Occupational Safety and Health Risks

The situation of direct and outsourced mining workers in Bolivia, Colombia, and Peru

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About this report

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Disclaimer

Contents

List of figures

List of tables

Abbreviations

ANFO	Ammonium nitrate and fuel oil
CSR	Corporate Social Responsibility
C176	ILO Safety and Health in Mines Convention No. 176
IDB	Inter-American Development Bank
ILO	International Labour Organization
IMVO-metaalsector	Dutch International Responsible Business Agreement for the Metals Sector
masl	Meters above sea level
MSD	Musculoskeletal Disorders
OSH	Occupational Safety and Health
PPE	Personal Protective Equipment
RBC	Responsible Business Conduct
RLS	Restless Leg Syndrome
SAS	Sleep Apnoea Syndrome
SINTRAMINERGÉTICA	National Union of Mining, Petrochemical, Agrofuel and Energy Industry Workers

Introduction

When AngloAmerican announced it would leave El Cerrejón, a coal mine in northeast Colombia, in December 2020,[1] mine workers had been striking for about 90 days, demanding not to apply the "death shift".[2] The dead shift implied the reduction from four to three daily shifts and the increase from 15 successive days of work to 21 days. The intense pace of work led to the workers' increased physical and psychological exhaustion, which put them at greater risk of accidents in the mine. The reduction of working shifts also left about 25% of the workforce unemployed. The company and its partners Glencore and BHP Billiton justified the change in working shifts by arguing a need to reduce costs and remain competitive, an argument that could not be sustained in view of the increasing coal prices of the past years.[3]

This is just one example of how mining companies often prioritise profit over the health and safety of their employees. Labour rights violations in the mining sector are not uncommon, with workers worldwide reporting excessive working hours, unsafe working conditions, and lack of basic health provisions next to the low salaries, anti-union violence, outsourcing, child labour, degrading treatment, violence, discrimination, and racism.[4] All over the world, labour rights violations specially affect women. For instance, female mine workers report inadequate personal protective equipment (PPE) and the inability to take maternity leave or shorter days to breastfeed due to the pressure of production targets.[5] Moreover, women's participation in the labour market brings with it an extension of the working day. In this context, most women workers maintain their unpaid role as care givers, while also working as paid employees. The Covid-19 pandemic exacerbated this situation for women employed in the mining sector (including Latin America).[6]

Downstream companies sourcing minerals from these supply chains have been under increasing scrutiny for failing to sufficiently address their suppliers' human and labour rights abuses. In response to calls by trade unions, conscious consumers, and other civil society groups, many companies have publicly committed to the various Corporate Social Responsibility (CSR) initiatives that exist to improve workers' labour conditions in upstream segments of the mineral supply chain. One such initiative is the Dutch International Responsible Business Conduct agreement for the metal sector (*covenant internationaal maatschappelijk verantwoord ondernemen voor de metaalsector*, IMVO-metaalsector), a partnership between businesses, trade associations, government, trade unions, and NGOs.

The IMVO-metaalsector is embedded in the Dutch International Responsible Business Conduct agreement founded on the Social and Economic Council of the Netherlands (SER) recommendation in 2016 as a means to concentrate stakeholders' efforts to combat human and labour rights abuses.[7] In addition to engaging companies and other stakeholders in a constant dialogue to improve their performance regarding international responsible business conduct in line with the OECD Guidelines for Multinational Enterprises, the IMVO-metaalsector helps the metals sector to comply with the EU Conflict Minerals Regulation, which entered into force in 2021 and obliges large importers to investigate the source of their raw materials.[8]

As part of its growing emphasis on labour rights in supply chains, CNV Internationaal started developing activities in the mining value chain in its 2017-2020 Trade Unions for Social Dialogue programme. In this context, CNV Internationaal began participating in the IMVO-metaalsector in 2019. Since then, CNV Internationaal and its partners in Colombia, Peru, and Bolivia have investigated hidden risks and labour rights issues in the mineral value chains of these countries. In particular, CNV Internationaal has developed a new platform, the Labour Rights Observatory for a Just Transition, through which insights are shared with investors, businesses, and governments to promote due diligence and corporate responsibility in the minerals supply chain. Currently, the Observatory focuses on coal mining in Colombia, but soon the focus will expand to mineral mining in Peru and Bolivia.

This research aims to consolidate the evidence base of Occupational Safety and Health (OSH) risks in the mining sector in Bolivia, Colombia, and Peru and to increase understanding of what these risks mean for the Due Diligence obligations of downstream companies in the Netherlands members of the IMVO-Metaalsector. The study relies on a combination of primary and secondary data. Primary data sources include the voices of 367 mine workers (of which 35 worked in Bolivia, 129 in Colombia, and 203 in Peru) obtained through CNV Internationaal's participatory digital monitoring for the mining sector in 2022 (see Appendix 1 for more details on the methodology applied for data collection). In addition, 17 key informants representing trade unions, health sector, government and mining companies/sector associations in Bolivia, Colombia, and Peru were interviewed to inform this research (see Appendix 2). Secondary sources include reports by trade unions, NGOs, company policies and publications, and media articles. Based on the findings, this report seeks to make recommendations on how members of the IMVO-Metaalsector can work together to improve the occupational safety and health of workers in countries supplying minerals to the Netherlands.

Chapter 1 summarises OSH risks in the mining sector in general, while Chapter 1.3.3 focuses on these risks from the perspective of workers in Bolivia, Colombia and Peru. Chapter 3 synthesises the factors that sustain the current OSH situation in the mining sector of the focus countries, including legislative frameworks, barriers to implementation, and enforcement. Lastly, Chapter 4 provides conclusions and recommendations to inform the efforts of CNV Internationaal and IMVO-Metaalsector members to address OSH risks in the mining sector in Bolivia, Colombia, and Peru.

1

Occupational Safety and Health risks in mining

Worldwide, mine sector workers experience excessive workloads and are exposed to situations that jeopardise their health and safety to meet their employers' production targets. This situation constitutes a breach of workers' right to a safe and healthy work environment and affects vulnerable groups such as women and subcontracted workers in particular ways. This chapter provides a review of Occupational Safety and Health (OSH) risks in the mining sector.

1.1 Increasing demand for minerals and impacts on workers

The mining sector ranks among the most dangerous sectors for workers, accounting for an array of physical and psychosocial risks that, if not mitigated, can lead to disease, injury, or death. According to the International Labour Organization (ILO), in 2015, mining employed less than one percent of the global workforce. Yet, it was responsible for eight percent of fatal workplace accidents.[9] Although there are no recent global estimates of deadly accidents in the mining sector, available data show that the rate of fatal accidents in mining is either increasing or remaining the same. In the USA, for example, the rate of fatal accidents in the mining sector increased from 9.77 accidents to 16.15 accidents per million hours worked between 2016 and 2021.[10] And in Australia, the average yearly fatality rate in mining remained at 2.4 between 2000 and 2019.[11] It is likely that the rate of fatal accidents in mining in developing countries is much higher than that of the USA and Australia, as the majority of mining accidents not only occur in developing countries, but also are on the rise.[12]

But it is not only the high rate of fatal accidents that makes mining a hazardous sector. According to the global trade union federation IndustriALL, occupational diseases kill more mine workers than accidents,[13] and the rate of occupational diseases and injuries is also increasing globally.[14] With the wealth of knowledge accumulated over centuries about the risks of mining, the advanced technology, and a myriad of voluntary initiatives and legislative frameworks to safeguard mine workers' health and safety, one may ask: Why is mining still so dangerous for workers? Human and labour rights advocates claim that mining remains a hazardous sector because, often, pressures to drive up profit and reduce costs stand on the way of mining companies fulfilling their OSH obligations.[15]

While the pressure on mining to make a profit at all costs is part and parcel of the global economic system,[16] it goes against the three pillars of Corporate Sustainability, namely the environment, social equity, and economic development.[17] This model not only compromises the mining sector's ability to meet investors' and consumers' increasing demand for sustainable supply chains, but also to increase productivity and attract the talent necessary to remain competitive.[18] Moreover, this profit-at-all-costs model underscores the unequal footing on which communities and workers stand in relation to mining companies.

For example, in Peru, the intensification of mining activities has been accompanied by fear in mostly impoverished communities that mining projects will contaminate the land and water that sustain their lives.[19] But because mining is an important source of income for the country,[20] the Peruvian government tends to criminalise social protests.[21] Also, there are reports of mining companies using private security forces, violating human rights, and exacerbating social stress and tensions.[22]

Likewise, the case of Cerrejón workers in Colombia and the "dead shift" illustrates a global trend where the circadian rhythms[i] of night-shift workers are disrupted and fatigue is triggered by extended shifts and overtime. Again, the pressure to maximise the productivity of mining operations is driven by a combination of increasing demand for minerals and the expectation of high returns by shareholders.[23] If well, the implementation of fatigue risk management in mining has been increasing in the past decade, it largely remains focussed on the symptoms and not on the causes of those risks.[24]

1.2 Mining impacts on workers' health and safety

The ILO already recognised in 1999 the risks faced by miners in mine processing operations with regard to OSH.[25] Although this particular research was focused on small-scale mining, the ILO authors noted that formal, large-scale mining can be just as dangerous for workers as small-scale mining, despite the reputation offered by a more formalised setting: "*A combination of lack of resources, lack of or non-application of safety regulations, lack of awareness, illiteracy, lack of training, inadequate equipment and remote location all point to the likelihood of there being more accidents in many small-scale mining operations than in larger, more formal, more public mines. On the other hand, the nature of small-scale mining (low level of mechanization, low intensity of operation) means that some of the risks can be lower than in large, formal mines*."[26]

Table 1 Most frequently cited health and safety issues in mine processing operations

Occupational safety issues	Occupational health issues
Causes of accidents: • rock falls; subsidence • lack of ventilation • explosions • lack of knowledge; lack of training; violation of regulations • obsolete and poorly maintained equipment **Types of accidents**: trips or falls (at the same level, or from one level to another); being hit by machinery or a moving object (including rocks, stone chips, tools); effects of cave-ins or rock falls (e.g., fractures, sprains, contusions).	**Worker health risks**: • exposure to silica dust (silicosis) and coal dust (pneumoconiosis); can cause permanent lung damage • exposure to mercury and other chemicals • effects of noise and vibration • effects of poor ventilation (heat, humidity, lack of oxygen) • effects of over-exertion, inadequate workspace and inappropriate equipment **Community health risks**: poor sanitation and lack of clean water, malaria, typhoid, dysentery, tuberculosis, sexually transmitted diseases (including AIDS), malnutrition and substance abuse.

Source: Scott, D. F., Grayson, L. R. (2003), *Selected Health Issues in Mining*; CDC (n.d.), "Inputs: Occupational Safety and Health Risks, online: https://www.cdc.gov/niosh/programs/mining/risks.html, viewed in October 2022.

The plethora of occupational safety and health issues in the mining industry (Table 1) highlights the importance of identifying and mitigating risks for workers. The following subsections take a closer look at those risks.

[i] Circadian rhythms are physical, mental, and behavioural changes in the human body that follow a 24-hour cycle.

1.2.1 Exposure to chemicals

Across the world, mining workers are frequently exposed to chemicals, heavy metals, and other potentially harmful substances that can spill on the skin and clothes, splash in the eyes, or be breathed in as fumes. Moreover, many of those chemicals can cause fires, explosions, or release of toxic gases, thereby also jeopardising the health and safety of mining workers (Table 2).

