries who engage in deceptive recruitment practices. Pilot standardized worker registration systems at the district or provincial level that document worker identities, employment terms, and employer information at the point of hire, enabling traceability and accountability throughout the employment relationship.
- Establish provincial or district-level labor grievance desks physically located in mining areas of Luapula and Central Provinces, staffed by trained officers who can receive and investigate complaints in person. Designate community focal persons in mining communities to serve as trusted intermediaries for workers who may be reluctant to engage directly with government offices. Enact and enforce explicit whistleblower protection measures to shield workers who report violations from employer retaliation, including expedited procedures for addressing retaliatory dismissals.
- Address infrastructure gaps in Luapula Province to enable local value addition and reduce workers’ dependence on exploitative employment conditions. Prioritize upgrading electrical infrastructure to support processing facilities, improving road networks to reduce isolation of mining areas, and supporting the development of processing capacity within the province to create higher-skilled employment opportunities.
- Mandate written employment contracts for all mine workers with standardized minimum terms, including wage rates, payment schedules, working hours, job responsibilities, housing arrangements (if provided), and termination procedures. Apply penalties to employers who fail

¹⁴ These could include, for example, future iterations of the National Mineral Resources Development Policy (2022), the National Critical Minerals Strategy 2024–2028, the Ministry of Mines and Minerals Development Strategic Plan 2022–2026, and the National Export Strategy (2018).

to provide written contracts or include terms that violate labor law. Establish expedited procedures for workers to recover unpaid wages, including mobile labor courts and wage guarantee funds.

- Develop and disseminate standardized, simplified employment contract templates tailored to ASM operations, available in local languages (including Bemba), to reduce barriers to formalizing employment relationships. Complement enforcement measures with positive incentives for labor formalization, such as subsidized license renewal fees, priority access to government support programs, or recognition schemes for operators who demonstrate compliance with labor standards.

To Private Sector Actors:

Downstream consumers and processors in Zambia's manganese sector, including processing facilities, traders, exporters, steel manufacturers, battery producers, and other end users, should implement robust supply chain due diligence and monitoring mechanisms to identify and address forced labor risks, such as the following:

- Move beyond contractual clauses to establish proactive auditing and monitoring programs with unannounced field visits to mine sites and intermediary operations, focusing especially on artisanal and small-scale operations. Commission independent third party audits of labor conditions, specifically assessing forced labor indicators as defined by ILO standards, including recruitment practices, wage payment systems, working hours, occupational safety conditions, housing arrangements, and workers' freedom of movement.
- Make contract renewals and commercial partnerships conditional on proven compliance with labor and human rights laws, with corrective action plans for non-compliance and de-accreditation from supply chains for serious and recurring violations. Implement direct mine-level traceability systems that can identify the specific mine or mining area of origin for all purchased manganese, working with processors and traders to establish segregated supply chains that maintain the identity of ore from extraction through processing and export.
- Create and promote safe, confidential, and accessible reporting channels for workers, including those in ASM operations and employed by intermediaries, managed by independent third parties to prevent retaliation against whistleblowers. Establish grievance mechanisms with multiple channels (hotlines, SMS, in-person reporting to trusted intermediaries) that allow workers to report labor violations safely and anonymously.
- Ensure through active verification that all workers in the supply chain receive adequate PPE and safety training before beginning work. Make PPE provision a contractual requirement for suppliers and conduct regular verification. Support training programs that educate workers about their rights under Zambian labor law and international standards.
- Review payment practices and intermediary arrangements that may lead to potential risks. Require that all workers have written employment contracts clearly specifying wages, working hours, job duties, housing arrangements, and termination procedures in languages workers understand. Address wage withholding practices by establishing direct payment verification systems and requiring documented proof of timely wage payments.
- Participate in multi-stakeholder initiatives focused on responsible sourcing of minerals and addressing forced labor in mining supply chains. Engage with sector-specific standards for manganese sourcing, contribute to regional traceability platforms, and share best practices with other companies sourcing from the region.

To Other Governments:

- Strengthen requirements for companies importing manganese and manganese-containing products to conduct due diligence on forced labor risks. Require importers to demonstrate

traceability back to the mine of origin, particularly for manganese sourced from high-risk regions, including Zambia. Companies should be required to implement robust monitoring systems that can identify and address forced labor indicators throughout their supply chains.

- Provide technical assistance and capacity-building support to Zambia's Ministry of Labor and Social Security to strengthen labor inspection systems in remote mining areas. This should include funding for additional labor inspectors, training on forced labor identification, transportation resources to access remote mine sites, and support for developing mobile inspection units capable of conducting surprise inspections in Luapula and Central Provinces. Establish joint inspection protocols between the Ministry of Labor and Social Security and the Ministry of Mines and Mineral Development to leverage complementary expertise and ensure coordinated enforcement of both labor and mining regulations at ASM sites.
- Engage with the Government of Zambia to support formalization of the ASM mining sector through bilateral dialogue and technical assistance. Support the development of registration systems for ASM operations, simplifying licensing procedures to encourage formalization, and creating incentives for ASM operations to transition to formal sector compliance with labor standards.
- Fund additional research to better understand the full scope of forced labor in Zambia's manganese sector, including studies that can access lower-resourced operations that may have been underrepresented in this research due to the energy crisis. Support CSOs and researchers conducting documentation of labor conditions and supply chain tracing in artisanal mining operations.

To Civil Society and Other Stakeholders:

- Expand the participation of miners' associations and unions in collective agreements and private socio-environmental certifications, ensuring that workers have effective representation in negotiations with mine owners, processors, and intermediaries. Support the National Union of Miners and Quarry Workers or other relevant unions to establish presence in ASM manganese operations.
- Promote independent, multilateral monitoring that includes CSOs, workers' associations, and universities in overseeing labor practices in the sector. Develop and implement monitoring frameworks that can assess forced labor indicators even in highly informal and fragmented supply chains.
- Support community empowerment initiatives and accessible reporting channels, including mobile apps and partnerships with local associations, so workers can safely report abuse. Provide legal support and advocacy services for workers facing labor violations, particularly those involving wage arrears, unsafe working conditions, and threats of dismissal.
- Conduct further research on forced labor across different regions, production scales, and intermediary arrangements in Zambia's manganese sector to inform targeted interventions. Research should specifically examine labor conditions at operations that were non-operational during this study period and at locally owned sites that may face greater resource constraints than foreign-invested operations.

Implementation of these recommendations requires coordinated efforts from all stakeholders. Improving the labor conditions in Zambia's manganese sector will require addressing both immediate labor violations and underlying socioeconomic factors, including informal employment, economic desperation driving internal migration, complex intermediary arrangements, and infrastructure gaps, while simultaneously strengthening oversight, traceability, and accountability throughout the supply chain. The sector's rapid growth and strategic importance as a critical mineral present both risks and opportunities. Without proactive intervention, expansion could exacerbate forced labor as operations scale up in remote areas with limited oversight. However, the sector's strategic importance also creates leverage

for requiring improved labor standards as a condition of market access and international investment. The persistence of forced labor in this rapidly expanding sector demonstrates that economic growth alone is insufficient to eliminate exploitation.

APPENDIX I: REFERENCES

- Africanews. (2024, August 13). Zambians brace up for up to 12 hours of daily power cuts. Africanews. <https://www.africanews.com/2023/01/05/zambians-brace-up-for-up-to-12-hours-of-daily-power-cuts>
- Brown, C. W., Goldfine, C. E., Allan-Blitz, L.-T., & Erickson, T. B. (2024). Occupational, environmental, and toxicological health risks of mining metals for lithium-ion batteries: A narrative review of the Pubmed database. *Journal of Occupational Medicine and Toxicology*, 19(1), 35. <https://doi.org/10.1186/s12995-024-00433-6>
- Centre for Environment Justice. (2025, May 25). *Manganese poisoning in Serenje strikes 28 workers as 271 record manganese above normal level in the blood*. Centre for Environment Justice. <https://cejzambia.org/manganese-poisoning-in-serenje-strikes-28-workers-as-271-record-manganese-above-normal-level-in-the-blood/>
- Chabaya, B. (2024, June 28). Power shortage forces 13 manganese plants to shut down—over 2,000 jobs to be affected in Chitambo and Serenje. *Zambia Reports*. <https://www.facebook.com/ZambiaReports/posts/power-shortage-forces-13-manganese-plants-to-shut-down-over-2000-jobs-to-be-affe/877950624360591/>
- Daily Nation Zambia. (2020, October 12). Chinese set up manganese processing plants. *Daily Nation Zambia*. <https://www.dailynationzambia.com/2020/10/chinese-set-up-manganese-processing-plants/>
- Daily Nation Zambia. (2021, December 24). Govt suspends three mining licences. *Daily Nation Zambia*. <https://www.dailynationzambia.com/NEW/2021/12/govt-suspends-three-mining-licences/>
- Daily Nation Zambia. (2023, July 8). More than 2,000 to lose jobs at Serenje’s manganese plants. *Daily Nation Zambia*. <https://www.dailynationzambia.com/NEW/2023/07/more-than-2000-to-lose-jobs-at-serenjes-manganese-plants/>
- Dentons. (2025). *Zambia’s mining law overhaul*. Dentons. <https://www.dentons.com/en/insights/articles/2025/march/18/mining-law-overhaul>
- DLA Piper Africa. (2024, November 22). *Understanding Zambia’s national critical minerals strategy: Key implications for the mining sector*. DLA Piper Africa. <https://www.dlapiperafrica.com/en/zambia/insights/2024/understanding-zambias-national-critical-minerals-strategy-key-implications-for-the-mining-sector>
- Duarte, J., Clavería, L. E., De Pedro-Cuesta, J., Sempere, A. P., Coria, F., & Calne, D. B. (1995). Screening Parkinson’s disease: A validated questionnaire of high specificity and sensitivity. *Movement Disorders*, 10(5), 643–649. <https://doi.org/10.1002/mds.870100518>
- Evans, G. R., & Masullo, L. N. (2025). Manganese toxicity. In *StatPearls*. StatPearls Publishing. <http://www.ncbi.nlm.nih.gov/books/NBK560903/>
- International Labour Organization. (2024). *Hard to see, harder to count: Handbook on forced labour surveys* (3rd ed.). International Labour Organization. <https://www.ilo.org/publications/hard-see-harder-count-handbook-forced-labour-surveys>
- International Manganese Institute. (2023). *Zambia’s manganese industry: A game-changer?* International Manganese Institute. <https://www.manganese.org/en/shop/zambias-manganese-industry-game-changer>

- Library of Congress. (2023, November). *Emergency Access to Strategic and Critical Materials: The National Defense Stockpile*. <https://www.congress.gov/crs-product/R47833?q=%7B%22search%22%3A%22national+defense+stockpile%22%7D&s=I&r=I>
- Lusaka Times. (2019, January 12). Zambia: Zambia's largest Manganese Smelter under construction by Chinese firm to gobble \$15 million. *Lusaka Times*. <https://www.lusakatimes.com/2019/01/12/zambias-largest-manganese-smelter-under-construction-by-chinese-firm-to-gobble-15-million/>
- Makanday Centre for Investigative Journalism. (2024, June 5). *Inadequate compensation: Former mineworkers diagnosed with manganism* [Video recording]. <https://www.facebook.com/reel/8056659184344020/>
- Makanday Media. (2023, January 31). *Zambia | Inside the manganese mine industry*. Investigative Journalism Hub. <https://ijhub.org.za/zambia-inside-the-manganese-mine-industry-source-makanday-on-january-31-2023/>
- Makanday Media. (2024, June 4). *Betrayed and abandoned | Ex-Indian owned manganese mine employees receive meagre compensation*. LinkedIn. https://www.linkedin.com/posts/makanday-media-b057bb1b5_betrayed-and-abandoned-ex-indian-owned-activity-7203765334980382721-NDKv/
- Mattison, D. R., Momoli, F., Alyanak, C., Aschner, M., Baker, M., Cashman, N., Dydak, U., Farhat, N., Guilarte, T. R., Karyakina, N., Ramoju, S., Shilnikova, N., Taba, P., & Krewski, D. (2024). Diagnosis of manganism and manganese neurotoxicity: A workshop report. *Medicine International*, 4(2), 11. <https://doi.org/10.3892/mi.2024.135>
- Mumba, E. (2021, December 2). Government should move into Luapula Province armed with production-oriented policies for mining activities to support economic growth. *Zambian Mining News*. <https://www.miningnewszambia.com/government-should-move-into-luapula-province-armed-with-production-oriented-policies-for-mining-activities-to-support-economic-growth/>
- Mupeseni, K. (2021a, November 17). Zambia: Manganese industry has potential to drive country's economic fortunes. *The Times of Zambia*. <https://allafrica.com/stories/202111170561.html>
- Ozayr. (2024, June 9). Zambia tallies the costs of mining for electric batteries. *The Mail & Guardian*. <https://mg.co.za/the-green-guardian/2024-06-09-zambia-tallies-the-costs-of-mining-for-electric-batteries/>
- Phiri, K., & Clayton, F. (2024, November 21). *As drought shrivels hydro, this African nation pivots to solar*. Yale E360. <https://e360.yale.edu/features/zambia-drought-hydro-solar-power>
- PwC. (2024, October 16). *Zambia 2024 mining report*. PwC. <https://www.pwc.com/zm/en/publications/zambia-mining-report.html>
- Reuters. (2024, April 23). *Zambia seeks power imports for key mining sector*. Reuters. <https://www.reuters.com/business/energy/zambia-seeks-power-imports-key-mining-sector-2024-04-22/>
- Sinkala, Z. (2023, May 5). *Price of jobs in Zambian manganese mine: Parkinson's-like brain damage*. TRT Afrika. <https://trtafrika.com/africa/price-of-jobs-in-zambian-manganese-mine-parkinsons-like-brain-damage-13099470>
- Sipula, C. (2024, November 13). *Government implements emergency measures to alleviate load shedding crisis in Zambia*. Pulitzer Center. <https://pulitzercenter.org/stories/government-implements-emergency-measures-alleviate-load-shedding-crisis-zambia>
- SSY Global. (2025). *Africa's minor ore powerhouse*. SSY. <https://www.ssyglobal.com/news/research/economy-minor-bulks-africas-minor-ore-powerhouse>