Table 2 Chemicals used in mining and processing minerals

Chemical substance	Use in mining	Effects on human health
Cyanide	Separation of gold from ore	Cyanide is deadly when swallowed. Exposure to low doses over a long time may cause goitre (a swelling in the throat which can also be caused by malnutrition).
Sulfuric acid	Toxic chemical used in copper mining. It is also a by-product of many kinds of mining, mixing with water and heavy metals to form acid mine drainage.	Contact with sulfuric acid can cause burns, blindness, and death.
Nitric acid	Used to produce explosives in mining, including ANFO.	Nitric acid causes irritation to the eyes, skin, and mucous membrane; it can also cause delayed pulmonary edema, pneumonitis (inflammation of lung tissue), bronchitis (inflammation of the bronchi caused by an infection), and dental erosion.
ANFO (ammonium nitrate and fuel oil)	Used in blasting tunnels in coal mining, quarrying, and metal mining.	Ammonium nitrate causes irritation and burns in nose, throat and lung, methemoglobinemia (blood disorder) with headache, fatigue, and blue colour to the skin and lips. Prolonged exposure can cause cancer. ANFO emits toxic fumes when detonated.
Mercury	Mined on its own and used to separate gold from ore.	When burned off to collect the gold, mercury turns to a gas that can be breathed in by anyone nearby. Mercury can also become a gas if it is spilled or left in an open container. Breathing in mercury fumes is very dangerous. Mercury is also dangerous if it is absorbed through the skin or eaten when it passes from someone's hands to food.
Lead	Often found with copper, silver and zinc	Exposure to high levels of lead may cause anaemia, weakness, and kidney and brain damage. Very high lead exposure can cause death.
Uranium	Mined on its own	Uranium releases harmful radiation that causes cancer, skin diseases, and other serious health problems.
Acetylene	Welding and soldering	Contact with acetylene can cause frostbite. Exposure can cause headache, dizziness, vertigo, and fainting.
Fumes from gasoline and diesel fuel	Fuel used to power vehicles and mining equipment	Health effects from exposure to asphalt fumes include headache, skin rash, sensitization, fatigue, reduced appetite, throat and eye irritation, cough, and skin cancer

Source: Adapted from Hesperian Health Guides (2008), Chemicals Used in Mining, In Hesperian Health Guides (Eds): *A Community guide to Environmental Health*, pp. 485-486.

1.2.2 Occupational diseases

Occupational diseases affect the lives of mining sector workers, regardless of whether they work in open cast or underground mines. Underground mining workers are frequently exposed to airborne hazards, including fumes from fuel used to power vehicles and mining equipment, coal and silica dust, and at times, asbestos. These substances are known to cause cancer in the lungs, bladder, and other parts of the body. Long-term exposure to coal and silica dust may onset lung cancer, silicosis (scarring and stiffening of the lungs), pneumoconiosis (or black coal disease, a group of lung diseases caused by inhaling coal and other types of dust), chronic obstructive pulmonary disease (COPD) or kidney disease.[27]

Another common occupational disease in mining is tinnitus (i.e., the perception of sound when no corresponding external sound is present) and hyperacusis (temporary or permanent hearing loss). Mining workers are routinely exposed to loud noises derived from drilling, heavy machinery, and explosions. Hearing loss results from faulty or lack of ear protection.[28]

Likewise, musculoskeletal disorders (MSDs) are a major affliction of mining workers. MSDs are defined as soft tissue[ii] disorders and surrounding structures that are not related to an acute or immediate event (such as a slip or fall). MSDs occur most often in the neck, shoulders, elbows, wrists, and lower back. They are associated with various occupational hazards, including physical workloads such as awkward posture, manual material handling, vibration, and psychosocial factors.[29]

1.2.3 Accidents

Injuries from heavy machinery are one of the two main types of accidents in mining. These injuries are a result of poor traffic management at the workplace. The risks of working with heavy machinery include being struck or run over, being crushed, falling off tall equipment or driving into unmarked or unguarded holes in the ground.[30] The other main type of mining accident are injuries resulting from errors, omissions and miscalculations when unleashing the explosions needed to break massive volumes of rock. Blast or explosive injuries can result from fly rock, misfires and toxic fumes and occur when explosive materials used in mining are not stored, handled, or transported in a safe manner.[31]

1.2.4 Biological hazards

Depending on the location where mining operations are found, workers can be at risk of tropical and vector-borne diseases such as malaria, dengue fever, chikungunya, leptospirosis (a bacterial disease affecting kidneys and liver) ancylostomiasis (a disease caused by hookworm *Ancylostoma duodenale),* and legionnaires' disease (a form of atypical pneumonia that can be contracted by aspirating water contaminated with the *Legionella* bacteria). The risk of contracting these diseases increases with poor sanitation. Ancylostomiases thrives in underground mines, where high levels of dissolved mineral salts in the loamy soil encourage parasitic growth. The high temperature and humidity in underground mines allow worms flourish.[32] While improvements in sanitisation including eradication of rats have lowered the occurrence of leptospirosis and ancylostomiasis in mines, these biological hazards prevail outside the developed world. Regular microbiological analysis of water used in cooling towers at the mine site is necessary to detect Legionella contamination or high concentrations of other heterotrophic microorganisms.[33]

[ii] Soft tissue refers to muscle, fat, fibrous tissue, blood vessels, or other supporting tissue of the human body.

1.3 Occupational Safety and Health issues in mining in focus countries

1.3.1 Bolivia

Bolivia is the world's sixth largest producer of zinc and tin, and the eighth largest producer of silver.[34] The Bolivian mining sector employs workers in both small-scale and large mines. Workers at small-scale mines are organised in cooperatives that supply minerals to larger mines (which are operated by multinational companies such as Trafigura and Santa Cruz Silver Mining). All mines are administered by the Bolivian State, regardless of whether the mine is run by a cooperative or a multinational mining company.[35]

Due to the poor working conditions in most of Bolivia's mines, workers are exposed to significant OSH risks such as silicosis and rheumatism.[36] The initial stage of silicosis, a lung disease caused by prolonged inhalation of silica dust, has very mild symptoms. According to the Director of the Occupational Safety Unit at the National Health Fund, Boris Inca, by the time the symptoms develop – tiredness, coughing, lack of appetite – the disease is already in its advanced stages.[37] It has also been noted that while the disease is usually prevalent among individuals who have worked in the mines for 20-25 years, it is now even diagnosed among children below 15 years of age.[38]

Cerro Rico is a silver mine in Potosí, Bolivia, exploited both by a subsidiary of Coeur Mining and miners' cooperatives. About 70% of the 14,000 cooperative workers at the Cerro Rico mine do not receive health insurance or pension benefits, and the cooperatives routinely flout basic safety laws.[39] Miners working at Cerro Rico are exposed to toxic gases, the risk of mines collapsing or even electrocution due to use of outdated machinery and tools.[40] Estimates indicate that Bolivians employed at small-scale mines run by cooperatives suffer three fatalities and 15 serious injuries each month. This fatality rate is 90% higher than that faced by miners in industrialised countries.[41]

1.3.2 Colombia

Colombia is the largest coal miner on the Latin American continent, making up for 81% of the continent's output.[42] In 2019, a survey conducted by members of the National Union of Mining, Petrochemical, Agrofuel and Energy Industry Workers (SINTRAMINERGÉTICA), found that the majority of workers' health concerns were associated with the musculoskeletal system, which is one of the leading causes of occupational morbidity (see box 1). Likewise, a cross-sectional study of workers in the Guachetá coal mines found that the most frequently reported health problems were related to musculoskeletal (pain in back and limbs) and respiratory and hearing disorders.[43]

Between 2005 to 2019, there were approximately 1,395 fatalities and 765 injuries reported in Colombia's coal mines.[44] While these figures concern primarily underground coal mines, explosions in open-cast mines (which are the types of mines in which this project focuses) are not exempted from this kind of accidents. More than 25% of the fatalities are due to explosions: "*Their occurrence results from low awareness regarding methane-related risks among the mining communities, insufficient technical expertise with respect to ventilation, incomplete regulation, and unsatisfactory execution of the existing rules on mining safety.*" [45] In August 2021, the accumulation of methane caused an explosion at an underground coal mine claiming 12 lives.[46] The year before, a similar accident claimed the lives of at least 11 miners,[47] and in March 2023, another accident killed 21 coal workers in Sutatausa, a town north of Colombia's capital, Bogotá.[48]

The health and safety risks for mine workers also include exhaustion, spinal fatigue, and lack of dust control. Long shifts, coupled with tedious commutes through rough roads, causes serious spinal injuries, particularly among heavy equipment operators. At El Cerrejón, for example, United Mine Workers of America (UMWA) representatives who visited the mine in 2012 found that on top of 12-hour workdays, workers spent between 8 and 10 hours commuting to and from work. They also reported that to deal with chronic worker fatigue, the mine owners planned to install lasers to flash the eyes of heavy equipment operators when slow blinking was detected..[49]

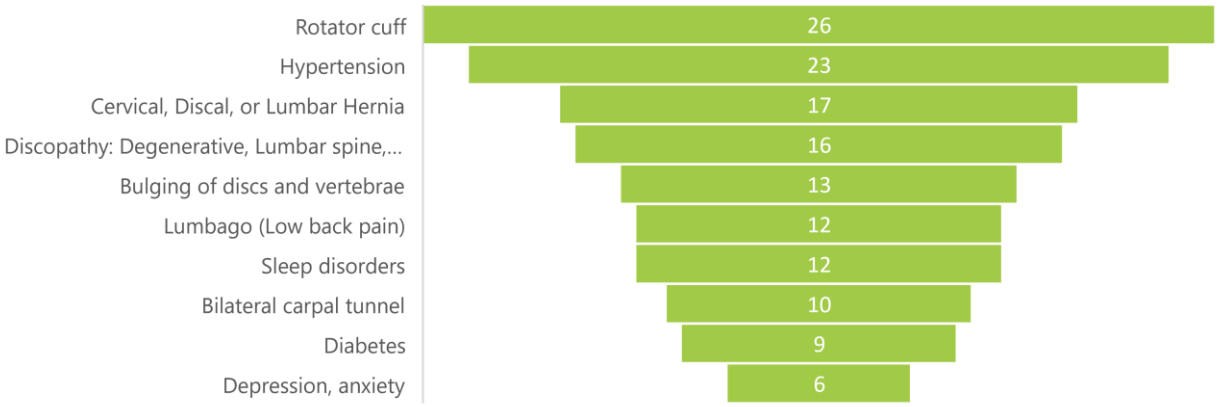
Communities around these coal mines are also affected. For instance, communities living near El Cerrejón, the largest open pit mine in Latin America, suffer from health issues like headaches, respiratory discomfort, dry cough, and vision problems due to the 24-hour operations.[50] Ill health of family members living in mining communities is a source of stress for mining workers as it disrupts the family's economy, who face the costs of healthcare and medicines. It also adds to the workload of female workers, who are expected to tend to ill family members, as part of their unpaid care work.

Box 1. Health and safety of mine workers affiliated to SINTRAMINERGÉTICA

In Colombia, members of SINTRAMINERGÉTICA conducted an internal survey in June 2019 on occupational diseases and accidents. Two hundred thirty workers, including 225 men and five women, participated in the study in different positions in the mining production chain. The workers were employed in two of the five concessions of La Jagua mine (Department of Cesar, in northern Colombia) that, until September 2021, belonged to Prodeco, a subsidiary of Glencore.

The workers surveyed were asked whether they had suffered from occupational illnesses or accidents. The data showed that 87% of the workers indicated that they suffered from one to five pathologies, 10% from six to 10 pathologies, 2% from 16 to 20 pathologies, and 1% indicated that they suffered from 21 pathologies. In this context, six of the ten top pathologies the surveyed SINTRAMINERGÉTICA workers suffered were musculoskeletal disorders (Graph 1).

Graph 1. Top 10 pathologies by surveyed workers



The workers surveyed were also asked whether the origin of the pathologies they suffered had been recognised as an occupational disease by the Occupational Risks Insurance Company (ARL) or private Health Care Providers (EPS). Fifty-one per cent indicated that they did not receive such recognition, while the rest did. In this context, 40% of the workers indicated that their pathologies classified as occupational diseases, 36% as common diseases, and 24% as occupational accidents. Further, the surveyed workers were asked whether they had notified their employer about their health conditions, to which 76% said they did, while 24% did not.

Source: SINTRAMINERGÉTICA Members with support from CNV Internationaal.

1.3.3 Peru

According to Peru's Ministry of Energy and Mines, the largest number of reported occupational diseases are related to hyperacusis (hearing loss) and pneumoconiosis.[51] In 2015, the Ministry received 6,708 reports of occupational diseases related to mining, more than 90% of which were noise-induced hearing loss or deafness.[52] However, it is important to note that inadequate mechanisms with regard to reporting could lead to inaccurate reporting, in both the number and type of diseases. Worker fatigue is another occupational risk that could in turn, cause vehicular and/or machinery accidents.[53]

In La Rinconada, a gold mining town in Peru, workers are employed under risky conditions with accidents being commonplace. In the mines, miners are forced to breathe in dust particles that cause silicosis, a terminal lung disease. Around 50-60% of post-mortems in the region found silicosis to be the cause of death. Over the past decade, miners have begun wearing masks; however, masks do not filter out all the particles and continue to expose workers to health risks. By the same token, the mercury used to extract gold also poses significant risks for the miners, potentially damaging their nervous system when inhaled or with skin contact.[54]

Moreover, the primary causes of accidents in small mines include rock falls and cavings, lack of ventilation, improper use of explosives, lack of knowledge or information, and the use of old machinery or equipment. The tunnels in the underground mines are very narrow and raise ventilation concerns. The haphazard planning of tunnels can also lead to the fracturing of the mine structures and result in caving.[55]

The figures presented above are an underestimation, as they do not account for the accidents suffered by outsourced workers, who make up the bulk of the labour force in the Peruvian mining sector. In this context, 72% of the 226,000 mining jobs in 2021 were conducted by outsourced workers.[56] Outsourcing is not only a strategy by the mining industry to cut costs but also an enabling factor for labour rights breaches such as health and safety at work.[57] It follows that the rate of occupational diseases and accidents among Peruvian outsourced mining workers is twice as high as that of direct workers.[58]

2

Mining workers' perspectives on their OSH risk exposure in Bolivia, Colombia and Peru

The pressures of meeting deadlines and production goals affect Bolivia, Colombia, and Peru mining sector workers. These pressures have a detrimental effect on workers' psychological and physical state and can threaten their health and safety at work. Other factors jeopardising workers' health and safety include inadequate personal protective equipment and high exposure to hazards. This chapter presents the results of an online survey among mining sector workers in Bolivia, Colombia, and Peru that captured their perspectives on their exposure to Occupational Safety and Health risks at the workplace.

2.1 Occupational Safety and Health risks

Ensuring the health and safety of workers is the responsibility of employers. To fulfil this responsibility, mining companies should periodically conduct systematic risk assessments. The risks identified through these assessments should inform the planning and implementation of short-term and long-term action plans that prioritise risk prevention above risk management and control measures. In this context, the results of the interventions should be evaluated and followed up. In doing this, psychosocial and general health issues should also be considered, along with the safety risks and risks to health caused by physical, chemical, and biological agents.[59]

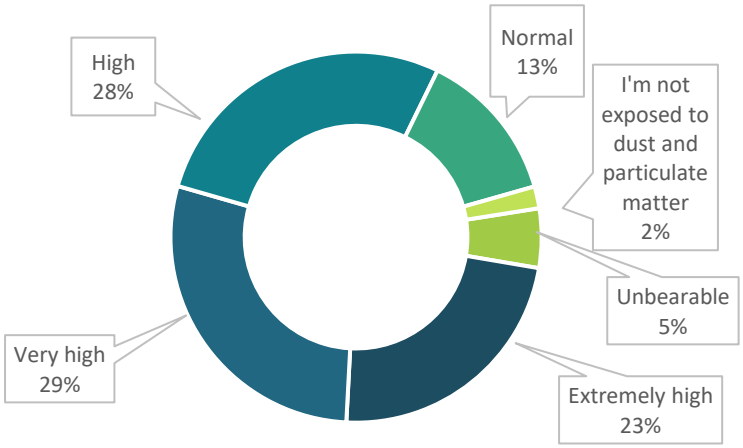
This chapter presents the results of an online survey among mining sector workers in Bolivia, Colombia, and Peru that captured their perspectives on their exposure to Occupational Safety and Health (OSH) risks at the workplace. The findings presented here correspond to the responses of 367 mining sector workers, of which 35 worked in Bolivia, 129 in Colombia, and 203 in Peru. Of the 367 workers, 355 self-identified as men, 11 as women, and one as LGBTQ+. The survey covered 14 mining companies, of which five were located in Bolivia, four in Colombia, and five in Peru. Of the 367 survey respondents, 289 were direct workers, and 78 were subcontracted workers. The methods used for the online survey are explained in Appendix 1, including the demographic profile of the survey respondents (e.g., gender, age, and ethnic background) and the different stages of the mining process represented.

The types of risks presented here are grouped into five different categories: physical risks, chemical and biological hazards, mechanical hazards, psychosocial risks, and ergonomic risks. Moreover, this chapter presents the surveyed workers' perceptions of their employers' management of OSH risks. It focuses on gender-specific risks and risks for subcontracted workers, a group of mining workers facing unequal treatment and longer working hours.[60] The survey results are complemented with information obtained through key informant interviews.

2.1.1 Physical risks

The workers who participated in the digital survey were asked about their perceived exposure to dust and particulate matter. Over three-quarters of them considered their exposure to be high, very high, extremely high, or unbearably high (Figure 1). Disaggregated by stage of the productive process, almost 90% of workers involved in excavating minerals reported high to unbearably high exposure to dust and particulate matter. Echoing the perspectives of the surveyed workers, a Peruvian union leader interviewed for this research said about the causes for the high exposure to dust: *"In the past, they used to give us respirators for dust, which were the most commonly available, but they didn't protect us well against dust and gases. We don't have filters, especially for dust, because the company only gives us two every two weeks, to save costs […] then there is the ventilation problem. At some sites, ventilation is adequate, but at some sites, it is not."*

Figure 1 Workers' perception of their exposure to dust and particulate matter



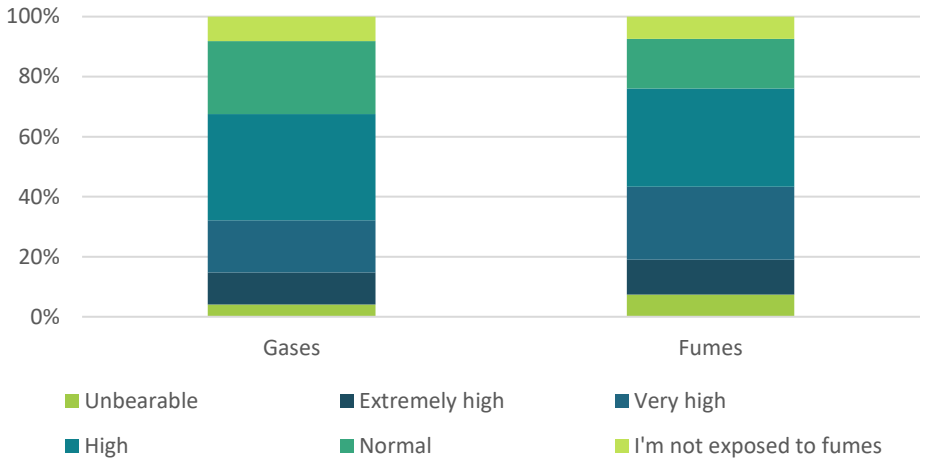
Question: The exposure to dust and particulate matter at your workplace is:

Likewise, over two-thirds of the surveyed workers reported high to unbearably high exposure to gases at work, and over two-thirds reported high to unbearably high exposure to fumes (Figure 2). Moreover, forty-three per cent of the surveyed workers said bad to very bad ventilation at the workplace. Another 31% reported "regular" (i.e., neither good nor bad) ventilation, and 26% reported good or very good ventilation.

Broken down by the stage of the mining process, the workers' perceptions are generally diverse, with workers finding ventilation at the mine from very good to very bad (Figure 3). In this context, it would be expected that Colombian respondents would not have major complaints about ventilation at the workplace, given that coal extraction in the country is done in open-cast mines. Yet, a few Colombian workers in the excavation segment complained about the very bad ventilation at the worksite. By contrast, 65% of the Peruvian workers in the excavation segment complained that ventilation at the workplace was bad or very bad.[iii] In the words of a Peruvian union leader: "*The most important risks that we have learned about from the colleagues we are representing are, for example, the fact that there is no adequate ventilation in the mine shafts...*"

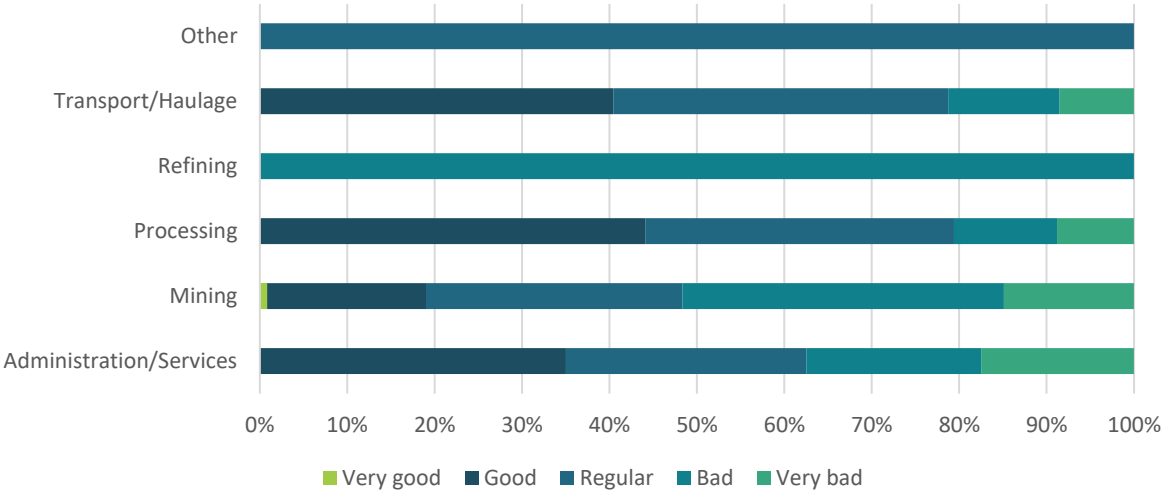
[iii] The surveyed workers in Peru and Bolivia work in underground mines.

Figure 2 Workers' perception of their exposure to gases and fumes at work



Question: The exposure to gases/fumes at your workplace is:

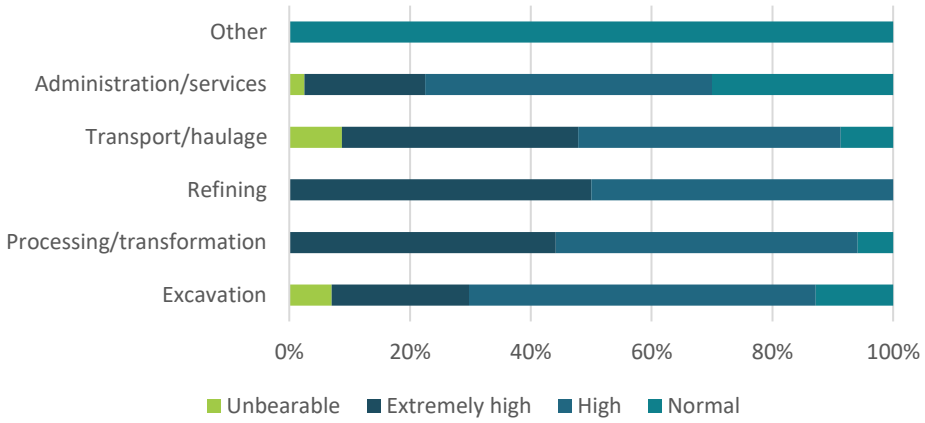
Figure 3 Workers' perceived quality of ventilation at the workplace



Question: The ventilation at your workplace is:

The surveyed workers were also asked about their perceived exposure to noise at work. Eighty-six per cent of them indicated high to unbearable exposure to noise (53% high, 27% extremely high, and 6% unbearable), 14% indicated normal exposure. Broken down by stage of the mining process, workers in the refining segment reported only high or extremely high exposure to noise (Figure 4). The key informants interviewed agreed that noise exposure was high in Bolivian, Colombian, and Peruvian mines. In the words of a key informant from the health sector in Peru: *"In the evaluations we have been carrying out on mining workers, we made two important evaluations. One was the evaluation of the presence of silicosis, through an X-ray of the lungs and its classification according to ILO recommendations, and an evaluation of sensorineural hearing loss, through an audiometry […] As an occupational disease, hearing loss is due to exposure to noise, which is very common in mining, and which is not mitigated with appropriate measures."*