- Tychsen, J. (Ed.). (2018). *Artisanal and small-scale mining handbook for Zambia*. Geological Survey of Denmark and Greenland. <https://panafgeo.eurogeosurveys.org/wp-content/uploads/2021/10/ASM-Handbook-for-Zambia.pdf>
- U.S. Department of Defense. (2024, May). *DOD awards \$20 million to enhance domestic manganese supply chain*. <https://www.war.gov/News/Releases/Release/Article/3779115/dod-awards-20-million-to-enhance-domestic-manganese-supply-chain/>
- U.S. Geological Survey. (2022). *The mineral industry of Zambia in 2020-2021*. <https://pubs.usgs.gov/myb/vol3/2020-21/myb3-2020-21-zambia.pdf>
- U.S. Geological Survey. (2025, November). *Interior Department releases final 2025 list of critical minerals*. <https://www.usgs.gov/news/science-snippet/interior-department-releases-final-2025-list-critical-minerals>
- World Bank. (2025). *Zambia economic update: Leveraging energy transition minerals for economic transformation*. World Bank. <https://www.worldbank.org/en/country/zambia/publication/zambia-economic-update-leveraging-energy-transition-minerals-for-economic-transformation>
- World Bank, Republic of Zambia, & Resilient and Inclusive Supply Chain Enhancement. (2025). *Repositioning Zambia to leverage energy transition minerals for economic transformation: A roadmap*. <https://thedocs.worldbank.org/en/doc/355ca480252c6b3efd02dbd0feb6701f-0400012025/original/Executive-Summary-ZMB-ETM-Roadmap-final.pdf>
- Xinhua. (2025, December 12). *Zambia to increase electricity generation amid major power deficit*. News Africa. <https://english.news.cn/africa/20251212/b574ff4d7e1445769cd5a9d32e737042/c.html>
- Zambia Ministry of Mines and Mineral Development. (2025, January 22). *Media statement by the Minister of Mines and Minerals Development Honourable Paul C. Kabuswe, MP at the press briefing on the performance of the mining sector in 2024*. <https://www.mmmd.gov.zm/?p=3792>
- Zambia Statistics Agency. (2023). *Highlights of the 2022 poverty assessment in Zambia*. <https://www.undp.org/sites/g/files/zskgke326/files/2023-10/highlights-of-the-2022-poverty-assessment-in-zambia-2023.pdf>
- Zambia Statistics Agency. (2025). *Fourth quarter 2024 GDP*. <https://www.zamstats.gov.zm/fourth-quarter-2024-gdp/>

APPENDIX 2: HS CODES

HS Code Glossary

Product	HS code	HS definition
Manganese ore	2602	Manganese ores and concentrates, including ferruginous manganese ores and concentrates with a manganese content of 20% or more, calculate by dry weight
Manganese oxides	2820	Manganese oxides
	2820.10	Manganese dioxide
	2820.90	Other (than manganese dioxide)
Ferro-manganese	7202.11	Ferro alloys. Ferro-manganese containing by weight more than 2% of carbon
Ferro-manganese	7202.19	Ferro alloys, other. Ferro-manganese containing by weight 2% or less of carbon
Ferro-silico-manganese	7202.30	Ferro-silico-manganese

APPENDIX 3: EXPORT VALUES

No trade destination tables appear here for HS codes 2820.10 (manganese dioxide) or 2820.90 (manganese oxides, excluding manganese dioxide) because no importing country reported receiving these goods from Zambia in 2024. Zambia reported exporting a minimal amount of HS 2820.90 to India (\$12,367 by value, or 0.175 MT by volume), though India's import records do not confirm this.

Top 5 Destination Markets of Manganese Ore (Value and Volume) for Zambia Exports, 2024

Destination country	Value (USD)	% by value	Destination country	Volume (MT)	% by volume
China	\$14,772,668	69.3%	China	67,028	53.42%
South Africa	\$5,405,475	25.3%	South Africa	53,643	42.6%
India	\$870,520	4.1%	India	3,263	2.6%
Burkina Faso	\$92,695	0.4%	Burkina Faso	652	0.5%
Zimbabwe	\$86,882	0.4%	South Korea	489	0.4%

Source: Trade Data Monitor, 2025; HS code 2602; values c.i.f. as reported by importer

Top 5 Destination Markets of Ferro-manganese, Containing by Weight More Than 2% Carbon (Value and Volume) for Zambia Exports, 2024

Destination country	Value (USD)	% by value	Destination country	Volume (MT)	% by volume
China	\$3,704,155	27.7%	China	4,838	35.2%
Italy	\$2,820,967	21.1%	Italy	2,648	19.3%
Netherlands	\$2,681,413	20.1%	Netherlands	2,408	17.5%
Pakistan	\$2,368,471	17.7%	Pakistan	2,154	15.7%
South Africa	\$1,257,195	9.4%	South Africa	1,280	9.3%

Source: Trade Data Monitor, 2025; HS code 7202.11; values c.i.f. as reported by importer

Top 5 Trade Destination Markets of Ferro-manganese, Containing by Weight 2% or Less of Carbon (Value and Volume) for Zambia Exports, 2024

Destination country	Value (USD)	% by value	Destination country	Volume (MT)	% by volume
South Africa	\$298,805	58.0%	South Africa	392	64.4%
Türkiye	\$133,410	25.9%	Türkiye	109	17.9%
Spain	\$82,922	16.1%	Spain	108	17.7%

Source: Trade Data Monitor, 2025; HS code 7202.19; values c.i.f. as reported by importer

Note: Only three countries reported imports of 7202.19 from Zambia in 2024.

Top 5 Destination Markets of Ferro-silico-manganese (Value and Volume) for Zambia Exports, 2024

Destination country	Value (USD)	% by value	Destination country	Volume (MT)	% by volume
Italy	\$27,589,441	24.9%	Italy	26,360	24.3%
Pakistan	\$27,085,794	24.5%	Pakistan	26,170	24.2%
Netherlands	\$17,253,996	15.6%	Netherlands	16,472	15.2%
South Africa	\$15,373,920	13.9%	South Africa	17,058	15.7%
Türkiye	\$5,968,132	5.4%	Türkiye	5,096	4.7%

Source: Trade Data Monitor, 2025; HS code 7202.30; values c.i.f. as reported by importer

Top Global Exporters of Manganese Ore, 2024

Country	Percent of total good exported globally, by value
South Africa	83.5%
Ghana	6.3%
Brazil	2.3%
China	1.9%
Côte d'Ivoire	1.8%
France	0.7%
Morocco	0.6%
Malaysia	0.4%
Netherlands	0.3%
Guyana	0.3%

Source: Trade Data Monitor, 2025; HS code 2602; values f.o.b. as reported by exporter

Top Global Exporters of Manganese Dioxide, 2024

Country	Percent of total good exported globally, by value
China	44.7%
Japan	21.3%
Spain	12.9%
Colombia	6.4%
United States	4.8%
India	2.9%
Belgium	1.6%
Georgia	1.4%
Poland	0.6%
Brazil	0.5%

Source: Trade Data Monitor, 2025; HS code 2820.10; values f.o.b. as reported by exporter

Top Exporters of Manganese Oxides Other Than Manganese Dioxide, 2024

Country	Percent of total <i>good</i> exported globally, by value
South Africa	14.6%
Norway	13.8%
India	12.5%
Netherlands	12.1%
Belgium	9.0%
Georgia	7.6%
United States	6.9%
China	5.8%
Brazil	5.3%
France	2.9%

Source: Trade Data Monitor, 2025; HS code 2820.90; values f.o.b. as reported by exporter

Top Global Exporters of Ferro-manganese Containing by Weight More than 2% Carbon

Country	Percent of total <i>good</i> exported globally, by value
India	44.9%
Malaysia	26.4%
Netherlands	9.3%
France	6.0%
South Africa	3.4%
Poland	2.9%
Slovakia	1.1%
United States	1.1%
South Korea	0.8%
Italy	0.6%

Source: Trade Data Monitor, 2025; HS code 7202.11; values f.o.b. as reported by exporter

Top Global Exporters of Ferro-manganese Containing by Weight 2% or Less of Carbon

Country	Percent of total <i>good</i> exported globally, by value
India	39.7%
South Africa	23.5%
Netherlands	17.5%
Spain	3.3%
Poland	2.9%
South Korea	2.2%
United States	2.1%
Italy	1.9%
Germany	1.8%
Türkiye	1.0%

Source: Trade Data Monitor, 2025; HS code 7202.19; values f.o.b. as reported by exporter

Top Global Exporters of Ferro-silico-manganese

Country	Percent of total <i>good</i> exported globally, by value
India	31.6%
Malaysia	11.8%
Norway	11.6%
Georgia	9.6%
Netherlands	7.4%
Poland	3.7%
Kazakhstan	3.7%
Zambia	3.1%
South Africa	2.4%
Ukraine	2.4%

Source: Trade Data Monitor, 2025; HS code 7202.30; values f.o.b. as reported by exporter

Export Values from Zambia, by HS Code

Good	HS code	Export value 2020	2021	2022	2023	2024	Top destination market for 2024 (percentage)
Manganese ore	2602	\$37,080,636	\$32,876,780	\$22,682,457	\$6,093,307	\$21,332,495	China (69.3%)
Manganese dioxide	2820.10	\$5,283	\$8	\$27,438	\$27,199	\$0	None
Manganese oxides (not manganese dioxide)	2820.90	\$6,800	\$538,012	\$2,281,632	\$594,732	\$0	None
Ferro-manganese, >2% carbon by weight	7202.11	\$13,805,003	\$29,660,583	\$27,001,869	\$9,682,050	\$13,398,116	China (27.7%)
Ferro-manganese, 2% or less carbon by weight	7202.19	\$312,585	\$273,484	\$524,526	\$148,946	\$515,137	South Africa (58.0%)
Ferro-silico-manganese	7202.30	\$16,894,136	\$89,654,304	\$166,039,542	\$107,738,929	\$110,684,773	Italy (24.9%)

Source Trade Data Monitor; HS codes 2602, 2820.10, 2820.90, 7202.11, 7202.19, 7202.30; values c.i.f. as reported by importers

Exports Volumes from Zambia, by HS Code

Good	HS code	Export volume 2020 (MT)	2021	2022	2023	2024	Top destination market for 2024 (percentage)
Manganese ore	2602	185,876	170,204	112,440	44,792	125,535	China (53.4%)
Manganese dioxide	2820.10	34	10	131	92	0	None
Manganese oxides (not manganese dioxide)	2820.90	57	1,160	3,332	1,155	0	None
Ferro-manganese, >2% carbon by weight	7202.11	29,641	23,172	17,677	9,161	13,748	China (35.2%)
Ferro-manganese, 2% or less carbon by weight	7202.19	339	195	315	142	609	South Africa (64.4%)
Ferro-silico-manganese	7202.30	151,197	308,325	257,138	127,315	108,308	Italy (24.3%)

Source Trade Data Monitor; HS codes 2602, 2820.10, 2820.90, 7202.11, 7202.19, 7202.30; values c.i.f. as reported by importers

APPENDIX 4: FINAL RESEARCH INSTRUMENTS

ZAMBIA MANGANESE STUDY: WORKER QUESTIONNAIRE

Field	Question	Answer
FIELDCONTROL		
INTERVIEWER_num <i>(required)</i>	INTERVIEWER NAME	1 2 3 4 5 6 7 8
PROVINCE <i>(required)</i>	PROVINCE	1 LUAPULA 2 CENTRAL
DISTRICT <i>(required)</i>	DISTRICT	
MUNICIPALITY	MUNICIPALITY	
LANGUAGE	SELECT LANGUAGE	1 ENGLISH 2 BEMBA 55 OTHER
LANGUAGE_OTHER	SPECIFY OTHER LANGUAGE <i>Question relevant when: LANGUAGE = 55</i>	
CONSENT		
STARTING_NOTE	INTERVIEWER: DO NOT READ RESPONSE OPTIONS ALOUD UNLESS INDICATED. LISTEN TO THE RESPONSE AND SELECT THE MOST APPROPRIATE RESPONSE OPTION(S). DO NOT READ UPPERCASE TEXT ALOUD. <i>Question relevant when: CONSENT = 1</i>	
SECTION 1: GENERAL INFORMATION <i>Group relevant when: CONSENT = 1</i>		
S1Q01 <i>(required)</i>	S1Q01. Have you worked in the Manganese industry in Zambia in the past 6 months?	1 YES 2 NO 77 DON'T KNOW