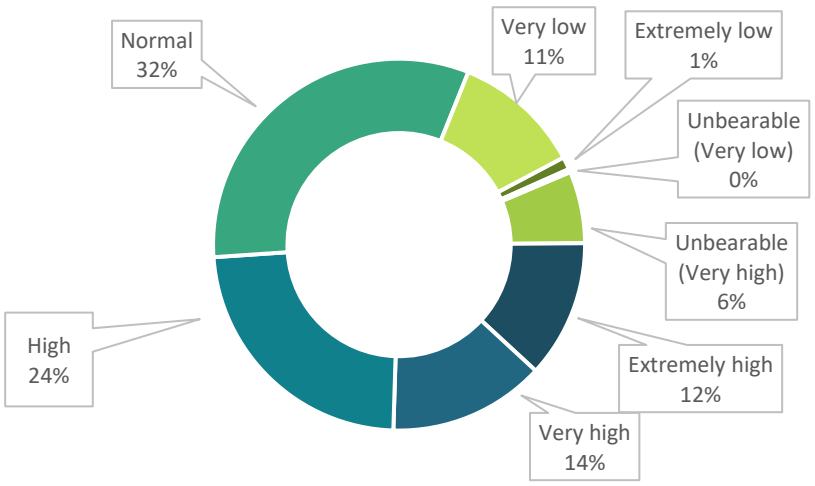
Figure 4 Workers' perceived exposure to noise at work



Question: The exposure to noise at your workplace is:

When asked about the temperature at their workplace, almost a third of the surveyed workers reported normal temperatures. All other workers reported some type of thermal discomfort at work, of which the majority related to high temperatures (Figure 5). Rapid changes from high to low temperatures can impair physiological processes of the human body in various ways, while also interacting with pre-existing conditions and chronic diseases, can result in damage to the brain, heart, lungs, kidneys, and liver.[61] Temperature changes can also make tendons, muscles, and scar tissue expand and contract, creating pain in joints affected by arthritis.[62]

Figure 5 Temperature at the workplace



Question: The temperature at your workplace is:

Extreme temperature changes are part and parcel of mining in Bolivia and Peru, where over 50% of the surveyed workers work at altitudes between 3,600 and 5,000 metres above sea level (masl)[iv] (Table 3). In this context, temperature extremes can range from 28 to 30 ℃ inside the mine (with relative humidity up to 100%) and, depending on the location of the mine, between -1 and 18 ℃ at elevations above 4,000 masl (with record low temperatures as low as -25 ℃).[63] There is consensus among the interviewed workers about the health effects of drastic temperature changes. In the words of a Bolivian informant: *"the deeper you go into the mine, the hotter it gets and if there is no ventilation, it is much hotter and so if you are working in a hot area and when you leave for the day you go out into the cold, then you feel the [change] every day from cold to hot and in these few years that I have felt a big change in my knee […] it hurts after a while […] I didn't have a problem but then I suddenly realised that I was in pain and my friend told me that it's that change from hot to cold and from cold to hot every day."*

Table 3 Workplace altitude

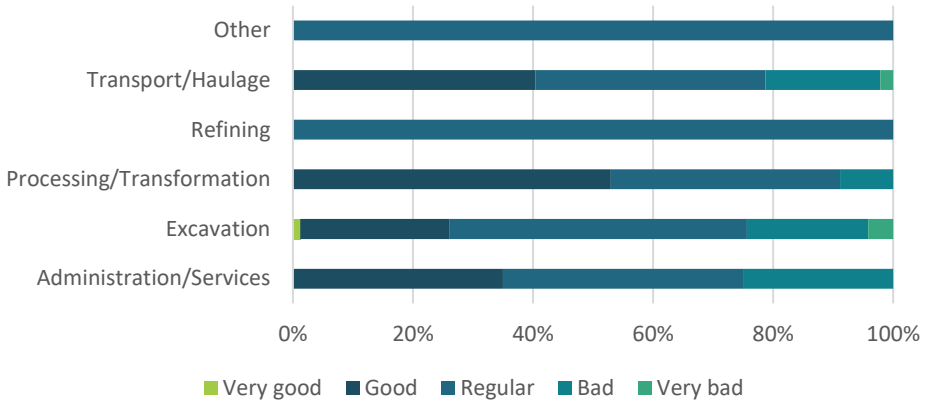
Altitude (meters above sea level)	% of survey respondents working at this altitude
Between 0 and 1500	23%
Between 1600 and 2500	4%
Between 2600 and 3500	3%
Between 3600 and 4500	32%
Between 4600 and 5000	26%
More than 5000	1%
Does not know	11%

Question: Altitude range above sea level of your workplace

Regarding the surveyed workers perception of lighting at their workplace, almost half (47%) perceived this to be neither good nor bad, 30% good, 19% bad, 3% very bad, and1% very good. Notably, almost three quarters of the workers in the excavation segment reported bad to very bad lighting at the workplace. Most workers reporting good or very good lighting were conducting administrative and service tasks, as well as workers in the transport/haulage stage of the productive process (Figure 6).

[iv] Two workers from Colombia indicated working at this altitude range, which goes in contradiction with the type and altitude range of coal mines in the country (coal mines in Colombia are open pits and the highest mine is found at an altitude of 2,750 masl).

Figure 6 Workers' perception of lighting at their workplace



Question: The lighting at your workplace is:

2.1.2 Chemical and biological hazards

Over 75% of the surveyed workers indicated exposure to chemicals at work. The most frequently cited chemical substances included oils and gases used for welding (Table 4). Acidic water was frequently reported as part of the category "acids". During an interview, a union representative from Bolivia described the health problems that result from exposure to acidic water: *"in some underground mines, we have what we call "mine water" or acidic water, or in Bolivia we call it "copajira water" […] I think this eye is a bit more damaged because copajira water is strong, you get a little drop into the eye and it makes you cry and many colleagues have red eyes, they have a kind of fleshiness in the eye."* The surveyed workers were also asked about their exposure to pathogenic biological agents at work. Ninety per cent of them reported high (69%) to very high (21%) exposure, while 10% reported normal workplace exposure to pathogenic biological agents.

Table 4 Workers' exposure to chemicals at work

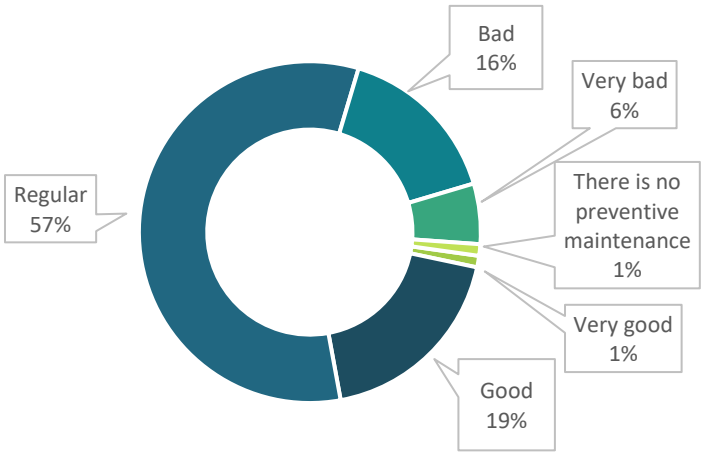
Type of chemical	Frequency
Oils	42
Welding gases	20
Fuels (including diesel fuel)	18
ANFO	14
Other gases (including HFC for aircon)	12
Acids (including acidic water)	10
Ammonia and cleaning products	8
Other/unspecified	154
Did not answer	74
Does not know	15

Question: Do you come into contact with any chemicals in your work? Please describe

2.1.3 Mechanical hazards

Mechanised equipment can pose a significant safety risk for workers. In this context, periodic maintenance of mechanical equipment, correctly planned and carried out, is essential to keep machines reliable and the workplace safe. Two types of maintenance are essential for workplace safety: preventive and corrective maintenance.

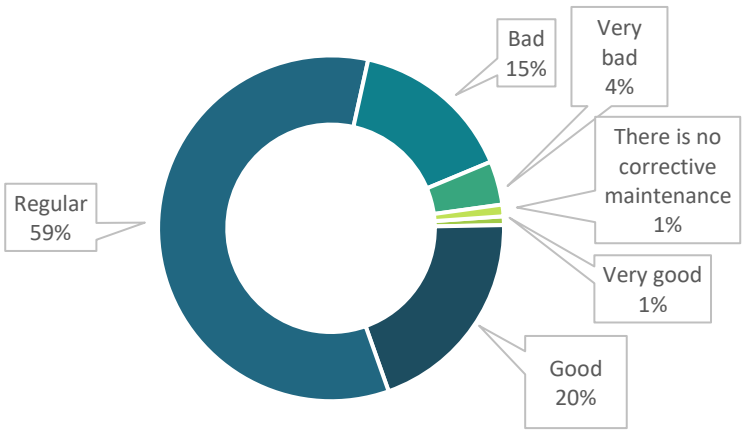
Figure 7 Workers' perspectives on preventive maintenance of machinery at work



Question: In the company where you work, the preventive maintenance of the machinery is:

Preventive maintenance is defined as "actions carried out at predetermined intervals or according to prescribed criteria intended to reduce the probability of failure or the degradation of the functioning of an item. In this case, actions are scheduled, proactive and intended to control the deterioration process leading to failure of a system (e.g., replacement, lubrication, cleaning or inspection)."[64] When asked about their perception of the quality of preventive maintenance at their workplace, more than half of the surveyed workers stated that maintenance was neither good nor bad, and 20% said maintenance was good (Figure 7).

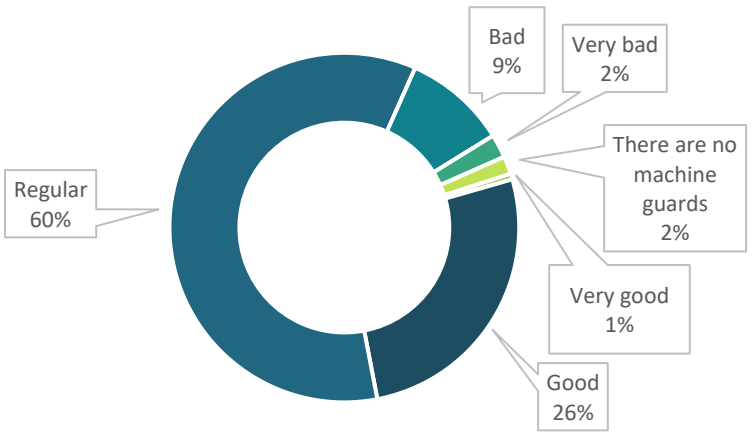
Figure 8 Workers' perspectives on corrective maintenance of machinery at work



Question: In the company where you work corrective maintenance of machinery is:

Corrective maintenance is defined as "actions intended to restore a system from a failed state to a working state (e.g., repair or replacement of broken components). This type of maintenance is also known as 'reactive maintenance' because the action is initiated when the unscheduled event of an equipment failure occurs."[65] Against this background, less than 20% of the surveyed workers considered the quality of corrective maintenance of machinery at work to be bad or very bad and 27% to be good or very good (Figure 8).

Figure 9 Workers' perception of the condition of machine guards at work



Question: In the company where you work, machine guards are:

Machine guards avoid potential equipment hazards and injuries at the workplace. They protect operators and other employees stationed near this equipment from the hazards of ingoing nip points, rotating parts, sparks, and flying debris.[66] In this context, the surveyed workers were asked to share their perception of machine guards at work, and only a quarter reported these to be in good or very good condition (Figure 9). According to a trade union leader from Colombia interviewed for this research, some of the most frequent accidents happen in the electrical area. Accidents in the mine area are not only limited to poorly maintained equipment, but also to poorly maintained infrastructure. In this context, trucks falling to lower levels and derailment occur commonly, due to the poor condition of roads.

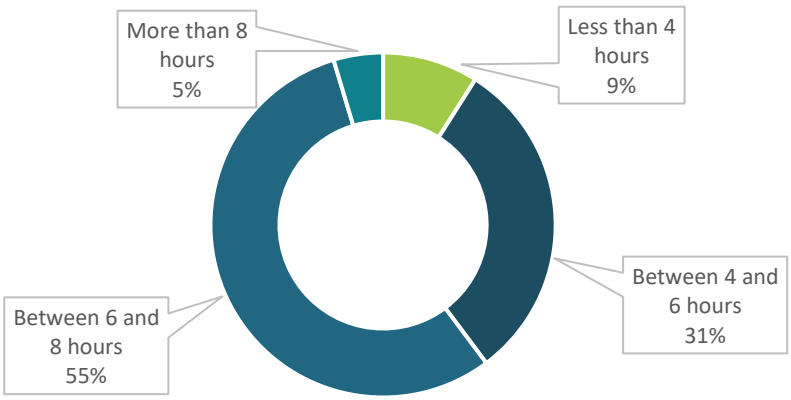
2.1.4 Psychosocial risks

Psychosocial risks in the workplace are situations that may affect workers' psychological response to their work and workplace conditions as well as their relationships with their supervisors and colleagues. High workloads, tight deadlines can trigger these risks, and lack of control of the work and working methods, as well as job insecurity, psychological and sexual harassment, and third-party violence.[67]

Workers experience stress when psychosocial risks remain unattended, and the demands of their job are excessive and greater than their capacity to cope with them. Prolonged stress on workers can lead to mental health problems and the development of serious physical health problems such as cardiovascular disease or musculoskeletal problems.[68] Moreover, adverse psychosocial factors at work have been linked to sleep problems.[69] For example, a key informant from Colombia reported that unions call psychosocial risks "silent risks" because workers tend not to speak about the stress, depression, and anxiety issues they deal with. Against this background, this study has used workers' reported issues with sleep, workloads, stress levels, and access to quality health care as indicators for psychosocial risks at work.

In terms of sleep duration among workers, 40% of survey respondents reported sleeping less than six hours every day (Figure 10) and ten per cent of surveyed workers reported taking sleep medication. Over a third of those workers are employed in excavation, and another third works in the transport/haulage segment. When disaggregated by gender, data revealed that 39% of men and 36% of women sleep less than six hours a day. The LGBTQ+ respondent reported sleeping less than four hours every day.

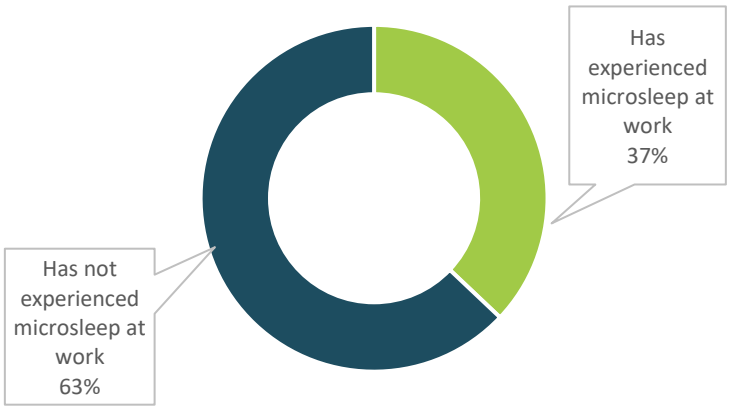
Figure 10 Sleep duration among workers



Question: How many hours do you sleep every day?

Sleep deprivation happens when workers do not sleep enough hours or when they sleep at the wrong time of the day (e.g., night shift workers).[70] Sleep deprivation is a risk factor for microsleep.[71] Microsleep is manifested as lapses in attention that can occur during complex tasks such as driving or operating machinery.[72] Microsleep can also be triggered by monotonous, repetitive tasks, even in a person who is well rested.[73] Against this background, surveyed workers were asked whether they had experienced microsleep at work. Over a third of them indicated having experienced microsleep at work (Figure 11). However, there is a possibility that microsleep is underreported, given that almost half of the survey respondents do not get more than six hours of sleep and that individuals afflicted by it do not always realise when microsleep episodes occur.[74]

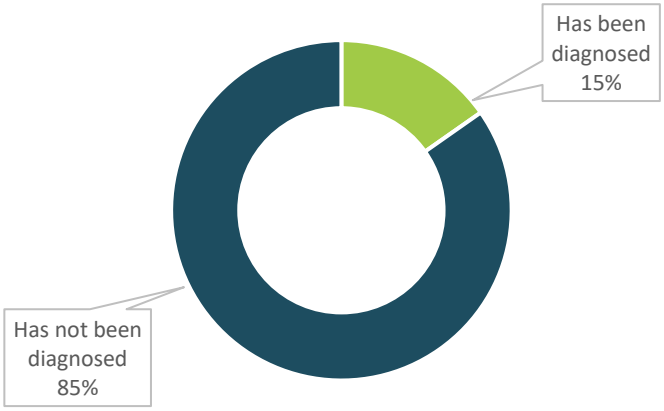
Figure 11 Microsleep at work



Question: Have you experienced microsleep at work?

Surveyed workers were asked whether they had been diagnosed with sleep deprivation syndrome (also known as sleep apnoea syndrome, SAS), restless leg syndrome (RLS), or daytime sleepiness (narcolepsy). SAS is frequently comorbid with RLS, and both are associated with disturbed sleep.[75] Only 15% of them indicated having been diagnosed with any of those conditions (Figure 12). In thirty per cent of the diagnosed cases, the disease was formally recognised as occupational. In this context, 12% of workers in the excavation segment, 42% of workers in the transport/haulage segment, and 21% of workers conducting administrative tasks reported having been diagnosed with apnoea, RLS, or narcolepsy.

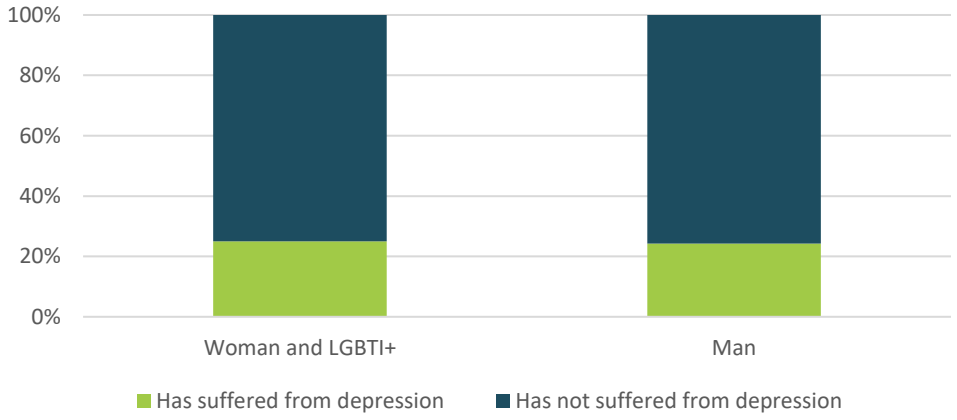
Figure 12 Apnoea, restless leg syndrome, or narcolepsy diagnoses among workers



Question: Have you been diagnosed with sleep deprivation syndrome (apnoea), restless legs syndrome or daytime sleepiness (narcolepsy)?

Survey respondents were also asked whether they had suffered from depression. Almost a quarter of them reported having suffered from it, while only 26% of those workers (all male) had been formally diagnosed with depression. Almost a quarter of male workers and less than 20% of female workers reported having suffered from depression, but none of the latter had been formally diagnosed with it. The LGBTQ+ respondent reported having suffered from depression too (Figure 13). It is notable that 58% of Afro-descendant workers and 35% of Indigenous workers reported having suffered from depression. Only 24% of the cases formally diagnosed with depression were recognised as an occupation disease, and only 15% of surveyed workers who reported suffering from depression had received psychological or psychiatric care in the last year.

Figure 13 Depression rate among workers, disaggregated by gender



Question: Have you suffered from depression?

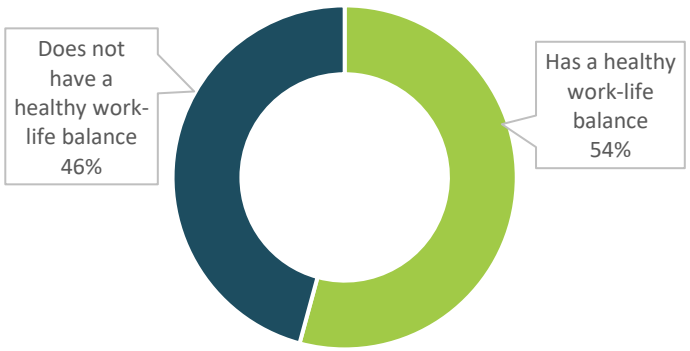
With regards to the workload of surveyed workers, more than half of them (57%) considered their working day to be exhaustingly long, the rest (43%) considered their working day was not exhaustingly long. This percentage is consistent across genders, stages of the productive process, and ethnicity of survey respondents. By contrast, only one third of subcontracted workers perceived their working day to be exhaustingly long, compared to direct workers, of whom almost two thirds thought their working days were exhaustingly long (Figure 14). As stated earlier in this section, heavy workloads can exacerbate psychosocial risks. In line with this, there is agreement among the interviewed informants that heavy workloads are increasing the stress levels of workers and jeopardising their safety at work. In the words of a Colombian union leader: *"We have had workers pensioned off due to mental problems caused by the risks related to work stress, shifts, pressure, harassment at work. Nowadays all the trucks have a camera, and the worker is monitored for the full 12 hours of his shift and if he moves 5 seconds away from the road, the system immediately calls him and says, "What is wrong with you? Why are you looking the other way? This type of pressure generates a tremendous mental problem, which we are already experiencing."*

Figure 14 Surveyed workers' perceived workload

Question: Is your working day exhaustingly long?

The surveyed workers were also asked about their work-life balance and more than half of them reported having a healthy work-life balance (Figure 15). Sixty-three per cent of female workers and fifty-four percent of men reported having a healthy work-life balance. The LGBTQ+ respondent reported not having a healthy work-life balance. Moreover, 87% of surveyed workers reported being head of household. Disaggregated by gender, 87% of the male workers and 63% of female workers reported being head of household. The LGBTQ+ respondent reported not being head of household.

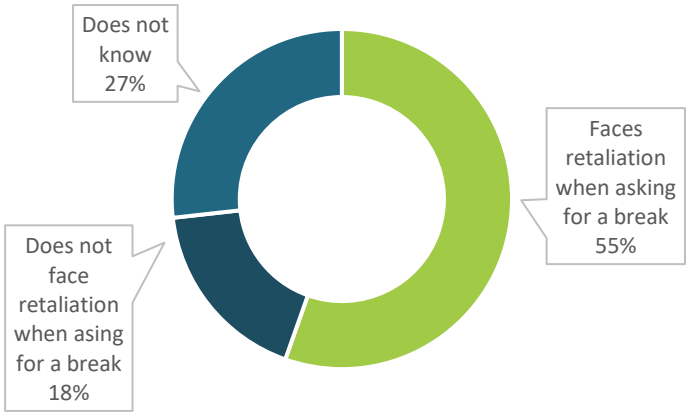
Figure 15 Surveyed workers' work-life balance



Question: Do you have a healthy work-life balance?

With relation to the frequency and length of rest, 58% of the surveyed workers reported not having the autonomy to decide when to take a break during the working day. Moreover, over half of them reported facing retaliation whenever they asked for a break outside the agreed working hours (Figure 16). Almost 58% of all reports of retaliation were from Peru, followed by Colombia (38%) and Bolivia (4%). Forty per cent of surveyed workers reported changes in their working hours without a reasonable period of notice.

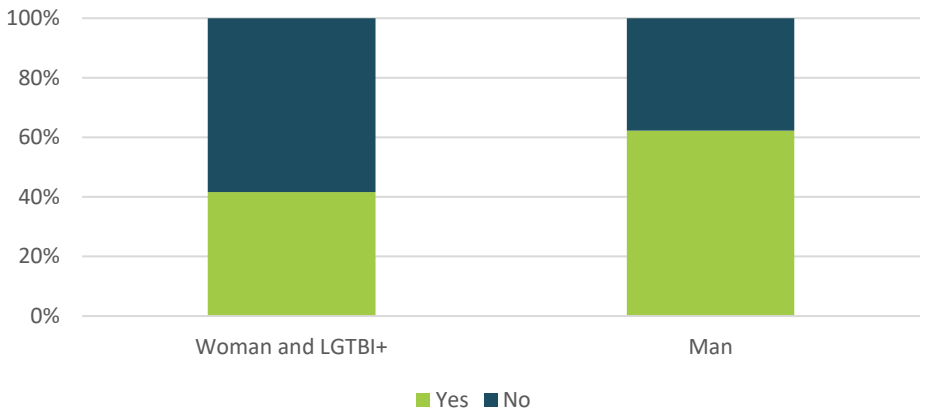
Figure 16 Permission to rest outside agreed working hours and retaliation by employers



Question: If you ask for a break outside the agreed working hours, do you face retaliation from your employer? n = 213

The surveyed workers were asked whether they felt the way they were treated at work was fair. Sixty-one per cent of them reported feeling unfairly treated at work, the rest (39) did not feel unfairly treated at work. Also, over 50% of racialised workers reported feeling unfairly treated at work. Notably, 63% of Afro-descendant workers felt unfairly treated at work. Disaggregated by gender, almost two thirds of male workers (63%) reported feeling unfairly treated at work, while 36% of the women felt treated unfairly (Figure 17). Moreover, more than half of direct and subcontracted workers felt treated unfairly at work. Broken down by country, 65% of the Bolivian workers and 60% of the Peruvian workers felt treated unfairly at work. In Colombia, where no subcontracted workers were surveyed, 64% of survey respondents felt unfairly treated.