Field	Question	Answer
		99 REFUSED
S1Q02 (required)	S1Q02. How old are you? [IF NEEDED: Your best guess is fine] <i>Question relevant when: S1Q01 = 1</i>	
SECTION 1: GENERAL INFORMATION > SECTION 1A: GENERAL INFORMATION <i>Group relevant when: CONSENT = 1 and (S1Q02 > 17 or S1Q02 = -76) and (S1Q01 = 1)</i>		
S1Q03 (required)	S1Q03. INTERVIEWER: MARK RESPONDENT'S SEX. ASK IF UNSURE.	1 MALE 2 FEMALE 3 PREFER NOT TO SAY
S1Q04 (required)	S1Q04. Where were you born?	1 ZAMBIA 2 ANGOLA 3 DRC 4 TANZANIA 5 MALAWI 6 MOZAMBIQUE 7 ZIMBABWE 8 BOTSWANA 9 NAMIBIA 55 OTHER COUNTRY 77 DON'T KNOW 99 REFUSED
S1Q04_OTHER (required)	RECORD OTHER COUNTRY OF BIRTH <i>Question relevant when: selected(S1Q04 , '55')</i>	
S1Q04A (required)	S1Q04A. In which province of Zambia were you born? <i>Question relevant when: S1Q04 = 1</i>	1 CENTRAL 2 COPPERBELT 3 EASTERN 4 LUAPULA 5 LUSAKA 6 NORTHERN 7 MUCHINGA 8 NORTH-WESTERN

Field	Question	Answer
		9 SOUTHERN 10 WESTERN 77 DON'T KNOW 99 REFUSED
 S1Q05 <i>(required)</i>	S1Q05. Have you ever attended school?	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
 S1Q05A <i>(required)</i>	S1Q05A. What is the highest class you have completed? <i>Question relevant when: S1Q05 = 1</i>	1 PRESCHOOL/NURSERY SCHOOL 2 SOME PRIMARY 3 COMPLETED PRIMARY 4 SOME SECONDARY 5 COMPLETED SECONDARY OR HIGHER 77 DON'T KNOW 99 REFUSED
 GI_READ	READ: For the following questions, please think about your most recent job working in the manganese industry. If you had more than one job, think about your main job.	
 S1Q05B <i>(required)</i>	S1Q05B. Did you relocate to take this job, including temporarily?	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
 S1Q05B1 <i>(required)</i>	S1Q05B1. Did you relocate from another part of Zambia or a different country? <i>Question relevant when: S1Q05B = 1</i>	1 ZAMBIA 2 DIFFERENT COUNTRY 77 DON'T KNOW 99 REFUSED
 S1Q05B2 <i>(required)</i>	S1Q05B2. From which province in Zambia did you relocate? <i>Question relevant when: S1Q05B1 = 1</i>	1 CENTRAL 2 COPPERBELT 3 EASTERN 4 LUAPULA 5 LUSAKA 6 NORTHERN 7 MUCHINGA

Field	Question	Answer
		8 NORTH-WESTERN 9 SOUTHERN 10 WESTERN 77 DON'T KNOW 99 REFUSED
 S1Q05B3 <i>(required)</i>	S1Q05B3. From which country did you relocate? <i>Question relevant when:</i> S1Q05B1 = 2	1 ANGOLA 2 DRC 3 TANZANIA 4 MALAWI 5 MOZAMBIQUE 6 ZIMBABWE 7 BOTSWANA 8 NAMIBIA 55 OTHER 77 DON'T KNOW 99 REFUSED
 S1Q05B3_OTHER	RECORD OTHER COUNTRY RELOCATED FROM <i>Question relevant when:</i> S1Q05B3 = 55	
 S1Q06 <i>(required)</i>	S1Q06. Approximately when did you start this work? INTERVIEWER: SELECT MONTH STARTED WORK	1 1. JANUARY 2 2. FEBRUARY 3 3. MARCH 4 4. APRIL 5 5. MAY 6 6. JUNE 7 7. JULY 8 8. AUGUST 9 9. SEPTEMBER 10 10. OCTOBER 11 11. NOVEMBER 12 12. DECEMBER 77 DON'T KNOW 99 REFUSED
 S1Q06_YEAR <i>(required)</i>	YEAR STARTED WORK	
INVALID_START_DATE_CHECK <i>(required)</i>	The start of employment date that has been selected ([S1Q06] / [S1Q06_YEAR]) is greater than the	

Field	Question	Answer
	current date (09 / 2025). Please return and fix the entry. <i>Question relevant when:</i> <i>INVALID_START_MONTH_FLAG = 1</i>	
 S1Q07 <i>(required)</i>	S1Q07. Do you still have this job?	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
SECTION 1: GENERAL INFORMATION > SECTION 1A: GENERAL INFORMATION > S1C <i>Group relevant when: not(selected(S1Q07 , '77')) and not(selected(S1Q07 , '99'))</i>		
 S1Q07A <i>(required)</i>	S1Q07A. Approximately when did you stop working this job? SELECT MONTH STOPPED WORKING JOB <i>Question relevant when: S1Q07 DOES NOT EQUAL 1</i>	1 1. JANUARY 2 2. FEBRUARY 3 3. MARCH 4 4. APRIL 5 5. MAY 6 6. JUNE 7 7. JULY 8 8. AUGUST 9 9. SEPTEMBER 10 10. OCTOBER 11 11. NOVEMBER 12 12. DECEMBER 77 DON'T KNOW 99 REFUSED
 S1Q07A_YEAR <i>(required)</i>	YEAR STOPPED WORKING JOB <i>Question relevant when: S1Q07 DOES NOT EQUAL 1</i>	
 INVALID_END_DATE_CHECK <i>(required)</i>	The end of employment date that has been selected ([S1Q07A] / [S1Q07A_YEAR]) is greater than the current date (09 / 2025). Please return and fix the entry. <i>Question relevant when:</i> <i>INVALID_END_MONTH_FLAG = 1</i>	

Field	Question	Answer
SECTION 1: GENERAL INFORMATION > SECTION 1A: GENERAL INFORMATION > S1C > S1D <i>Group relevant when: (JOB_END_FLAG DOES NOT EQUAL 1) and (DOES_NOT_KNOW_FLAG DOES NOT EQUAL 1)</i>		
S1Q08 <i>(required)</i>	S1Q08. Do you have a boss?	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
S1Q08A1 <i>(required)</i>	S1Q08A1. Does anyone tell you when to work? <i>Question relevant when: S1Q08 > 1</i>	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
S1Q08A2 <i>(required)</i>	S1Q08A2. Does anyone tell you where to work? <i>Question relevant when: S1Q08 > 1</i>	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
S1Q08A3 <i>(required)</i>	S1Q08A3. Does anyone tell you which tasks to do at work? <i>Question relevant when: S1Q08 > 1</i>	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
S1Q08B <i>(required)</i>	S1Q08B. Who tells you to do this? <i>Question relevant when: S1Q08A1 = 1 or S1Q08A2 = 1 or S1Q08A3 = 1</i>	1 SITE OWNER 2 SUBCONTRACTOR 3 MANPOWER AGENCY 4 TRADER 5 MEMBER OF RESPONDENT'S FAMILY 55 OTHER 77 DON'T KNOW 99 REFUSED
S1Q08B_OTHER <i>(required)</i>	RECORD OTHER <i>Question relevant when: selected(S1Q08B , '55')</i>	
S1Q08C <i>(required)</i>	S1Q08C.	1 a site owner? 2 a subcontractor?

Field	Question	Answer
	Is your boss... READ ALOUD RESPONSE OPTIONS AND SELECT ALL THAT APPLY <i>Question relevant when: S1Q08 = 1</i>	3 a manpower agency? 4 a trader? 5 a member of your family? 55 OTHER 77 DON'T KNOW 99 REFUSED
 S1Q08C_OTHER <i>(required)</i>	RECORD OTHER <i>Question relevant when: selected(S1Q08C , '55')</i>	
 S1Q08D <i>(required)</i>	S1Q08D. INTERVIEWER: WHAT DOES THE RESPONDENT CALL THIER BOSS OR THE PERSON WHO TELLS THEM WHAT TO DO? USE A GENERAL TERM OR NICKNAME, NOT A REAL NAME. <i>Question relevant when: S1Q09 = 1</i>	
 S1Q08E <i>(required)</i>	S1Q08E. Are you the boss of other workers? <i>Question relevant when: S1Q08 = 1</i>	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
 S1Q08F <i>(required)</i>	S1Q08F. What kind of mine do you work in?	1 TUNNEL 2 OPEN PIT 3 ALLUVIAL 55 OTHER 77 DON'T KNOW 99 REFUSED
 S1Q08F_OTHER <i>(required)</i>	RECORD OTHER <i>Question relevant when: selected(S1Q08F , '55')</i>	
 S1Q08G <i>(required)</i>	S1Q08G. At your work site, do the workers use ... SELECT ALL THAT APPLY	1 generators? 2 water pumps? 3 excavators or bulldozers? 4 mechanized drills? 55 other machinery?

Field	Question	Answer
	Question relevant when: (selected(S1Q08B , '2') or selected(S1Q08C , '2') or selected(S1Q08F , '2'))	66 NONE 77 DON'T KNOW 99 REFUSED
 S1Q08G_OTHER (required)	RECORD OTHER Question relevant when: selected(S1Q08G , '55')	
 S1Q10 (required)	S1Q10. Is your worksite run by a cooperative?	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
 S1Q10A (required)	What's the name of the cooperative? Question relevant when: S1Q10 = 1	
 S1Q11 (required)	S1Q11. In which manganese mining activities did you engage in the most recent month you worked? SELECT ALL THAT APPLY	1 SOIL AND ROCK TESTING/SAMPLING DRILLING, BLASTING, AND 2 TRENCHING TO ACCESS THE ORE 3 LAND CLEARING AND INFRASTRUCTURE SET UP 4 ORE EXCAVATION TRANSPORTATION OF ORE TO 5 STOCKPILES OR THE PROCESSOR 6 SORTING AND OR CRUSHING WASHING AND GRAVITY 7 SEPARATION USING JIGS, SPIRALS, OR WASHING TABLES 8 EFFLUENT AND DUST CONTROL 9 LOADING ORE ONTO TRUCKS 10 SMELTING AND REFINING 11 SALES TO TRADERS, SMELTERS, OR EXPORTERS 12 SITE RESTORATION AND REFORESTATION

Field	Question	Answer
		55 OTHER 77 DON'T KNOW 99 REFUSED
 S1Q11_OTHER_WORK_FOLLOW_UP	What other work related to the manganese mining did you do? <i>Question relevant when: selected(S1Q11 , '55')</i>	
 S1Q11A <i>(required)</i>	S1Q11A. On which of these activities do (did) you spend the most time?	1 SOIL AND ROCK TESTING/SAMPLING DRILLING, BLASTING, AND 2 TRENCHING TO ACCESS THE ORE 3 LAND CLEARING AND INFRASTRUCTURE SET UP 4 ORE EXCAVATION TRANSPORTATION OF ORE TO 5 STOCKPILES OR THE PROCESSOR 6 SORTING AND OR CRUSHING WASHING AND GRAVITY 7 SEPARATION USING JIGS, SPIRALS, OR WASHING TABLES 8 EFFLUENT AND DUST CONTROL 9 LOADING ORE ONTO TRUCKS 10 SMELTING AND REFINING 11 SALES TO TRADERS, SMELTERS, OR EXPORTERS 12 SITE RESTORATION AND REFORESTATION 55 OTHER: ... 77 DON'T KNOW 99 REFUSED

Field	Question	Answer
SECTION 2: RECRUITMENT <i>Group relevant when: (CONSENT = 1) and (S1Q02 > 17 or S1Q02 = -76) and (S1Q01 = 1) and (S1Q07 DOES NOT EQUAL 77) and (S1Q07 DOES NOT EQUAL 99) and (JOB_END_FLAG DOES NOT EQUAL 1) and (DOES_NOT_KNOW_FLAG DOES NOT EQUAL 1)</i>		
S2Q01 <i>(required)</i>	S2Q01. Next we would like to ask you a few questions about how you started in your job. Did anyone help you get this job?	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
S2Q01A <i>(required)</i>	S2Q01A. Who helped you get this job? INTERVIEWER: SELECT ALL THAT APPLY. ASK "Anyone else?" BEFORE MOVING ON. <i>Question relevant when: S2Q01 = 1</i>	1 FAMILY MEMBER 2 FRIEND 3 RECRUITMENT AGENT 55 OTHER 77 DON'T KNOW 99 REFUSED
S2Q01A_OTHER <i>(required)</i>	RECORD OTHER PERSON WHO HELPED GET JOB <i>Question relevant when: selected(S2Q01A , '55')</i>	
S2Q01B	S2Q01B. Did you have debt to a recruitment agent or your [boss] for costs related to getting the job, such as recruitment fees or travel? <i>Question relevant when: S1Q09 = 1</i>	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
S2Q01C	S2Q01C. Did you have to work to pay off the debt? <i>Question relevant when: S2Q01B = 1</i>	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
S2Q02 <i>(required)</i>	S2Q02. Did you feel compelled to take this job? <i>Question relevant when: S1Q09 = 1</i>	1 YES 2 NO 77 DON'T KNOW 99 REFUSED