Figure 17 Workers' perception of their treatment at work



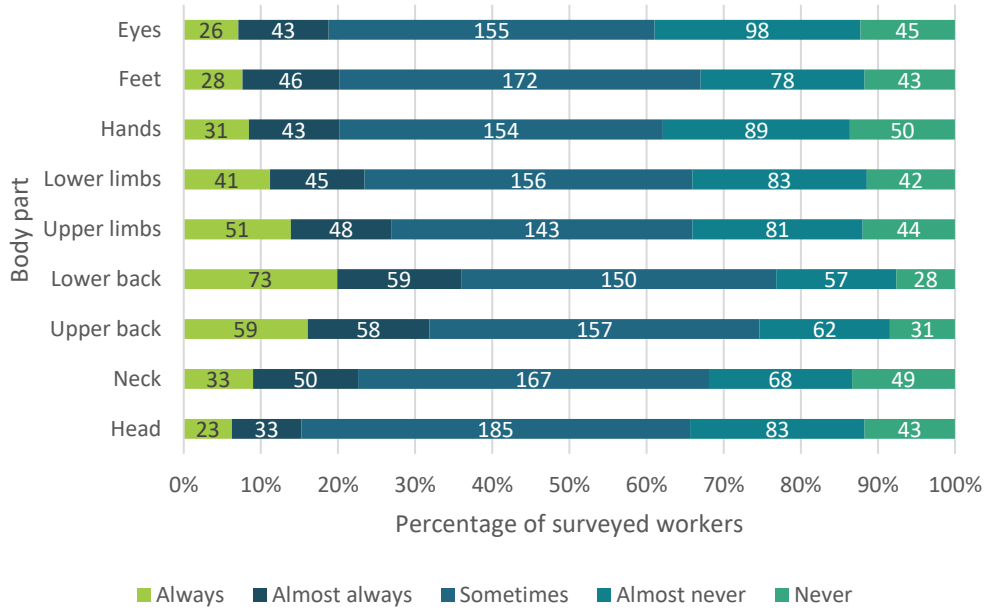
Question: Do you feel the way you are treated at work is unfair?

2.1.5 Ergonomic risks

Ergonomic risks are situations at the workplace that cause wear and tear on the body and can cause injury. These include repetition, awkward posture, forceful motion, stationary position, high force exertion, repetition, vibration, extreme temperature, noise, and work stress.[76] If not prevented, ergonomic risks can cause musculoskeletal disorders (i.e., injuries and disorders that affect the human body's movement or musculoskeletal system, including muscles, tendons, ligaments, nerves, discs, and blood vessels, see Section 1.2.2.). In mining, outdoor, and underground work environments exacerbate exposure to those risks, making this sector more challenging than other industries.[77]

Against this background, the surveyed workers were asked how often they experienced discomfort, malaise, or pain in different parts of their bodies. On average, 67% of the workers felt discomfort, malaise, or pain in some part of their bodies at least sometimes. By contrast, on average, 11% of the surveyed workers reported never experiencing pain, discomfort, or malaise in any part of their bodies. The most frequent ailment was pain or discomfort in the lower back, with 76% of surveyed workers experiencing it at least sometimes (Figure 18).

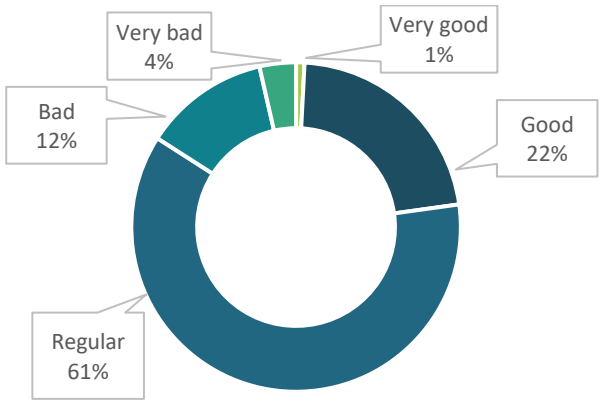
Figure 18 Frequency of workers' pain in different body parts



Question: Do you experience discomfort, malaise or pain in your head, neck, upper back, lower back, upper limbs, lower limbs, hands, feet, or eyes?

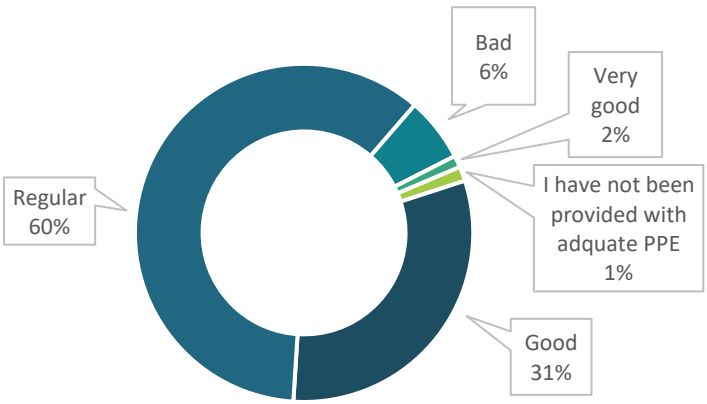
Regarding workers' access to healthcare at the workplace, 82% of surveyed workers reported the presence of dedicated healthcare personnel at the company where they worked. In this context, 50% of the surveyed workers felt that the company's health personnel were not impartial when attending their health complaints. They were also asked about the level of health and safety protection in their workplace. Less than a quarter of the surveyed workers considered this to be very good or good (Figure 19). Moreover, 57 of them reported not understanding the process that must be followed for a disease to be considered occupational.

Figure 19 Workers' perceived level of health and safety protection at work



Question: What level of health and safety protection do you perceive from your work?

Figure 20 Workers' perceived condition of their Personal Protective Equipment (PPE)



Question: What is the condition of the personal protective equipment (PPE) provided by the company where you work?

The surveyed workers were also asked to rate the condition of the PPE they had been provided with at the company where they worked. One third of them considered this to be in good or very good condition, while four workers (1% of the total surveyed) reported not having been provided with adequate PPE (Figure 20). All of the workers who reported not having adequate PPE were men and three of them worked in the excavation segment, while one of them worked in the transport/hauling segment. Moreover, 71% of the surveyed workers indicated that there had been workplace accidents in the company where they worked in the past year. According to the workers, the causes of those accidents were diverse, with poor labour conditions and lack of preventive maintenance being the most common (Table 5).

Table 5 Causes of workplace accidents, according to surveyed workers in focus countries

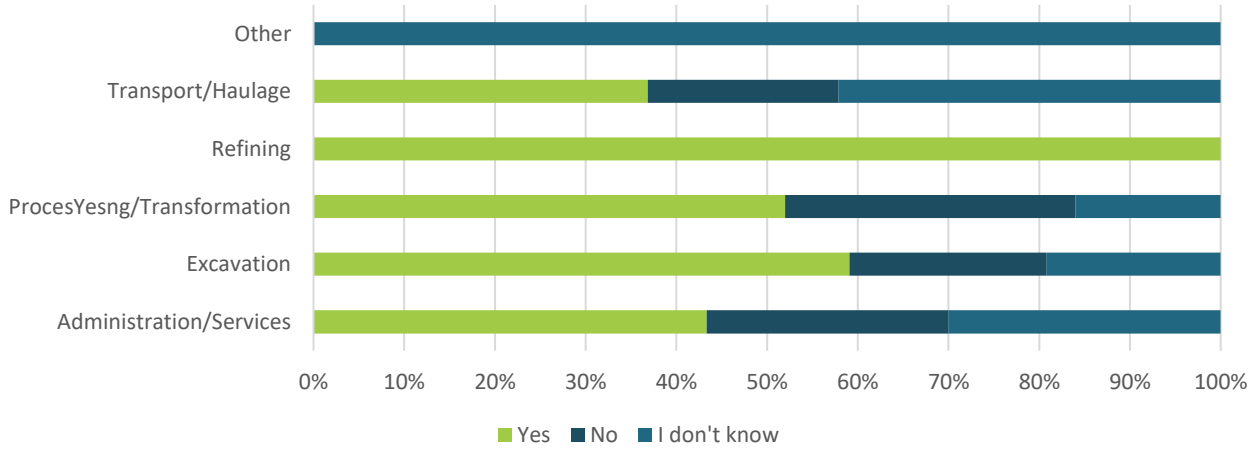
Cause of accident	Frequency
Poor labour conditions (including lack of preventive maintenance)	35
Fatigue	30
Falls	22
Rock falls and collapse	20
Microsleep	9

Pressure and harassment from supervisors	9
Mismanagement and poor planning	9
Unspecified causes	8
Lack of concentration	7

Question: What were the causes of those accidents?

Likewise, the surveyed workers were asked whether there had been workplace accidents caused by a bad safety protocol regarding PPEs. Fifty-four percent of the respondents indicated that there had been workplace accidents caused by a bad safety protocol regarding PPEs. Twenty-three percent did not know and 29% said there were no workplace accidents caused by a bad safety protocol regarding PPEs. Broken down by stage of the mining process, all the workers in the refining segment indicated that there had been workplace accidents caused by a bad safety protocol regarding PPEs (Figure 21).

Figure 21 Workplace accidents caused by a bad safety protocol regarding PPEs



Question: Have there been workplace accidents in the company caused by a bad safety protocol regarding PPEs?

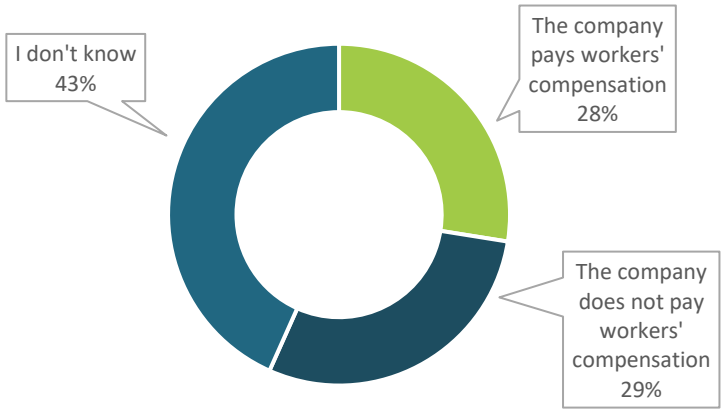
Moreover, the most cited cause for PPE-related workplace accidents was inadequate PPE (47%), followed by low quality of the PPE (26%), absence of PPE (15%), and unspecified causes (12%). Almost half of the surveyed workers indicated that the company where they worked did not involve workers when carrying out the investigation of occupational accidents (Figure 22). These findings go in line with the opinion of a union leader from Peru: *"In some cases, when there is an accident, only the chief on duty and the supervisor go to the scene. They go, they check, and then, a day or two later, depending on the seriousness of the accident, they call in the workers' representatives. In this part too, I have always instilled in my colleagues, who are the representatives, that this should not be allowed. Because one thing is to investigate an accident right at the place where it took place, and another thing when you make up your report, right?"*

Figure 22 Mining companies' inclusion of workers in workplace accident investigations

Question: Did the company involve workers when carrying out the investigation of occupational accidents?

The surveyed workers were also asked whether they had had any occupational diseases or accidents. The majority of workers (69%) had not had any occupational diseases or accidents. From the workers who had had an occupational disease or accidents, 57% had been incapacitated in the last year. In this context, less than a third of the surveyed workers indicated that their employer paid workers' compensation (Figure 23). While the same proportion of direct and subcontracted workers reported that employers paid workers' compensation (27%), half of the subcontracted workers did not know whether workers' compensation was paid, a higher percentage compared to direct workers (41%).