Field	Question	Answer
S2Q02A <i>(required)</i>	S2Q02A. Why did you feel compelled to take this job? INTERVIEWER: SELECT ALL THAT APPLY. ASK "Any other reason?" AT LEAST TWICE BEFORE MOVING ON. <i>Question relevant when: S2Q02 = 1</i>	THREATS OF OR SUBJECTION TO PHYSICAL VIOLENCE 1 AGAINST RESPONDENT OR RESPONDENT'S FAMILY BY EMPLOYER RESTRICTION ON 2 RESPONDENT'S MOVEMENT BY EMPLOYER DEBT BONDAGE OR 3 MANIPULATION OF DEBT (DEBT TO EMPLOYER) WITHHOLDING OF VALUABLE 5 DOCUMENTS BY EMPLOYER DEPORTATION OR THREAT OF 6 DEPORTATION THREAT OF LOSS OF 7 HOUSING/LAND 55 OTHER JOB OPPORTUNITIES ARE 66 SCARCE/I WOULDN'T HAVE MONEY/ETC 77 DON'T KNOW 99 REFUSED
S2Q02A_OTHER <i>(required)</i>	RECORD OTHER REASONS <i>Question relevant when: selected(S2Q02A , '55')</i>	
S2Q03 <i>(required)</i>	S2Q03. Do (did) you have a written contract for this work? <i>Question relevant when: S1Q09 = 1</i>	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
S2Q03A <i>(required)</i>	S2Q03A. Did you have a verbal agreement for this work? <i>Question relevant when: S2Q03 DOES NOT EQUAL 1 and S1Q09 = 1</i>	1 YES 2 NO 77 DON'T KNOW 99 REFUSED

Field	Question	Answer
S2Q04 <i>(required)</i>	S2Q04. Think about what your [boss] told you before you started the job. Now think about the job you're actually doing. Did the conditions of the job you were promised actually happen? <i>Question relevant when: S1Q09 = 1</i>	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
S2Q04A <i>(required)</i>	S2Q04A. Which elements did not happen? [INTERVIEWER: LISTEN AND SELECT ALL THAT APPLY. ASK "Anything else?" TWICE BEFORE MOVING ON.] <i>Question relevant when: S2Q04 = 2</i>	NATURE OF THE JOB 1 (FUNDAMENTAL DUTIES OF THE JOB, TYPE OF JOB) 2 WORK TASKS 3 HOURS 4 EARNINGS 5 LIVING CONDITIONS 6 HAZARDS 7 JOB LOCATION 8 LEGALITY OF WORK 9 EMPLOYER 55 OTHER 77 DON'T KNOW 99 REFUSED
S2Q04A_OTHER <i>(required)</i>	RECORD OTHER THINGS THAT DIDN'T HAPPEN AS PROMISED <i>Question relevant when: selected(S2Q04A , '55')</i>	
S2Q04B <i>(required)</i>	S2Q04B. What would have happened if you had asked for the work or conditions you were promised? [INTERVIEWER: LISTEN AND SELECT ALL THAT APPLY. ASK "Any other reason?" TWICE BEFORE MOVING ON.]	THREATS OF OR SUBJECTION TO PHYSICAL VIOLENCE 1 AGAINST RESPONDENT OR RESPONDENT'S FAMILY BY EMPLOYER RESTRICTION ON 2 RESPONDENT'S MOVEMENT BY EMPLOYER DEBT BONDAGE OR 3 MANIPULATION OF DEBT (DEBT TO EMPLOYER)

Field	Question	Answer
	Question relevant when: S2Q04 = 2	5 WITHHOLDING OF VALUABLE DOCUMENTS BY EMPLOYER 6 DEPORTATION OR THREAT OF DEPORTATION 7 THREAT OF LOSS OF HOUSING/LAND 9 DISMISSAL OR THREATS OF DISMISSAL 55 OTHER 66 NOTHING 77 DON'T KNOW 99 REFUSED
S2Q04B_OTHER (required)	RECORD OTHER CONSEQUENCE Question relevant when: selected(S2Q04B , '55')	
SECTION 3: LIVING CONDITIONS Group relevant when: (CONSENT = 1) and (S1Q02 > 17 or S1Q02 = -76) and (S1Q01 = 1) and (S1Q07 DOES NOT EQUAL 77) and (S1Q07 DOES NOT EQUAL 99) and (JOB_END_FLAG DOES NOT EQUAL 1) and (DOES_NOT_KNOW_FLAG DOES NOT EQUAL 1)		
S3Q01 (required)	S3Q01. Does (Did) your [boss] provide your housing? Question relevant when: S1Q09 = 1	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
S3Q01A (required)	S3Q01A. Does your [boss] deduct the cost of housing from your earnings? Question relevant when: S3Q01 = 1	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
S3Q01B (required)	S3Q01B. Could you have lived somewhere else and still work at your job? Question relevant when: S3Q01 = 1	1 YES 2 NO 77 DON'T KNOW 99 REFUSED

Field	Question	Answer
S3Q01C <i>(required)</i>	S3Q01C. Why not? [INTERVIEWER: LISTEN AND SELECT ALL THAT APPLY] <i>Question relevant when: S3Q01B = 2</i>	EMPLOYER, MANAGER, 1 WOULD NOT LET ME/ THEY REQUIRE THAT I LIVE HERE 2 I CAN'T AFFORD TO LIVE SOMEWHERE ELSE 3 NO ALTERNATIVE DUE TO REMOTENESS OF WORKSITE 55 OTHER 77 DON'T KNOW 99 REFUSED
S3Q01C_OTHER <i>(required)</i>	RECORD OTHER REASON <i>Question relevant when: selected(S3Q01C , '55')</i>	
S3Q02 <i>(required)</i>	S3Q02. I would like to ask you a few questions about your housing. How would you describe the quality of your housing-- Would you say good, ok, or bad? <i>Question relevant when: S3Q01 = 1</i>	1 GOOD 2 OK/FINE 3 BAD 77 DON'T KNOW 99 REFUSED
S3Q02A <i>(required)</i>	S3Q02A. Do (Did) you have access to clean water in or near your housing? <i>Question relevant when: S3Q01 = 1</i>	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
S3Q02B <i>(required)</i>	S3Q02B. Do you feel that your housing is harmful to your health? <i>Question relevant when: S3Q01 = 1</i>	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
S3Q02C <i>(required)</i>	S3Q02C. Do (Did) you feel safe in your housing? <i>Question relevant when: S3Q01 = 1</i>	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
S3Q02D <i>(required)</i>	S3Q02D.	1 1-4 PEOPLE 2 5-8 PEOPLE

Field	Question	Answer
	How many people sleep (slept) in the room you sleep (slept) in, including yourself? <i>Question relevant when: S3Q01 = 1</i>	3 9 OR MORE PEOPLE 77 DON'T KNOW 99 REFUSED
S3Q03 (required)	S3Q03. READ: Now I will ask you about your freedom of movement at work and outside of work. During working hours, can you leave your workplace if needed? <i>Question relevant when: S1Q09 = 1</i>	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
S3Q03A (required)	S3Q03A. Why can't you leave your workplace during working hours? [INTERVIEWER: LISTEN AND SELECT ALL THAT APPLY] <i>Question relevant when: S3Q03 = 2</i>	SUBJECT TO 1 FINES/DEDUCTIONS/DISMISSAL 2 SUBJECT TO VERBAL ABUSE 3 PHYSICALLY UNABLE TO LEAVE 4 REPUTATION WOULD SUFFER 5 OTHER 5 7 DON'T KNOW 7 9 REFUSED 9
S3Q03A_OTHER (required)	RECORD OTHER REASON <i>Question relevant when: selected(S3Q03A , '55')</i>	
S3Q03B (required)	S3Q03B. How are you prevented from leaving? [INTERVIEWER: LISTEN AND SELECT ALL THAT APPLY] <i>Question relevant when: selected(S3Q03A , '3')</i>	1 WOULD BE STOPPED BY SUPERVISOR 2 GUARDS 3 LOCKED DOORS/GATES 4 ISOLATED WITHOUT TRANSPORT 5 SUBJECTED TO PHYSICAL VIOLENCE 55 OTHER

Field	Question	Answer
		77 DON'T KNOW 99 REFUSED
S3Q03B_OTHER (required)	RECORD OTHER WAY PREVENTED FROM LEAVING <i>Question relevant when: selected(S3Q03B , '55')</i>	
S3Q04 (required)	S3Q04. Are you free to leave the area of your lodgings outside of work hours? <i>Question relevant when: S3Q01 = 1</i>	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
S3Q04A (required)	S3Q04A. Who prevents you from coming and going outside of work hours? [INTERVIEWER: LISTEN AND SELECT ALL THAT APPLY] <i>Question relevant when: S3Q04 = 2</i>	1 GUARD 2 MANPOWER AGENCY 3 FAMILY/SPOUSE 55 OTHER 77 DON'T KNOW 99 REFUSED
S3Q04A_OTHER (required)	RECORD OTHER <i>Question relevant when: selected(S3Q04A , '55')</i>	
S3Q05 (required)	S3Q05. Does your [boss] hold any of your important documents, such as your NRC or birth certificate? <i>Question relevant when: S1Q09 = 1</i>	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
S3Q05A (required)	S3Q05A. Can you access your documents if needed? <i>Question relevant when: S3Q05 = 1</i>	1 YES 2 NO 77 DON'T KNOW 99 REFUSED

Field	Question	Answer
SECTION 4: HOURS, DEBT AND PAYMENT <i>Group relevant when: (CONSENT = 1) and (S1Q02 > 17 or S1Q02 = -76) and (S1Q01 = 1) and (S1Q07 DOES NOT EQUAL 77) and (S1Q07 DOES NOT EQUAL 99) and (JOB_END_FLAG DOES NOT EQUAL 1) and (DOES_NOT_KNOW_FLAG DOES NOT EQUAL 1)</i>		
S4Q01 <i>(required)</i>	S4Q01. Sometimes workers are in debt to their employers or recruiters, for example after buying food or receiving part of their salary in advance. The next questions are about debt to your [boss]. Has your [boss] charged you excessive or unagreed amounts for food, lodging, or supplies? <i>Question relevant when: S1Q09 = 1</i>	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
S4Q01A <i>(required)</i>	S4Q01A. Have these amounts put you in debt with your [boss]? <i>Question relevant when: S4Q01 = 1</i>	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
S4Q01AA <i>(required)</i>	S4Q01AA. Have you been fined at work? IF NEEDED: For example, fines for workplace violations or failure to reach production targets <i>Question relevant when: S1Q09 = 1</i>	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
S4Q01B <i>(required)</i>	S4Q01B. Has you gone into debt with your [boss] due to fines? <i>Question relevant when: S4Q01AA = 1</i>	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
S4Q01BB <i>(required)</i>	S4Q01BB.	1 YES 2 NO 77 DON'T KNOW

Field	Question	Answer
	Do you have any debt with your [boss]? <i>Question relevant when: S4Q01A DOES NOT EQUAL 1 and S4Q01B DOES NOT EQUAL 1 and S1Q09 = 1</i>	99 REFUSED
S4Q01BB_alt (required)	S4Q01BB_alt. Do you have any other debt with your [boss]? <i>Question relevant when: S4Q01A = 1 or S4Q01B = 1</i>	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
S4Q01C (required)	S4Q01C. Does your [boss] unfairly increase the amount of your debt over time? <i>Question relevant when: S4Q01A = 1 or S4Q01B = 1 or S4Q01BB = 1 or S4Q01BB_alt = 1</i>	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
S4Q01D (required)	S4Q01D. If you were to leave your job before paying off your debt, what would happen? INTERVIEWER: SELECT ALL THAT APPLY. ASK "Anything else?" AT LEAST TWICE BEFORE MOVING ON. <i>Question relevant when: S4Q01A = 1 or S4Q01B = 1 or S4Q01BB = 1 or S4Q01BB_alt = 1</i>	THREATS OF OR SUBJECTION TO PHYSICAL VIOLENCE 1 AGAINST RESPONDENT OR RESPONDENT'S FAMILY BY EMPLOYER RESTRICTION ON 2 RESPONDENT'S MOVEMENT BY EMPLOYER 5 WITHHOLDING OF VALUABLE DOCUMENTS BY EMPLOYER 6 DEPORTATION OR THREAT OF DEPORTATION 7 THREAT OF LOSS OF HOUSING/LAND 8 ARREST OR PROSECUTION DEDUCTION OF AMOUNT 10 OWED FROM THE FINAL PAYMENT 11 WITHHOLDING OF MATERIAL GOODS AS COLLATERAL

Field	Question	Answer
		12 EXCLUSION FROM FUTURE EMPLOYMENT 55 OTHER 66 NOTHING 77 DON'T KNOW 99 REFUSED
S4Q01D_OTHER <i>(required)</i>	RECORD OTHER CONSEQUENCE <i>Question relevant when: selected(S4Q01D , '55')</i>	
S4Q02 <i>(required)</i>	S4Q02. Now I would like to ask you about your earnings. Please only include your standard earnings, not any overtime pay or bonuses. Include only the amount you take home, after any deductions. About how much do you earn in Kwacha for a typical day's work? INTERVIEWER: IF RESPONDENT IS PAID IN KIND OR IN ANOTHER CURRENCY, ASK RESPONDENT TO ESTIMATE VALUE IN KWACHA	
S4Q03 <i>(required)</i>	S4Q03. Who pays you? <i>Question relevant when: S1Q09 = 1</i>	1 SITE OWNER 2 SUBCONTRACTOR 3 MANPOWER AGENCY 4 MEMBER OF YOUR FAMILY 55 OTHER 77 DON'T KNOW 99 REFUSED
S4Q03_OTHER <i>(required)</i>	RECORD OTHER <i>Question relevant when: selected(S4Q03 , '55')</i>	
S4Q04 <i>(required)</i>	S4Q04. Are your earnings enough to meet your basic needs ?	1 YES 2 NO 77 DON'T KNOW 99 REFUSED

Field	Question	Answer
S4Q05 <i>(required)</i>	S4Q05. Does your [boss] impose a production quota/target? <i>Question relevant when: S1Q09 = 1</i>	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
SECTION 4: HOURS, DEBT AND PAYMENT > quotagroup_start		
S4Q05A <i>(required)</i>	S4Q05A. What is the daily quota/target? ENTER NUMBER <i>Question relevant when: S4Q05 = 1</i>	
S4Q05A_UNIT <i>(required)</i>	INDICATE THE UNIT OF MEASUREMENT <i>Question relevant when: S4Q05 = 1</i>	1 KG 2 TONS 55 OTHER 77 DON'T KNOW 99 REFUSED
S4Q05A_UNIT_OTHER <i>(required)</i>	RECORD OTHER UNIT OF MEASUREMENT <i>Question relevant when: selected(S4Q05A_UNIT , '55')</i>	
S4Q05B <i>(required)</i>	S4Q05B. Do you consider the quota/target to be a reasonable amount for an individual worker working alone? <i>Question relevant when: S4Q05 = 1</i>	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
S4Q05C <i>(required)</i>	S4Q05C. What would happen if you failed to meet the quota/target? INTERVIEWER: SELECT ALL THAT APPLY. ASK "Anything else?" AT LEAST TWICE BEFORE MOVING ON.	THREATS OF OR SUBJECTION TO PHYSICAL VIOLENCE 1 AGAINST RESPONDENT OR RESPONDENT'S FAMILY BY EMPLOYER RESTRICTION ON 2 RESPONDENT'S MOVEMENT BY EMPLOYER

Field	Question	Answer
	Question relevant when: S4Q05 = 1	DEBT BONDAGE OR 3 MANIPULATION OF DEBT (DEBT TO EMPLOYER) 4 LOSS OF WITHHELD WAGES 5 WITHHOLDING OF VALUABLE DOCUMENTS BY EMPLOYER 6 DEPORTATION OR THREAT OF DEPORTATION 7 THREAT OF LOSS OF HOUSING/LAND 9 DISMISSAL OR THREATS OF DISMISSAL 10 FINE OR SALARY DEDUCTION 12 EXCLUSION FROM FUTURE EMPLOYMENT 55 OTHER NOTHING/EARN LESS 66 MONEY/REPUTATION WOULD SUFFER 77 DON'T KNOW 99 REFUSED
S4Q05C_OTHER (required)	RECORD OTHER CONSEQUENCE Question relevant when: selected(S4Q05C , '55')	
SECTION 5: WORKING CONDITIONS Group relevant when: (CONSENT = 1) and (S1Q02 > 17 or S1Q02 = -76) and (S1Q01 = 1) and (S1Q07 DOES NOT EQUAL 77) and (S1Q07 DOES NOT EQUAL 99) and (JOB_END_FLAG DOES NOT EQUAL 1) and (DOES_NOT_KNOW_FLAG DOES NOT EQUAL 1)		
S5Q01	S5Q01. Do people under age 18 work at the place where you work?	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
S5Q02 (required)	S5Q02A. Does your work involve exposure to...	1 excessive noise? 2 extreme heat? 3 dangerous chemicals? 4 dangerous or sharp tools or heavy machinery?

Field	Question	Answer
		5 carrying unreasonably heavy loads? 6 dust or strong fumes? 7 tunnel collapse? 55 any other risks to your health or safety? 66 NONE 77 DON'T KNOW 99 REFUSED
S5Q02_OTHER (required)	RECORD OTHER HAZARD <i>Question relevant when: selected(S5Q02 , '55')</i>	
S5Q07 (required)	S5Q07. What would happen if you refused to do these hazardous activities? INTERVIEWER: SELECT ALL THAT APPLY. ASK "Any other reason?" AT LEAST TWICE BEFORE MOVING ON. <i>Question relevant when: S1Q09 = 1 and S5Q02 DOES NOT EQUAL 66</i>	THREATS OF OR SUBJECTION TO PHYSICAL VIOLENCE 1 AGAINST RESPONDENT OR RESPONDENT'S FAMILY BY EMPLOYER RESTRICTION ON 2 RESPONDENT'S MOVEMENT BY EMPLOYER DEBT BONDAGE OR 3 MANIPULATION OF DEBT (DEBT TO EMPLOYER) 4 LOSS OF WITHHELD WAGES 5 WITHHOLDING OF VALUABLE DOCUMENTS BY EMPLOYER 6 DEPORTATION OR THREAT OF DEPORTATION 7 THREAT OF LOSS OF HOUSING/LAND 9 DISMISSAL OR THREATS OF DISMISSAL 10 FINE OR SALARY DEDUCTION 12 EXCLUSION FROM FUTURE EMPLOYMENT 55 OTHER NOTHING/EARN LESS 66 MONEY/REPUTATION WOULD SUFFER

Field	Question	Answer
		77 DON'T KNOW 99 REFUSED
S5Q07_OTHER (required)	RECORD OTHER CONSEQUENCE <i>Question relevant when: selected(S5Q07 , '55')</i>	
S5Q03 (required)	S5Q03. Does your [boss] provide you with the personal protective equipment (PPE) needed to perform your job safely? <i>Question relevant when: S1Q09 = 1</i>	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
S5Q04 (required)	S5Q04. I will read a list of protective gear. Please tell me which items you usually wear when working: INTERVIEWER: LISTEN AND SELECT ALL THAT APPLY. INCLUDE ALL PPE USED WHETHER PROVIDED BY EMPLOYER OR WORKER.	1 protective goggles 2 helmet 3 ear-plugs 4 respirator or dust-mask 5 protective clothing such as coveralls 6 gloves 7 shoes or boots 55 Do you wear any other protective gear? 66 NONE 77 DON'T KNOW 99 REFUSED
S5Q04_OTHER (required)	RECORD OTHER PROTECTIVE GEAR <i>Question relevant when: selected(S5Q04 , '55')</i>	
S5Q05 (required)	S5Q05. Does your [boss] provide you with the training needed to perform your job safely? <i>Question relevant when: S1Q09 = 1</i>	1 YES 2 NO 77 DON'T KNOW 99 REFUSED

Field	Question	Answer
S5Q06 (required)	S5Q06. Does your [boss] endanger your life by failing to take proper safety precautions? Question relevant when: S1Q09 = 1	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
S5Q08 (required)	S5Q08. Have you ever gotten hurt or sick because of your work in this job?	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
S5Q08A (required)	S5Q08A. What types of injury or sickness have you had? INTERVIEWER: LISTEN AND SELECT ALL THAT APPLY. Question relevant when: S5Q08 = 1	1 HEAD INJURY 2 INJURY TO OR DEAFNESS IN EARS 3 EYE INJURY 4 INJURY TO SHOULDER 5 INJURY TO OR SWELLING IN HANDS 6 SMOKE, DUST, OR CHEMICAL DAMAGE TO LUNGS 7 INJURY TO ABDOMEN 8 BACK STRAIN/ PAIN IN BACK 9 INJURY TO KNEES OR LEGS 10 INJURY TO ANKLE/FEET 11 HEAT STROKE 12 BURN FROM FIRE 13 CHEMICAL BURN 14 CUTS/WOUNDS 55 OTHER 77 DON'T KNOW 99 REFUSED
S5Q08A_OTHER (required)	RECORD OTHER INJURY/SICKNESS Question relevant when: selected(S5Q08A , '55')	
S5Q08B (required)	S5Q08B. How did you get hurt or sick?	1 FALLING ROCK 2 TOOL ACCIDENT 3 MACHINERY ACCIDENT 4 INHALATION OF DUST/SMOKE

Field	Question	Answer
	INTERVIEWER: LISTEN AND SELECT ALL THAT APPLY. <i>Question relevant when: S5Q08 = 1</i>	5 VIOLENCE BY COWORKER/EMPLOYER 6 CARRYING HEAVY LOADS 7 REPETITIVE MOVEMENT 8 POOR SANITARY CONDITIONS 55 OTHER 77 DON'T KNOW 99 REFUSED
S5Q08B_OTHER <i>(required)</i>	RECORD OTHER WAY GOT HURT/SICK <i>Question relevant when: selected(S5Q08B , '55')</i>	
S5Q09 <i>(required)</i>	S5Q09. Does your [boss] require you to work when you are seriously sick or injured? <i>Question relevant when: S1Q09 = 1</i>	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
S5Q09A <i>(required)</i>	S5Q09A. What would happen if you refused to work while sick or injured? INTERVIEWER: SELECT ALL THAT APPLY. ASK "Any other reason?" AT LEAST TWICE BEFORE MOVING ON. <i>Question relevant when: S5Q09 = 1</i>	THREATS OF OR SUBJECTION TO PHYSICAL VIOLENCE 1 AGAINST RESPONDENT OR RESPONDENT'S FAMILY BY EMPLOYER RESTRICTION ON 2 RESPONDENT'S MOVEMENT BY EMPLOYER DEBT BONDAGE OR 3 MANIPULATION OF DEBT (DEBT TO EMPLOYER) 4 LOSS OF WITHHELD WAGES 5 WITHHOLDING OF VALUABLE DOCUMENTS BY EMPLOYER 6 DEPORTATION OR THREAT OF DEPORTATION 7 THREAT OF LOSS OF HOUSING/LAND 9 DISMISSAL OR THREATS OF DISMISSAL 10 FINE OR SALARY DEDUCTION

Field	Question	Answer
		12 EXCLUSION FROM FUTURE EMPLOYMENT 55 OTHER 66 NOTHING 77 DON'T KNOW 99 REFUSED
S5Q09A_OTHER <i>(required)</i>	RECORD OTHER CONSEQUENCE <i>Question relevant when: selected(S5Q09A , '55')</i>	
S5Q09B1	S5Q09B. I have a few more questions about your health and mobility. Do you have trouble arising from a chair?	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
S5Q09B2	Is your handwriting smaller than it once was?	1 YES 2 NO 3 NOT APPLICABLE - DOESN'T WRITE 77 DON'T KNOW 99 REFUSED
S5Q09B3	Do people tell you your voice is softer than it once was?	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
S5Q09B4	Is your balance, when walking, poor?	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
S5Q09B5	Do your feet suddenly seem to freeze in door-ways?	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
S5Q09B6	Does your face seem less expressive than it used to?	1 YES 2 NO 77 DON'T KNOW 99 REFUSED

Field	Question	Answer
S5Q09B7	Do your arms and legs shake?	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
S5Q09B8	Do you have trouble buttoning buttons?	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
S5Q09B9	Do you shuffle your feet and take tiny steps when you walk?	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
S5Q10 (required)	S5Q10. On average, how many hours do you work per week?	
S5Q10A (required)	S5Q10A. What would happen if you refused to work over 48 hours per week? INTERVIEWER: SELECT ALL THAT APPLY. ASK "Any other reason?" AT LEAST TWICE BEFORE MOVING ON. <i>Question relevant when: S5Q10 > 48 and S1Q09 = 1</i>	THREATS OF OR SUBJECTION TO PHYSICAL VIOLENCE 1 AGAINST RESPONDENT OR RESPONDENT'S FAMILY BY EMPLOYER RESTRICTION ON 2 RESPONDENT'S MOVEMENT BY EMPLOYER DEBT BONDAGE OR 3 MANIPULATION OF DEBT (DEBT TO EMPLOYER) 4 LOSS OF WITHHELD WAGES 5 WITHHOLDING OF VALUABLE DOCUMENTS BY EMPLOYER 6 DEPORTATION OR THREAT OF DEPORTATION 7 THREAT OF LOSS OF HOUSING/LAND 9 DISMISSAL OR THREATS OF DISMISSAL 10 FINE OR SALARY DEDUCTION 12 EXCLUSION FROM FUTURE EMPLOYMENT 55 OTHER

Field	Question	Answer
		NOTHING/EARN LESS 66 MONEY/REPUTATION WOULD SUFFER 77 DON'T KNOW 99 REFUSED
S5Q10A_OTHER <i>(required)</i>	RECORD OTHER CONSEQUENCE <i>Question relevant when: selected(S5Q10A , '55')</i>	
S5Q11 <i>(required)</i>	S5Q11. How many days do (did) you usually work each week?	1 1 DAY 2 2 DAYS 3 3 DAYS 4 4 DAYS 5 5 DAYS 6 6 DAYS 7 7 DAYS - DON'T KNOW 77 - REFUSED 99
S5Q12	S5Q12. Are you required to work non-stop without breaks during the working day?	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
S5Q13 <i>(required)</i>	S5Q13. Can you raise concerns about your working conditions without fear of the consequences? <i>Question relevant when: S1Q09 = 1</i>	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
S5Q15 <i>(required)</i>	S5Q15. Does your [boss] do anything to prevent you from quitting your job? <i>Question relevant when: S1Q09 = 1</i>	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
S5Q15A <i>(required)</i>	S5Q15A.	1 THREATS OF OR SUBJECTION TO PHYSICAL VIOLENCE

Field	Question	Answer
	How does (did) your [boss] keep you from quitting your job? INTERVIEWER: SELECT ALL THAT APPLY. ASK "Any other reason?" AT LEAST TWICE BEFORE MOVING ON. <i>Question relevant when: S5Q15 = 1</i>	AGAINST RESPONDENT OR RESPONDENT'S FAMILY BY EMPLOYER RESTRICTION ON 2 RESPONDENT'S MOVEMENT BY EMPLOYER DEBT BONDAGE OR 3 MANIPULATION OF DEBT (DEBT TO EMPLOYER) 4 LOSS OF WITHHELD WAGES 5 WITHHOLDING OF VALUABLE DOCUMENTS BY EMPLOYER 6 DEPORTATION OR THREAT OF DEPORTATION 7 THREAT OF LOSS OF HOUSING/LAND 12 EXCLUSION FROM FUTURE EMPLOYMENT 55 OTHER 66 NO COERCION ("NEEDED JOB, COULDN'T QUIT") 77 DON'T KNOW 99 REFUSED
S5Q15A_OTHER <i>(required)</i>	RECORD OTHER WAY BOSS KEPT FROM QUITTING JOB <i>Question relevant when: selected(S5Q15A , '55')</i>	
S5Q15B	You mentioned that you would face "exclusion from future employment" in response to this (these) questions: 0 0 0 0 0 0 Please tell me more about that. <i>Question relevant when: selected(S4Q01D , '12') or</i>	