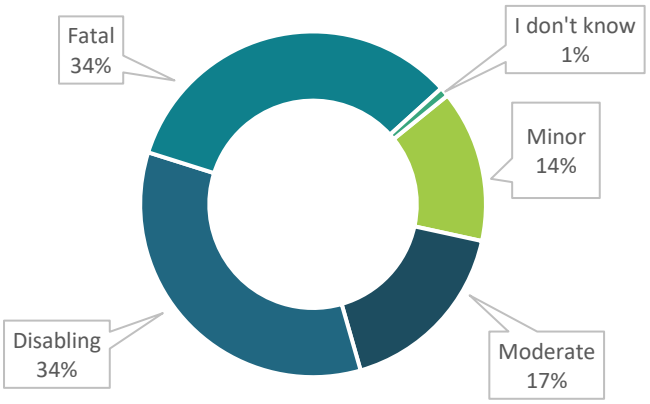
Figure 23 Workers' sick leave compensation



Question: Does your employer pay workers' compensation?

Regarding the severity of accidents at the workplace, two thirds of workers indicated that these were either disabling or fatal (Figure 24). In this context, 52% of the surveyed Peruvian workers reported fatal accidents. The fatality rate reported by the surveyed workers was much lower in Bolivia (16%) and Colombia (6%). By contrast, in Colombia, most of the accidents reported by survey respondents were disabling (62%). Two thirds of accidents in Bolivia were either minor or moderate. One third of the accidents reported by direct workers were fatal. Twenty-three percent of subcontracted workers reported fatal accidents.

Figure 24 Severity of workplace accidents



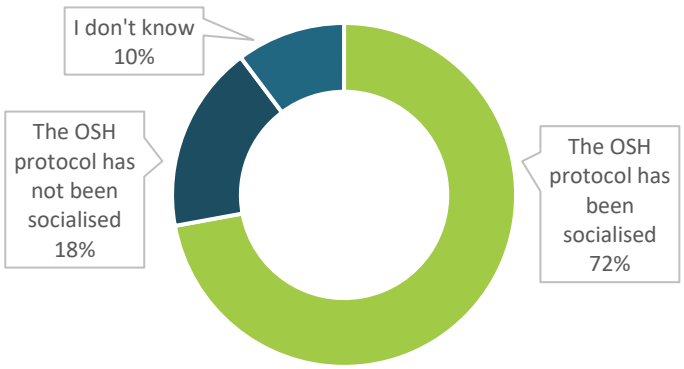
Question: The accidents reported in the last year were:

2.2 Management of OSH risks

The management OSH risks is a formal process for identifying hazards, evaluating and analysing risks associated with those hazards. The main goal of OSH risk management is to take action to eliminate the hazards or control the risks that cannot be eliminated to minimise injury and occupational diseases. A key element of OSH risk management systems is the active participation or involvement of workers.[78]

Against this background, the surveyed workers were asked whether there was an occupational health and safety management system in place where they worked. Eighty-seven per cent of them responded that there was an OSH management system in place. Over two thirds of the workers reported that the OSH protocol had been socialised among workers (Figure 25). In this context, 80% workers thought the company had instated the protocol in response to its legal obligations. Eleven per cent of workers thought setting up the OSH protocol had been the outcome of a business decision, and 9% did not know why the company had introduced the protocol. The workers were also asked whether there were workers, activities or locations not contemplated in the OSH management system of the company where they worked. Over half of them (57%) did not know, and 22 % believed there were workers, activities, or location not included in the OSH management system.

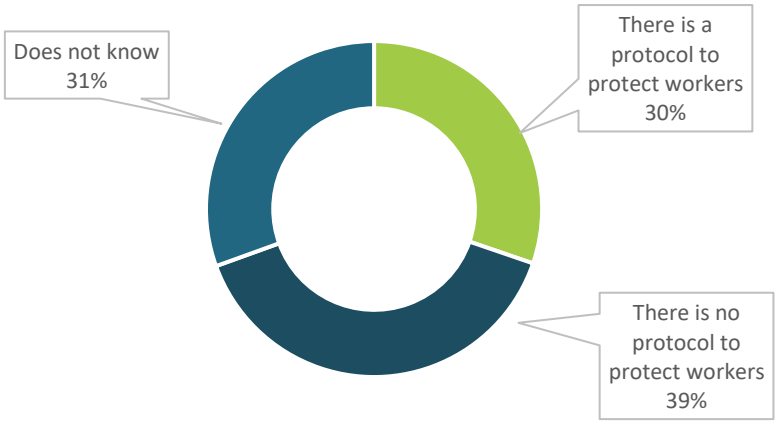
Figure 25 Socialisation of OSH protocol among workers



Question: Has the Occupational Health and Safety protocol been made available to workers?

Most surveyed workers were positive about their companies' implementation of the OSH management system. In this context, 23% believed that the company ensured the continuous improvement processes of the OSH management system; 19% believed their employer ensured quality processes to identify hazards or ensured risk assessment. Twelve per cent believed the company ensured continuous improvement processes of the occupational health and safety management system, and the rest believed their employer did not guarantee any of the above.

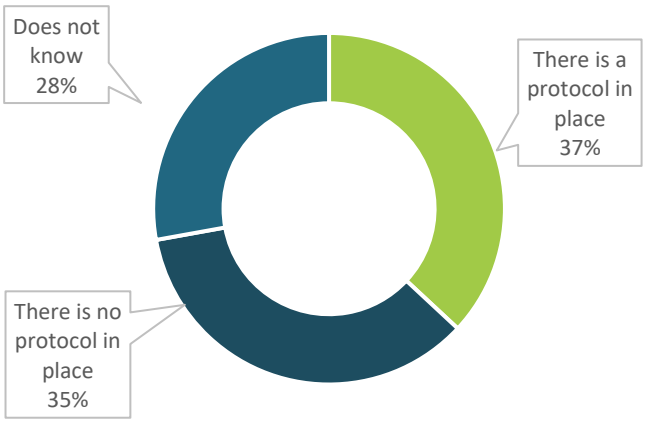
Figure 26 Protocol to protect workers from retaliation



Question: In the company where you work, is there a protocol to protect workers from retaliation when they complain about working conditions?

The workers were also asked whether the company where they worked had known processes for reporting hazards or risk situations at work. Seventy-two per cent of them responded that the company had such procedures. The rest of the workers said that their employer had not put a process in place to report hazards or risk situations at work (14%) or did not know if this was the case (14%). Likewise, almost 40% of workers stated that their company had no protocol to protect workers from retaliation when they complained about working conditions (Figure 26). A company representative interviewed for this project indicated that the company had yet to adopt any of the main OSH standards (namely, OSHAS 18001, ISO 45001, 9001, 5001, or 37500), but that it was NOSA-certified. In this context, the fact that NOSA has no publicly available whistle-blower protection standards suggests the absence of this standard. It is also possible that existing whistle-blower protection policies and protocols are not sufficiently socialised among workers.

Figure 27 Protocols to guarantee workers' right to protect themselves against OSH risks



Question: Does the company where you work have policies and processes to protect workers from exercising the right to leave work when there is a risk of injury, illness, accident, or disease?

The workers were asked whether the company they worked for had policies and processes in place to protect workers from exercising the right to leave work when there was a risk of injury, illness, accident, or disease. Almost 40% reported that the company they worked for had such protocols in place (Figure 27). Most subcontracted workers (52%) reported that the company had no protocols to guarantee workers' right to protect themselves against OSH risks. By contrast, 30% of direct workers reported the absence of such protocols. These findings do not necessarily prove the absence of policies to protect workers' rights to remove themselves from dangerous situations at work, but they are certainly an indication that such policies are not sufficiently socialised among workers. In line with this assertion, the US Department of State found that the Colombian law generally protects workers' rights to remove themselves from situations that endanger health or safety without jeopardy to their employment, although some violations of this right were reported during the year 2021.[79]

Almost half of the surveyed workers (48%) found that the companies they worked for did not have good OSH practices for subcontractors. In this context, two-thirds of workers reported that company they worked for did not have any voluntary health promotion programmes or services for direct employees. Likewise, 71% of the workers reported that company where they worked did not have voluntary health promotion programmes or services for outsourced workers. The range of health promotion programmes for both direct and outsourced workers reported by the surveyed workers is provided in Table 6.

Table 6 Programmes by employers to promote the health of workers

Type of programme	For direct workers	For outsourced workers
Learning active breaks	92	74
Encourage the practice of sports	59	39
Providing healthy food	55	42
Reconciling work and family life	25	23
Other	1	2

Question: Which of the following programmes or services does the company where you work have for direct employee or direct employee health promotion?
Note: The numbers above concern the number of times surveyed workers indicated the existence of health promotion programmes.

With regard to the companies' obligation to report workplace accidents, the majority of surveyed workers (45%) did not believe that the company where they worked reported accidents at work to the competent authority. Among the workers that believed their employer did not report workplace accidents, 40% were Colombian and 60% Peruvian. Notably, none of the Bolivian respondents perceived that their employer did not report work accidents to the competent authority (responses to this question in Bolivia were divided between workers who believed their employer reported (69%) and those who did not know whether their employer reported (31%)).

The high number of employees who did not believe their employer reported workplace accidents to the competent authority is possibly explained by the lack of reliability of data pertaining workplace safety. This lack of reliability is the result of the interplay of various causes, including insufficient capacities to enforce labour inspections,[80] or to enforce the compliance of reporting responsibilities, among others. In the words of a trade union leader from Colombia with OSH expertise: "*The form [that needs to be filled to report accidents to FASECOLDA, the Federation of Colombian Insurance Companies, a private instance in charge of aggregating data and reporting to the Colombian Ministry of Labour] asks questions regarding the of cause of accident, if it occurred at dawn, in the afternoon, at night, all that information. I have always asked them where [this information] is kept and they say that it is archived. There could be a wealth of information that could make the problem visible, which is not used because there is no single official information system, the Ministry of Labour should be in charge of that, that is the first thing.*"

This opinion is also shared by the Bolivian mining sector representative interviewed for this research: *"On the part of the Ministry, we see [their effort to aggregate and publish information on workplace accidents] as very low, we have had no dissemination or recommendation from them, [neither] have [they] been involved in serious accident investigations, for example in other areas, they are very isolated, there is little communication and very low standard of investigation on their part."* By contrast, the interviewed Peruvian government representative underscored that, from his point of view, mining companies did not comply with their responsibilities to report workplace accidents. At the same time, the informant conceded that: *"[this situation] is linked to the weakness of the labour administration bodies to enforce or eventually sanction non-compliance, or the weakness of the labour administration, I think this is also related to this."*

The workers were also asked whether the health system at work met their expectations. Almost two thirds of them (61%) found that the health system at work attended to their needs in a timely manner. Thirty-six percent of workers responded that the health system did not tend to their needs, and 3% said there was no health system at work.

Contrary to the results of this survey, there is consensus among the trade union representatives interviewed for this research that mining companies in Bolivia, Colombia and Peru do not handle workplace accidents properly. In the words of a union leader from Peru: *"there have been reports and many workers have died, as far as I can remember, from stomach cancer. About seven workers have died from stomach cancer and a few who have quite serious digestive problems, which have not been diagnosed, because the system itself is late in providing medical attention. For example, if the worker wants to attend an appointment with a specialist [he] can only attend if he's given unpaid leave. But a worker who is disabled, who has economic hurdles, often tries to get an appointment during his break, and often the doctor is not there. Therefore, the opportunity to get medical attention in a timely manner is lost and these illnesses evolve in silence, often leading to death."*

Likewise, a trade union leader from Colombia explained that workplace accidents and injuries are handled by public and private work insurance companies. According to the informant, whenever there is an accident, these companies *"look for a way to disqualify injuries as a result of a workplace accident and look for ways to not compensate workers."*

2.3 Gendered risks

This study captured the voices of 367 workers, of which roughly 3% were women and one LGBTQ+ respondent. While, undoubtfully, a larger effort is needed to reach out to more women, it is true that less than 8% of the workers with formal employment in the Latin American mining sector are women. According to IDB, the gender gap is also rife in leadership positions, where less than 17% of executive and 1% of top management positions are filled by women.[81] Likewise, women are notably absent from field operations and only a few work as technicians and they tend to occupy jobs in the administrative segment.[82] These trends reflect the proportion of surveyed female informants in the different segments of the productive process: almost 55% of the female informants worked in the administration/services segment, 27% in excavation, and 18% in processing. The LGBTQ+ respondent also worked in the processing segment. Statistics rarely capture information on the participation of non-normative identities in the labour market and therefore reporting on their experiences in the mining sector is important to increase the visibility about the challenges they face to access their rights to a safe and healthy workplace.