Field	Question	Answer
	<i>selected(S4Q05C , '12') or selected(S5Q07 , '12') or selected(S5Q09A , '12') or selected(S5Q10A , '12') or selected(S5Q15A , '12')</i>	
S5Q16	What is the name of the place where you work (worked) for the job we've been talking about? [INTERVIEWER: RECONFIRM CONFIDENTIALITY IF NEEDED.]	
S5Q17	Where is your workplace located? INTERVIEWER: RECORD AS MUCH DETAIL AS POSSIBLE.	
S5Q18	Do you own the mine site?	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
S5Q19	Do you control access to the mine site?	1 YES 2 NO 77 DON'T KNOW 99 REFUSED
SECTION 5: WORKING CONDITIONS > S5Q20_start		
S5Q20	Where are the minerals you mine sold?	
S5Q20A	INTERVIEWER: INDICATE THE TYPE OF PLACE DESCRIBED BY THE RESPONDENT. SELECT ALL THAT APPLY.	1 MINERAL PROCESSING PLANT 2 INTERMEDIARY/MIDDLE MAN 3 LARGE MINING CORPORATION 55 OTHER
S5Q20A_OTHER	RECORD OTHER TYPE OF PLACE	
interviewer_notes	INTERVIEWER NOTES	

ZAMBIA MANGANESE STUDY: WORKER INTERVIEW PROTOCOL QUESTION BANK

Interviewer:	Date (DD/MM/YY):
Location of interview:	
Name:	Sex:
Profession (if applicable):	
Position (if applicable):	
Employer/Affiliated Institution/Organization (if applicable):	
Contact information (office address, phone number, email):	
Time interview started:	
Time interview ended:	

Interviewer Instructions:

Foster a dynamic conducive to gathering good data. The interview should have the relaxed feel of a conversation. Set the tone by using a slow pace in your speech.

Ask one question at a time. Give the respondent ample time to reflect and fully respond before moving to the next. Try not to interrupt, and do not answer on their behalf.

If the respondent agrees to be recorded, give them your full attention. Make note of any follow-up questions you want to remember to ask, but otherwise focus on the respondent rather than your paper.

Probe for more depth, particularly when responses are brief. Use phrases such as, “Tell me more about that” and “Can you give me an example?” Aim to get specific instances, in considerable detail, whenever possible.

You do not have to ask each question verbatim, but at least broach all the topics covered that are relevant to the worker by the guide. If a respondent makes clear they have no knowledge of that topic, move on to the next. Adapt the flow and questions to make them relevant to the respondent.

For each item, ask the general question first, and then probe the sub-items that have not been addressed spontaneously.

After gaining consent and assent, including to record, start the recording and then state the interview code number.

Introduction/Background:

1. Could you please tell me about your work in manganese mining?
 - a. How long have you been working in manganese?
 - b. How long have you worked in mining in general? (i.e., whether in manganese or otherwise)
2. Are you originally from Luapula/Central Province?
 - a. If not, where did you come from?
 - b. When and why did you come to Luapula/Central Province?

3. Please tell me about a typical workday.
 - a. What specific tasks do you perform in the mining process?
4. Do you know where the manganese goes after it leaves your mining site?
 - a. How is it sold?
 - b. How is it transported before/after sale?
 - c. Who buys it?
5. Have you heard of any processors or buyers in this area?
6. What products do you think are made from the manganese you mine?
7. Do you know what companies or countries buy manganese from Zambia? If so, please share more details about what you know.

Recruitment and Contracts:

8. How did you first hear about your current job in manganese mining?
9. Can you please explain how you got this job?
 - a. Was a recruiter involved?
 - i. If so: was the recruiter your employer or someone else?
 - ii. If so: was there a recruitment fee?
 - I. If yes: How much and how did you pay it?
 - b. Were you recruited from another region of Zambia or another country?
 - i. If so: What promises were made to you during recruitment?
10. How did you travel to Luapula/Central Province?
 - a. Who arranged your transportation?
 - b. Did you have to pay for the transportation? If so, how much?
11. Were you forced into taking this job for any reason?
12. If so, please explain: **(POSSIBLE REASONS TO PROBE FOR: DEBT BONDAGE, PHYSICAL FORCE, FALSE PROMISES)**
13. Did you take this job because of any debts that you have?
14. If so, are these debts from before this job or after? Please explain.
15. **(IF PREVIOUSLY MENTIONED RECRUITMENT DEBTS)** Are these the same debts from recruitment you mentioned before?
16. Do you have to work to pay off any wage advances you received from the recruiter or your employer?
 - a. Please explain the amount you received and how much you need to repay.
 - b. Did you reach an agreement with your employer or recruiter about how and when you will repay the advance?
17. Do you have a written contract with your current employer?
18. **IF YES:** Were you given a chance to read it? Did you understand it? Do you have a copy of it?
19. **IF NO:** Do you have a verbal agreement?
20. Does your day-to-day work match what was in your contract / your agreement? Does it match what you were originally promised (**EXAMPLES:** wage, location, type of work)?
 - a. Please explain.
21. Do you feel that you were tricked into taking a job that is worse than what you agreed to do when you were recruited / hired? If so, please explain how it is worse.

- a. Would you have taken this job if you had not been tricked? Please explain.
- 22. Does your employer hold any of your personal documents? Such as your NRC card (National Registration Card) passport, etc.?
- 23. IF YES: Who keeps them and why? Can you access them if you need to?

Working Conditions:

- 24. How would you describe your overall working conditions in the manganese mine/industry?
- 25. IF **CONDITIONS ARE REPORTED AS POOR ASK:** If you had known about these conditions, would you still have taken this job?
- 26. Please describe your relationship with your employer or mine/site manager.
- 27. Have you ever experienced any harassment or abuse by your employer/manager? Tell me more about that.
 - a. Have you seen any other workers experience any harassment or abuse? Can you tell me about one example?
- 28. How is your workload?
 - a. What is your workload or daily target?
 - b. Do you have enough time during your normal hours to do your work?
- 29. Does your employer/manager do anything to make you work harder or faster? (**Probe for violence, threats or wage deductions**)
- 30. What happens when workers want to stop working before they meet their targets / workload? (**Probe for penalties / threats**)
- 31. Do you work overtime? If so, how often? For how many hours?
 - a. Are you paid for your overtime work?
- 32. Could you turn down overtime if you wanted to? How would / has your employer responded if/when you turned down overtime?
- 33. Can you tell me how you are paid? (**PROBE: cash, mobile transfer, bank transfer, in-kind**)
 - a. Who pays you?
 - b. How is your pay calculated? Is it based on how many hours you work? Or is it calculated based on how much you produce? (i.e. hourly wage or piece rate)
 - c. How much are you paid and how often?
 - i. Is this always the same or does it change? Are your payments ever late? If so, please explain.
 - l. If your payments are late or less than agreed, have you talked to your employer about it? Please explain what happened if you did.
- 34. Do you think you are paid fairly for the work you do? Please explain.
- 35. Is the pay the same for all other workers doing the same job that you do or are others paid differently? Please explain.
- 36. What are the most hazardous (dangerous) parts of your job in manganese mining? How often do you do these things?
- 37. Was it clear that you would do these things before you started the job?
- 38. Have you ever refused any task because of danger? (**PROBE FOR THE SPECIFIC THREAT / ACTION TAKEN**)

39. Are you given proper safety equipment to do these tasks? What equipment do you have? Is it good quality? **(PROBE FOR EXPOSURE TO MANGANESE DUST, PROTECTIVE MASKS, GLOVES, ETC.)**
40. Do you always use this safety equipment? If no, why?
 - a. Are you aware of any health risks from working with manganese? What effects have you observed?
 - b. Have you or your co-workers experienced any unusual health symptoms like tremors, difficulty walking, or changes in behavior?
41. Have you ever been injured on the job? Please explain.
42. What happens if you do not go to work because you are sick or injured? **(PROBE FOR THREATS / EXPERIENCING: VIOLENCE, WAGE DEDUCTIONS/WITHHOLDING, JOB LOSS, ETC.)**
43. Have you taken on any debts from your employer? **(PROBE: recruitment fee, pay advance, fees for purchase or using tools or equipment, employer paid off debt on respondent's behalf, purchases at company-owned store)**
 - a. If so, please explain to whom, in exchange for what, and the amount of the debt.
 - b. How long have you had this debt? How are you repaying it?
 - c. What are the terms of your debt (interest, etc.) and do you think they are fair? Please explain.
 - d. Does your debt seem to be increasing, decreasing, or staying the same over time?
44. Can you tell me about any breaks you receive during your day such as for meals or to use the bathroom? How often are the breaks and how long are they?
 - a. Has your employer ever threatened you or your family or done something to you or your family to stop you from taking a break? How often?
45. If you had to leave work for the day for any reason, could you?
 - a. Has your employer ever threatened you or your family or done something to you or your family to stop you from doing this?**(PROBE FOR THE SPECIFIC THREAT / ACTION TAKEN)**
46. Do you know what the conditions are for ending your contract if you want to leave?
47. Have you seen anyone punished for ending or wanting to end their contract?
 - a. Have you ever tried to end your contract?
 - i. If so, did your employer or recruiter say or do anything to try and stop you from leaving? Please explain what happened.
 - b. If you wanted to leave, how would you get transportation back to your home area?
48. If you are unhappy about your wages, working conditions, hours, etc., is there anywhere you can report your complaints? Please explain.
 - a. How has your employer reacted to worker complaints in the past?
 - b. Are you aware of any government inspections at mining sites?

Living Conditions:

49. Where do you live? Is it near the mining site?
50. Do you live in any form of employer-provided housing?
IF YES:
 - a. Did you choose to do so or was it required by your employer? Please explain.

- b. Do you have to pay for the housing?
 - c. Can you describe it to me (or draw it)?
 - i. How many people do you share it with? Are they family or others?
51. Do you have access to drinkable water in your house?
- a. What kind of sanitation facilities does it have?
 - b. Do you feel safe in your home? Why or why not?
 - c. If you had known about the housing conditions, would you still have taken this job? Please explain.
52. **(IF LIVES IN EMPLOYER HOUSING)** Are you able to leave your housing during non-working hours? Are there times when you cannot leave? Please explain.
- a. How far is your housing from the nearest town or village?
 - b. Is transportation available if you want to go to town?
53. **(IF LIVES IN EMPLOYER HOUSING)** If you were to leave your job how soon would you have to leave your housing?
54. **(IF LIVES IN EMPLOYER HOUSING)** Where do you buy food and clothing?
- a. Do you ever buy these items with credit? Under what terms?
 - b. Is there a company store where you can buy goods? How are the prices compared to markets in town?

Geographic Isolation:

55. How far is the mining site from the nearest town or village?
56. Is there public transportation available from the mining site?
- a. How much does it cost?
 - b. Could you afford to pay for transportation if you needed to leave?
57. Do you have a mobile phone? Is there network coverage at the mining site or where you live?
58. If you wanted to leave this job and return to your home area, would anything prevent you from doing so?
- a. What would be the biggest challenge to leaving?

Conclusion:

59. What do you think would improve your working conditions?
60. Is there anything else about your working or living conditions you'd like to add? Do you have any questions for me?

ZAMBIA MANGANESE STUDY: SUPPLY CHAIN KEY INFORMANT INTERVIEW PROTOCOL

Interviewer:	
Date (DD/MM/YY):	
Location of interview:	
KII code:	
Profession (if applicable):	
Position (if applicable):	
Employer/Affiliated institution/Organization (if applicable):	
Contact information (office address, phone number, email):	
Time interview started:	
Time interview ended:	

Interviewer Instructions:

Foster a dynamic conducive to gathering good data. The interview should have the relaxed feel of a conversation. Set the tone by using a slow pace in your speech.

Ask one question at a time. Give the respondent ample time to reflect and fully respond before moving to the next question. Try not to interrupt, and do not answer on their behalf.

If the respondent agrees to be recorded, give them your full attention. Make note of any follow-up questions you want to remember to ask, but otherwise focus on the respondent rather than your paper.

Probe for more depth, particularly when responses are brief. Use phrases such as, "Tell me more about that" and "Can you give me an example?" Aim to get specific instances, in considerable detail, whenever possible.

You do not have to ask each question verbatim but at least broach all the topics covered **that are relevant to the key informant**. If a respondent makes clear they have no knowledge of that topic, move on to the next. Adapt the flow and questions to make them relevant to the respondent.

For each item, ask the general question first, and then probe the sub-items that have not been addressed spontaneously.

Introduction Questions:

1. Could you please tell me about your role and what you focus on?
 - a. Do you have any other experiences related to the manganese sector in Zambia?
2. Can you describe your organization's work directly in the manganese sector?
 - a. **PROBE FOR WHAT KIND OF ACTIVITIES IN THIS AREA DO YOU AND YOUR ORGANIZATION UNDERTAKE?**

Supply Chain General:

3. Could you please tell me how the production of manganese works in Zambia, with specific focus on Luapula and Central Provinces?
 - a. What laws and regulations are central to operations in the manganese mining sector?
 - b. How do artisanal and small-scale mining operations differ from larger-scale mining operations in terms of regulations, operations, forms of ownership and downstream buyers? (PROBE: FOR ANY RELATIONSHIPS TO LARGER CORPORATIONS)
4. How important is the manganese industry to Zambia? How important is it to Luapula and Central Provinces specifically? In what way is it important?
 - a. Are most manganese mining operations in Central and Luapula Provinces artisanal, small-scale, or large-scale? What is the typical size or production capacity of these operations? **(PROBE FOR BOTH CENTRAL AND LUAPULA)**
 - b. What has/have been the most significant change(s) to the industry in the last few years? Please explain.
5. Have there been any recent socio-political events that have impacted the manganese supply chain in Central and Luapula Provinces? Please explain.
 - a. **PROBE FOR IMPACTS OF ENVIRONMENTAL REGULATIONS, COST OF ENERGY, AND LOAD SHARING**
 - b. How have they impacted your company/organization/mining activities?
6. Who are the major stakeholders (government and private sector) and influencers in the manganese industry in Zambia, particularly in Luapula and Central Provinces?
 - a. What role do foreign investors play in the industry?
 - b. How would you describe a foreign investor? Do foreign investors in this industry hold licensing permits? Are they stakeholders in publicly traded companies? Do they participate in joint ventures?
 - c. Are joint ventures common? If so, how are they typically structured? [PROBE FOR IDENTIFICATION OF FOREIGN INVESTORS FROM ALL COUNTRIES]
 - d. Which entity has the greatest influence on how manganese is processed and sold in Zambia?
 - e. How would you describe an “offtaker” and their role in the manganese industry in Zambia?

Production Process:

7. Could you please describe the production process of manganese from extraction to processing to export? **(PROBE FOR INTERMEDIATE GOODS PRODUCED)**. Where do you or your company/organization become involved in that process?
 - a. It seems manganese ore is transported from extraction sites to processing facilities by truck. Are there any exceptions to this general practice? How does your company transport/receive the manganese?
 - b. What tools/equipment and techniques are typically used for extraction by artisanal and small-scale miners in Luapula and Central Provinces?

8. Can you explain the difference between oxidized manganese ore and carbonate ore production? How do their downstream uses vary?
9. How common is illegal mining? What, would estimate, is the ratio of legally vs. illegally mined manganese ore?
10. How does the processing of mining licenses work in Zambia? Is it an effective system? What are its advantages and limitations?
11. As most of manganese ore mining in Zambia is open pit, is there a seasonal flow to production? If yes, does the seasonality impact everyone in the industry? Are the rains predictable?
12. After extraction, what processing of manganese occurs domestically in Zambia?
 - a. What about specifically in Luapula and Central Provinces? Where are the main processing areas? **(PROBE FOR NAMES AND LOCATIONS OF ALL PROCESSORS)** Are there any smelters in Luapula and Central Province?
 - b. What goods (including by-products and downstream goods) are produced in-country? Of these, which are the most common (or produced) by your company? **(PROBE FOR THE COMMERCIAL IMPORTANCE AND TRADE OF DEAD-BURNED/SINTERED MAGNESIA)**
 - c. One source indicated that in 2023, there were 13 manganese smelters in Zambia. Does that seem accurate to you? What happened to these entities during the load shedding? Who do you think will be operating as manganese smelters in Zambia in the next two years?
 - d. Are any intermediate manganese products consumed domestically? If so, by which companies? Do you know of any business that may come in line in the near future?
13. How long can manganese ore and its intermediate products be stored? Are they typically warehoused before sale, or sold immediately? If there are warehouses, are they vertically integrated with mining or processing entities or owned by third-party stakeholders?
14. Is manganese ore physically or mechanically crushed?
 - a. Is there a difference in the quality of intermediate products of manual or mechanically crushed ore? If so, what are the differences and why?
15. Other than data provided by the Ministry of Mines, are there other sources or databases of manganese extraction sites, processing facilities, or warehouses in Luapula and Central Provinces or more broadly in Zambia?
 - a. **PROBE IF PARTICIPANT IS WILLING TO SHARE THE INFORMATION, OR WHO TO CONTACT TO GET ACCESS**
 - b. What do you feel is the most reliable source of data on the manganese industry in Central and Luapula Provinces and Zambia in general? **(PROBE FOR OPINIONS ON ZAMBIA MINISTRY OF MINES, USG GEOLOGICAL SURVEY, AND MINERAL YEARBOOK, INTERNATIONAL MANGANESE INSTITUTE)**
 - c. **(IF THE RESPONDENT IS A PROCESSOR, ASK:)** Do you have a list of extraction sites that are a part of your supply chain? Tell me more about how that list is updated/maintained. How long have you worked with your suppliers? How were these entities impacted by the load shedding?
 - d. **(IF THE RESPONDENT IS A TRADER, ASK:)** Do you have a list of extraction sites or processing facilities that you buy from or sell to? Tell me more about who you decided to source raw materials from? How long have you worked with your various suppliers? How were these facilities impacted by the load shedding that prevented manganese processors from operating last year?

Intermediate Traders and Aggregation:

16. How would you describe the different categories of intermediate traders or aggregators and storage facilities? **(PROBE IF LOCAL, NATIONAL, EXPORTERS, ETC.)**
17. What role do local traders, intermediate traders, or aggregators play in the manganese supply chain in Luapula and Central Provinces? **(PROBE FOR SPECIFICS ON MARKETING CHANNELS: HOW ARE SALES INITIATED? IN WHAT FORM IS THE CONTRACT? HOW FREQUENT ARE SALES? WHO IS RESPONSIBLE FOR TRANSPORTATION?) (PROBE FOR THE ROLE OF FOREIGN INVESTORS]**
 - a. How do they interact with artisanal and small-scale miners?
 - b. How do they interact with processors and exporters?
 - c. What value do they add to the supply chain?
18. How is pricing determined at different stages of the supply chain?
 - a. Who has the most influence over pricing?
 - b. What stakeholder in the domestic supply chain is most at risk of losing money and/or not making a profit?
 - c. How does this impact miners, particularly artisanal and small-scale miners?

Tracing and Due Diligence:

19. What types of products does manganese from Zambia end up in? **(PROBE FOR BOTH INTERMEDIARY GOODS AND FINISHED/END GOODS DIFFERENT THAN THOSE ALREADY IDENTIFIED THROUGH RESEARCH)**
 - a. (IF APPLICABLE: WHICH OF THOSE GOODS DOES YOUR COMPANY MAKE?)
 - b. What is silica-manganese or ferro-manganese produced in this area used for? Who are the end users of these products? **(PROBE FOR LOCAL AND INTERNATIONAL COMPANY NAMES AND SPECIFIC PRODUCTS)**
20. How might one track manganese mined at a particular site through the domestic supply chain?
 - a. **(IF RELEVANT, ASK:)** Could you walk us through how your company does this?
 - b. Is there a point in the supply chain where you anticipate tracking would no longer be possible? **(PROBE FOR SPECIFICS: IS THE NEXT BUYER IN THE DOMESTIC/INTERNATIONAL SUPPLY CHAIN KNOWN? DOCUMENTED? IF TRACEABILITY IS LOST, IS THAT BECAUSE PRODUCTS ARE CO-MINGLED, OR DOWNSTREAM BUYERS ARE INVOLVED IN INFORMAL CONTRACTS AND THEREFORE KNOWN ONLY TO SELLER/SUPPLIER?)**
 - c. **(SPECIFIC PROBE)** When does the mixing of manganese from different sites occur, and how does mixing occur?
21. What oversight is being conducted by the government when it comes to the manganese industry and its supply chain? How does this impact your company/organization?
 - a. **(PROBE FOR SPECIFICS ON WHAT THE INITIATIVES ARE AND WHO IS PROMOTING THEM [E.G., SUB-NATIONAL OR NATIONAL GOVERNMENT, INTERNATIONAL CORPORATIONS, DOMESTIC COMPANIES])**
 - b. Are there any supply chain traceability initiatives? If yes, please explain the stakeholders involved, including your own company/organization.
 - c. What are the different quality, sustainability, or labor certifications available for companies in the supply chain and how common are they? **(IF RELEVANT, ASK:)** How are these

certifications monitored/approved, and is your company a part of any of them? If so, please explain how you got approved and how you are monitored for compliance.

22. What due diligence initiatives does your company/organization participate in to monitor conditions in the manganese supply chain?
- (IF NOT ANSWERED IN PREVIOUS QUESTION)** Does your company have any internal certification system or supply chain documentation?
 - Does your company have any industrial certification or business licenses? Can you please explain the process involved in obtaining the certification(s)/business licenses and how you are monitored for compliance? **(IF NOT ANSWERED IN PREVIOUS QUESTION)** Are you actively working to obtain any additional certifications in the near future? Please tell me more about that.

Sourcing Questions (for Buyers, Processors, Traders, and Exporters):

23. Where do you source your manganese from?
- PROBE (GEOGRAPHICAL REGION, NAMES OF SITES, ETC.) SPECIFICALLY FOR LUAPULA AND CENTRAL PROVINCES**
 - Please explain your sourcing process (buying method, transportation process, etc.).
 - Do you keep the manganese you buy from each source separate, and at what point do you combine manganese from multiple sources? Please explain.
24. How often do you source manganese from Luapula and Central Provinces?
- Are there times of the year when this changes? Please explain.
 - How do you determine how much you buy from a source?
 - Are there formal contracts for such transactions, and how are they structured? **(PROBE VERBAL OR WRITTEN, TIME FRAME OF AGREEMENT, EXCLUSIVITY TO BUY OR SELL, PRICING STRUCTURE, TRANSPORT REQUIREMENTS, QUALITY CHECKS, ETC.)**
25. **(IF NOT COVERED PREVIOUSLY)** Who are your primary buyers (domestic and/or international) of manganese or manganese intermediate processed products?
- PROBE REGIONS, COMPANIES, COUNTRIES, SPECIFIC INDUSTRY-INCLUDING DOMESTIC STEEL, BATTERY, EV BATTERIES, AND CHEMISTRY INDUSTRIES**
 - What form of manganese is utilized by these industries?

Export and International Markets:

26. How would you describe the role of Zambian manganese exports in the global trade of manganese?
- What are the main international markets for Zambian manganese? **(PROBE, BASED ON RESPONSE, ASK FOLLOW-UP QUESTIONS BASED ON HISTORICAL TRADE DATA, TO ACCOUNT FOR ANY DISCREPANCIES)**
 - How did the recent energy crisis (load shedding) impact export relationships? How do you expect they will be impacted in the next two years?
 - Are there any recent changes (emerging/declining demand) in destination markets? **(PROBE FOR COUNTRIES AND/OR COMPANIES)**

- d. How does manganese from artisanal and small-scale miners in Luapula and Central Provinces enter the export market? Some sources indicate that it is shipped by truck to ports in South Africa, Mozambique, and Tanzania. Does this seem correct to you? Is ore transported by train?
 - e. Does Zambia export ore to other countries for smelting? If so, would you expect this transfer of goods to show up in official trade statistics? Why or why not?
27. Who are the major players/stakeholders/companies in importing markets, such as China, India, South Africa, and the United States? Please explain.
- a. Do they have a physical presence in Zambia? If so, where is it located?
 - b. Can you describe in what product form the manganese is exported from Zambia?
(PROBE, GIVEN KNOWN EXPORT FORMS OF MANGANESE, ASK FOR INFORMATION ON INFORMAL/ILLEGAL TRADE AND/OR QUALITY/QUANTITY REQUIREMENTS OF IMPORTERS)
 - c. Are you aware of situations where the importing company is formally connected to the exporter in Zambia? This could be in the form of a subsidiary, vertically integrated exporter, or formal relationship with an export trade specialist, etc. **(PROBE FOR CONTRACTS, OWNERSHIP, PART OF SAME LARGER COMPANY, ETC. PROBE FOR THE ROLE OF IMPORTERS FROM CHINA, INDIA, US, AND SOUTH AFRICA)**
28. Exports from Zambia typically go through ports of Durban, South Africa, and Dar es Salaam, Tanzania. What would be the most important reason that would determine which port manganese exports are sent through (e.g., ease of logistics, timing, cost, corporate formal connections)?
- a. What challenges exist in the transportation of manganese from Zambia to these ports?
 - b. Do you have any opinions on the differences (pro/cons) between these ports? Have you ever visited these areas in-person?

Labor Questions:

29. What is your overall impression of working conditions in the manganese mining sector in Luapula and Central Provinces?
- a. What are the main issues you are aware of? **(PROBE FOR FORCED LABOR IF NOT STATED)**
30. What can you tell us about labor standards in the manganese industry, especially at artisanal and small-scale mining sites?
- a. What are the primary concerns across the industry when it comes to labor standards?
 - b. How are labor standards enforced at your workplace and who enforces them?
 - c. Are you aware of any health issues related to manganese exposure among workers?
 - d. Are you aware of any health issues by those living in areas near mining or processing of manganese from the environmental conditions (e.g., water, air)?
31. During which stages of the manganese supply chain are risks of forced labor most prevalent?
- a. What are the risk factors at each stage (mining, processing, transport, etc.)?
 - b. How do these risks differ between artisanal, small-scale, and large-scale operations?
32. Do labor conditions at extraction sites impact your sourcing decisions or business practices? If so, how?

- a. Do your buyers /other buyers along your supply chain) express concerns about labor conditions in your supply chain? If so, what kind of concerns?
- 33. How is labor organized at mine sites? Are workers employees or informal workers? Do they work for the landowner or a agent/recruiter/aggregator? How are workers paid? **(PROBE FOR HOURLY, DAILY, BY THE PIECE/WEIGHT)** Who pays the workers?

Conclusion:

- 34. Could you suggest any organizations or individuals that are well-informed about the manganese supply chain or labor conditions in the industry that we could interview?
 - a. **(IF APPLICABLE BASED ON RESPONDENT TYPE: PROBE IF THE INDIVIDUAL HAS ANY ADDITIONAL REPORTS OR DATA THEY ARE ABLE TO SHARE, SUCH AS ANY LISTS MENTIONED IN QUESTION 9)**
- 35. Is there anything else you would like to add about the manganese supply chain in Zambia that we have not covered?

ZAMBIA MANGANESE STUDY: LUAPULA AND CENTRAL PROVINCES: LABOR RIGHTS AND LABOR CONDITIONS KEY INFORMANT INTERVIEW PROTOCOL

Interviewer:	
Date (DD/MM/YY)	
Location of interview:	
KII Code:	
Profession (if applicable):	
Position (if applicable):	
Employer/Affiliated Institution/Organization (if applicable):	
Contact information (office address, phone number, email):	
Time interview started:	
Time interview ended:	

Interviewer Instructions:

Foster a dynamic conducive to gathering good data. The interview should have the relaxed feel of a conversation. Set the tone by using a slow pace in your speech.

Ask one question at a time. Give the respondent ample time to reflect and fully respond before moving to the next. Try not to interrupt, and don't answer on their behalf.

If the respondent agrees to be recorded, give them your full attention. Make note of any follow-up questions you want to remember to ask but otherwise focus on the respondent rather than your paper.

Probe for more depth, particularly when responses are brief. Use phrases such as, "Tell me more about that" and "Can you give me an example?" Aim to get specific instances, in considerable detail, whenever possible.

You do not have to ask each question verbatim but at least broach all the topics covered that are relevant to the key informant. If a respondent makes clear they have no knowledge of that topic, move on to the next. Adapt the flow and questions to make them relevant to the respondent.

For each item, ask the general question first, and then probe the sub-items that have not been addressed spontaneously.

Introduction Questions:

- I. Could you please tell me about your role and what you focus on?
 - a. Do you have any other experiences related to the manganese mining and processing sector in Zambia?
 - b. Can you describe your organization's work directly related to workers' rights in the manganese mining sector, particularly in Central and Luapula Provinces?

2. What is your overall impression of working conditions in the artisanal and small-scale manganese mining sector in Central and Luapula Provinces?
 - a. What are the main issue areas you are aware of?
 - b. What do you think of worker-employer relations in the industry?

Recruitment:

3. How do individuals become employed in artisanal and small-scale manganese mining in Central and Luapula Provinces, and what recruitment methods are used by employers
 - a. **(PROBE AS RELEVANT):** How common is recruitment from other regions of Zambia? How are workers from other regions typically recruited?
 - b. Are there any fees or costs associated with recruitment or securing employment in the manganese mining sector?
 - c. Are workers recruited from across the borders? How does this happen, who recruits and how does this work?
4. Are any promises made to workers as part of the recruitment methods? If so, what kinds of promises?
 - a. In your opinion/experience, are those promises being met?
 - b. What happens when workers discover the actual conditions differ from what they were promised?
5. Do workers in the artisanal and small-scale manganese mining sector typically have written contracts, verbal contracts, or no contracts?
 - a. If written, do workers usually understand the contents of the contract? **(PROBES: WRITTEN IN A LANGUAGE THE WORKER CAN UNDERSTAND; WORKER IS LITERATE OR ALLOWED TO HAVE SOMEONE READ IT; WORKER IS GIVEN SUFFICIENT TIME TO EXAMINE THE CONTRACT)**
 - b. Who normally receives payment for the manganese mined or work done? How is payment distributed among workers?
6. Are you aware of any reports of deceptive recruitment practices or coercion to work in the artisanal and small-scale manganese mining sector?

Earnings, Hours, Benefits, and Debt:

7. In your experience, what are the key issues that workers face in terms of their wages and benefits in the manganese mining sector? **(EXAMPLES INCLUDE: LOW WAGES, WITHHELD WAGES, WAGE DEDUCTIONS, ETC.)**
 - a. How and how often are workers paid?
 - b. Are there significant differences in payment methods between artisanal miners and miners in small-scale operations?
 - c. Do you believe that the amounts workers are paid are fair considering the work that they do? **(Please explain)**
8. Are workers paid according to a piece rate or quota system?
 - a. If so: what are the typical targets and are those targets reasonable/achievable?
 - b. What happens if workers don't meet their targets?
9. How many hours does an average worker typically work per day and per week? Do they receive pay for all these hours?
 - a. How common is it for workers to work overtime or past their agreed hours?
 - b. What happens to workers if they refuse to work overtime or additional hours?
10. How common is it for workers in the manganese mining sector to be in debt to employers, recruiters, or middlemen?
 - a. What kinds of borrowing and pay-back arrangements have you seen?

- b. How often are workers unable to leave their jobs because of debt to an employer or recruiter?
- c. Are there any other financial obligations that tie workers to specific employers?

Working Conditions, Hazardous Work, and Coercion:

11. What are the main risk factors for labor exploitation in the artisanal and small-scale manganese mining sector in Central and Luapula Provinces?
 - a. What factors make a worker in this sector more vulnerable to exploitation? **(PROBE FOR SPECIFICS ON DEMOGRAPHICS -- AGE RANGE, GENDER, MIGRATORY STATUS, EDUCATIONAL LEVEL)**
 - b. Are workers who are recruited from other regions more vulnerable to exploitation than local workers? If so, why?
 - c. How about workers from other countries? Are they more vulnerable to exploitation than local workers, If so, why?
12. What are the most common hazards workers face in the manganese mining sector?
 - a. Are workers provided with personal protective equipment (PPE)? If so, who provides it?
 - b. If PPE is provided, do workers in Artisanal and small-scale mining use it? If not, why don't they use them?
 - c. How common are manganese-related health issues among miners?
 - d. What happens if workers become ill or injured? Do they have access to medical care?
13. How common is it to hear of, or witness coercion or threats from employers toward workers?
 - a. Please explain the specific situations when this occurs and any types of workers more likely to experience it.
 - b. Are certain types of workers (e.g., those from other regions or countries) more likely to experience coercion or threats? Why?
14. How common is it that workers are unable to leave their jobs if they want to? Please explain.
 - a. Do workers who leave or attempt to leave their job face any negative consequences from their employers?
 - b. What makes it difficult for workers to leave their jobs in the manganese mining sector?
 - c. For workers recruited from other regions or countries, are there additional challenges to leaving their employment? Please explain.

Surveillance and Living Conditions:

15. What kind of involvement do employers or mine operators have in workers' lives outside of work?
16. How do workers access goods and services to meet their basic needs?
 - a. Are workers reliant on employers for these items? Please explain.
 - i. Are workers provided with these items on credit? Under what conditions?
 - b. Do employers operate stores or provide goods and services to workers?
17. By your estimation, what proportion of workers live in employer-provided housing?
 - a. Is this housing free or is there a fee? If a fee, how much?
 - b. Can those workers move freely outside of working areas -- including into the nearest town or village?
18. Are workers able to live somewhere outside of employer-provided housing if they want? Please explain why or why not. **(SKIP IF NOT IN EMPLOYER PROVIDED HOUSING)** Can you describe the living conditions of those in employer-provided housing? **(PROBE FOR: ACCESS TO WATER, ELECTRICITY, HEATING, SIZE, CONSTRUCTION MATERIALS, NUMBER OF FAMILIES/PERSONS TO A HOME, ETC.)**

19. Have you heard of situations where employers monitor or limit the communication of their workers? Please explain.
20. How common is it for an employer or recruiter to hold onto a worker's identity documents?
 - a. How are workers able to regain or access their documents?

Grievance Procedures and Industry/Government Initiatives:

21. What level of understanding do workers in the manganese mining sector have of their rights? Please explain and identify any areas where awareness is low.
22. What mechanisms are available to workers for submitting grievances?
 - a. Are workers likely or able to access those mechanisms? Why or why not?
 - b. How common is it for workers to experience retaliation for doing so? Please explain.
23. Besides your own organization, what other entities are actively working to improve labor conditions in the manganese mining sector? (**PROBE FOR GOVERNMENT EFFORTS, INDUSTRY EFFORTS, AND UNION EFFORTS**)
 - b. How effective have these efforts been and what key gaps (e.g., policy) remain for protecting workers' rights and improving their working conditions?
24. What role do unions or workers' associations play in the manganese mining sector in Central and Luapula Provinces?
 - a. What are the barriers to worker organization in this sector?

Health and Environmental Impacts:

25. What are the health and environmental impacts of manganese mining in Central and Luapula Provinces?
 - a. How are these impacts being addressed, if at all?
 - b. Are there any community concerns or conflicts related to manganese mining?
26. How are workers adapting to the layoffs occasioned by the load shedding?
 - a. Any social protection mechanisms in place by government or the employer?
 - b. Short-term and long-term impact on workers
 - c. What can be done to cushion workers?

Child Labor:

27. Are you aware of children or adolescents under 18 working in manganese mining in Central and Luapula Provinces? (Probe for where this is more prevalent between Central and Luapula)
 - a. If so, how common is it? In which activities do they participate?
 - b. What factors drive child labor in the industry?
 - c. How does the presence of child labor relate to forced labor in the sector, if at all?

Conclusion:

28. Who are the main stakeholders in the manganese mining sector in Central and Luapula Provinces involved in addressing or perpetuating forced labor issues?
29. How does manganese produced with forced labor enter the formal supply chain?
30. Could you suggest any organizations or individuals that are well-informed about labor conditions in the manganese mining sector that we could interview?
31. Is there anything else you'd like to add about labor conditions in the manganese mining sector that we haven't covered?

APPENDIX 5: INDICATOR AND QUESTION MAPPING

Forced labor occurs if there is both involuntary work and coercion at any of the 3 stages:		
Recruitment stage		
Category of indicator	Indicator	Indicator present if...
Involuntary work	Forced recruitment	S2Q02=1 & S2Q02A = 1, 2, 3, 5, 6, or 7
	Deceptive or fraudulent recruitment	S2Q04A=1, 3, 4, 5, 6, 7, 8, or 9
	Recruitment linked to debt	S2Q01B=1
Coercion	Physical or sexual violence	S2Q02A=1 or S2Q04B=1
	Restrictions on workers' movement	S2Q02A=2 or S2Q04B=2
	Abuse or manipulation of debt	S2Q02A=3 or S2Q04B=3
	Retention of cash, assets, or identity documents	S2Q02A=5 or S2Q04B=5
	Deportation or contacting authorities	S2Q02A=6 or S2Q04B=6
	Loss of housing/land provided by employer	S2Q02A=7 or S2Q04B=7
	Dismissal	S2Q04B=9
Employment stage		
Category of indicator	Indicator	Indicator present if...
Involuntary work	Recruitment linked to debt	S2Q01B=1
	Hazardous or degrading working conditions	S5Q03=2 or S5Q06=1 or S5Q09=1
	Onerous working hours or work schedule	S5Q10 > 60 or S5Q12=1
	Degrading work-related living conditions	((S3Q01C_1=1) or (S3Q01A=1 & S3Q01C_3=1)) and [(S3Q02=3) + (S3Q02A=2) + (S3Q02B=1) + (S3Q02C=2) + (S3Q02D=3) >=2]
Coercion	Physical or sexual violence	S4Q01D=1 or S4Q05C=1 or S5Q07=1 or S5Q09A=1 or S5Q10A=1 or S3Q03B=5
	Restrictions on workers' movement	S4Q01D=2 or S4Q05C=2 or S5Q07=2 or S5Q09A=2 or S5Q10A=2 or (S3Q03B= 1, 2, 3, or 4) or (S3Q04A=1 or 2)
	Abuse or manipulation of debt	S4Q05C=3 or S5Q07=3 or S5Q09A=3 or S5Q10A=3 or S4Q01A=1 or S4Q01B=1 or S4Q01C=1
	Withholding of wages	S4Q05C=4 or S5Q07=4 or S5Q09A=4 or S5Q10A=4
	Retention of cash, assets, or identity documents	S4Q01D=5 or S4Q05C=5 or S5Q07=5 or S5Q09A=5 or S5Q10A=5 or S3Q05A=2
	Deportation or contacting authorities	S4Q01D=6 or S4Q05C=6 or S5Q07=6 or S5Q09A=6 or S5Q10A=6
	Loss of housing/land provided by employer	S4Q01D=7 or S4Q05C=7 or S5Q07=7 or S5Q09A=7 or S5Q10A=7
	Arrest	S4Q01D=8
	Dismissal	S4Q05C=9 or S5Q07=9 or S5Q09A=9 or S5Q10A=9

Employment separation stage		
Category of indicator	Indicator	Indicator present if...
Involuntary work	Inability to terminate employment	S5Q15=1 & S5Q15A=1, 2, 3, 4, 5, 6, or 7
Coercion	Physical or sexual violence	S5Q15A=1
	Restrictions on workers' movement	S5Q15A=2
	Abuse or manipulation of debt	S5Q15A=3
	Withholding of wages	S5Q15A=4
	Retention of cash, assets, or identity documents	S5Q15A=5
	Deportation or contacting authorities	S5Q15A=6
	Threat of loss of housing/land provided by employer	S5Q15A=7