Despite the masculinisation of the sector, this study found some differences between genders (i.e., women, men, and a LGBTQ+ respondent). For example, less than ten percent of the surveyed men reported sleeping less than four hours a day, compared to 25% of the persons of women (including the LGBTQ+ worker). About 60% of surveyed women and other found that their working day was exhaustingly long, although only 36% stated feeling unfairly treated at work. While not significantly different, a smaller percentage of men (55%) found their working day exhaustingly long. As stated earlier, women engaged in paid employment see their workdays extend significant as they maintain their unpaid job as care givers at home.

Further, one of the Colombian trade union leaders who informed this research denounced the lack of gender disaggregated data concerning workplace accidents, which is compounded by the failure of companies and governments to fulfil their obligation to report workplace accidents. In the words of the informant: *"For example, last year 513,857 accidents had occurred by December 31, 2021, a little more than half a million accidents at work, [there are] 10,799,000 workers. These statistics are not broken down by sex, much less by age, they are broken down by economic sector."* This situation constitutes a risk in which gender-disaggregated data is crucial to ensuring gender-sensitive prevention and mitigation of workplace accidents affecting workers of each gender and ultimately achieve equality between men and women in occupational safety and health.[83]

2.4 Risks for subcontracted workers

This study found that almost half of the surveyed workers did not think that companies they worked for had good OSH practices for subcontractors. This assertion was made in the context of the types and adequacy of programmes by companies to promote the health of workers. While this could be interpreted as an indication that companies have not sufficiently socialised their policies and programmes, a few studies have found that subcontracting agencies supplying workers to mining operations in Latin America do not provide frequent or sufficient safety trainings.[84] This situation not only constitutes a unique risk for the health and safety of outsourced workers, but it hinders the provision of occupational health services in the workplace and complicates auditing services.

As stated earlier, more than half of the subcontracted workers reported that the company they worked for had no protocols to guarantee their right to protect themselves against OSH risks. This finding, together with the information provided by a Peruvian union leader interviewed for this study, points to the possibility that subcontracted workers are more prone to retaliation when making complaints about their working conditions. In the words of the informant: *"There are many outsourced workers in Peru who are being left aside […] many of them are not part of the [bipartite] consultation processes on OSH […] they don't get to give their opinion, they are only made to comply […] and when they want to unionise, their contract is ended and they are out of a job".*

By contrast, the mining sector representative from Peru stated that in their operations, *"we have an [OSH] committee as at each mining unit, each subcontractor that has more than 20 workers has its own committee in the operations and there is a monthly safety meeting with these subcontractors*. *[Moreover,] the [OSH] management system encompasses all our operational processes, but also includes part of the management of the subcontracting company, that is, the subcontracting company is aligned to our management system."* While there is merit in the mining company's effort to use the same standards for direct and subcontracted workers via the inclusion of subcontracting agencies in the planning and monitoring of OSH management systems, the fact that workers still report poor practices merits paying a closer look at possible loopholes in these systems.

3

Structural barriers to comprehensive Occupational Safety and Health

Which factors influence the mining sectors' OSH standards and complying with those standards? In answering that question, this chapter looks at legal frameworks in producing countries as well as the mining industry's voluntary CSR initiatives that seek to address OSH risks. Attention is paid to the limitations of those legal frameworks and voluntary initiatives.

Legislation, together with resourceful supervision and control of implementation, is considered the main foundation on which risk mitigation in mining should be based. The ILO Safety and Health in Mines Convention No. 176, 1995 (C176) supports the development of such legislation. It states the preventive and protective measures that should be undertaken by the employer to assess the risk and address it in the following order of priority: eliminate or reduce the risk; control the risk at source; minimise the risk by means that include the design of safe work systems; and, in so far as the risk remains, provide for the use of personal protective equipment.[85]

When it comes to technical and organisational measures to improve mine safety and prevent mining accidents, there are several guidelines and codes of practice. Apart from C176, two other instruments serve as a point of reference to guide OSH measures the mining sector: the Underground Work (Women) Convention, 1935 (No. 45) and the Safety and Health in Mines Recommendation, 1995 (No. 183).[86] These instruments often serve as the bases for national legislation and international voluntary initiatives on RBC.

3.1 Legal frameworks and enforcement bodies in producing countries

The mechanism for enforcement of the provisions of occupational safety, health and welfare statute in mines includes inspection of mines, inquiry into accidents, surveys, grant of permissions and exemptions, and approvals, among others. The policies and governmental bodies of Bolivia, Colombia, and Peru that embody this mechanism are analysed in the following sections.

3.1.1 Bolivia

Legal framework

Bolivia has not ratified the key ILO Conventions on OSH, including C155 - Occupational Safety and Health Convention, 1981 (No. 155) C176 - Safety and Health in Mines Convention, 1995, although it has ratified C045 - Underground Work (Women) Convention, 1935.[87] However, Bolivia's constitution, through Article 46, expressly recognises the right to safety and health at work as a fundamental human right: "To decent work, with industrial safety, hygiene and occupational health, without discrimination, and with fair, equitable and satisfactory remuneration or salary, which ensures for himself and his family a dignified existence. To a stable source of employment, under equitable and satisfactory conditions."[88]

In Bolivia, the main terms relating to workers' health and safety are legally defined in Decree Law No. 16998 of 2 August 1979, approving the General Law on Hygiene, Occupational Safety and Welfare. Article 4 of the Decree Law provides up to 20 definitions which contribute to a better understanding of the law.[89]

Table 7 General definitions set in Decree Law No. 16998

Term	Definition
Worker	Any person who provides services to an employer for wages, salary or other remuneration, including any apprentice or trainee working for pay or without remuneration.
Industrial or occupational safety	The set of procedures and rules of a technical, legal and administrative nature, oriented to the protection of the worker, of the risks against their physical integrity and its consequences, as well as to maintain the continuity of the productive process and the intangibility of the assets of the workplace.
Industrial or occupational risk	A potential state of natural or artificial origin which may cause an occupational accident or disease.
Unsafe condition	Any physical condition or absence of norm, capable of causing an accident.
Unsafe act	Any unnecessary action and/or exposure of the worker to a risk which may cause an accident.
Workplace accident	Any unforeseen event that disrupts a work activity causing injury(ies) to the worker and/or disruption to machinery, equipment, materials and productivity.
Injury	Any bodily dysfunction or impairment caused by an accident or occupational disease. Injuries can be minor, severe and fatal.
Minor injury	A work-related injury that requires first aid or medical attention but does not cause the worker to lose one or more working days.
Severe injury	Any injury that results in incapacity for work, causing the worker to miss one or more working days.
Fatal injury	Any injury that causes death.
Investigation of an accident	The methodical sequence that is observed in the study of an accident from a period prior to its occurrence until the moment the exact causes and circumstances contributing to the occurrence of the event have been determined.
Safety statistics	The result of the analysis and mathematical evaluation of data related to occupational accidents and diseases conducted to obtain useful information for research, planning and control of occupational health and safety activities.

Source: Government of the Plurinational State of Bolivia (n.d.), *Ley General de Higiene y Seguridad Ocupacional y Bienestar. Ley (Decreto Ley) (2-Agosto-1979) Vigente.*

Moreover, three ministerial resolutions estipulate technical OSH norms:[90]

- Ministerial Resolution Nr. 387/17: Sets minimum levels of illumination at the workplace (Technical Safety Norm (NTS) 001), minimal conditions of noise exposure (NTS 002), minimal conditions to conduct work at a risky height (NTS 003), safety conditions for work on scaffolds (NTS 005), safety conditions for demolition work (NTS 006), safety conditions for excavation works (NTS 007), and safety conditions for work in confined spaces (NTS 008).
- Ministerial Resolution Nr. 1411/18: Sets the guidelines for occupational safety and health programmes (NTS 009).
- Ministerial Resolution Nr. 612/20: Sets standards for nutrition and food at the workplace (NTS 011), hygiene services at the workplace (NTS 012), and ground transportation services for commuting workers (NTS 013).

Competent authorities

In Bolivia, the Ministry of Labour, Employment and Social Security is the highest institution in terms of OSH matters. Its mission is to develop actions to promote and protect work, dignified employment, the restitution of socio-labour and fundamental labour rights, recognised in favour of workers.[91] In this context, two dependencies of the Ministry of Labour, Employment and Social Security are in charge of planning and enforcing OSH norms:

- **General Directorate of Labour, Hygiene and Occupational Safety**

  The General Directorate of Labour, Hygiene and Occupational Safety supervises working conditions and health and safety within the Bolivia's establishments. The objectives pursued by this body are to promote policies and actions to ensure adequate labour relations, ensuring compliance and enforcement at the national level of labour and industrial safety legislation, as well as international conventions on the subject.[92]

  Among the attributions of the General Directorate of Labour, Hygiene and Occupational Safety, the following stand out:[93]

  - Comply with and enforce compliance with labour and social standards in the framework of decent work.
  - Promote policies for the prevention of occupational diseases and accidents at work, as well as the dissemination of and compliance with labour, occupational safety and health standards.
  - Coordinate, elaborate and execute policies and programmes on occupational health and safety, with public and private entities, through the National Institute of Occupational Health.
  - Plan, organise, direct, coordinate, coordinate, execute and control activities, technical and operative tasks under the responsibility of its unit, complying with the established management goals.
  - To regulate the planning, organisation, direction and control of the activities of the Departmental and Regional Labour Headquarters in relation to the attention to the demands of workers and occupational health, referring to the payment of social benefits, overtime and others, labour migration and presentation of payrolls and salaries, industrial safety, accidents at work and others in the area of their competence.

- **National Institute of Occupational Health**

  The National Institute of Occupational Health (INSO) is technical scientific body under the supervision of the Ministry of Health, whose purpose is the analysis and study of OSH conditions, as well as the promotion and support for their improvement, in accordance with its regulations. INSO seeks to implement its structure and services throughout the national territory, promoting research, epidemiological surveillance, and training, with dynamism, productivity, and timeliness at the service of Bolivian workers.[94]

  The main functions of INSO are:[95]

  - To carry out training, information, research, study and dissemination of OSH activities;
  - To draw up technical OSH standards, in coordination with related bodies;
  - To elaborate the Technical Guides for the application of the Regulations derived from the Law.
  - Elaborate and supervise the protocols and procedures for pre-occupational and occupational medical examinations, systematic and compulsory for workers, coordinating with the Social Security management bodies;
  - To provide technical advice to companies and public and private entities on OSH;
  - To provide technical advice and the necessary expert collaboration with the Occupational Health and Safety Inspectorate in its respective surveillance and control functions;

- To establish a system of registration of occupational accidents and diseases at the national level;
- To implement a procedure for the statistical calculation of occupational accidents and diseases valid for Bolivia; Any others that correspond to it for the promotion of OSH.

Barriers of Bolivian legislation to comprehensive OSH

Despite the number of provisions to protect workers' right to workplace safety and health, according to the US Department of Labour, Bolivia's OSH legislation is not effectively enforced. The Ministry of Labour, Employment and Social Welfare's General Directorate of Labour, Hygiene and Occupational Safety is responsible for the protection on workers' OSH, but has insufficient funds and inspectorate capacity, and noncompliance is underreported. Workers in informal employment enjoy even less protection.[96]

3.1.2 Colombia

Legal framework

Colombia has not ratified the key Conventions on OSH, including C155 - Occupational Safety and Health Convention, 1981 (No. 155) and C176 - Safety and Health in Mines Convention, 1995.[97]

In Colombia, occupational safety at mining sites is regulated through four policy instruments: Law 685 of 2001 or the Mining Code, as amended by Law 1382 of 2010; Decree 1335 of 1987 or the Safety Regulations for Underground Workings, as amended by Decree 1886 of September 2015; Decree 2222 of 1993 or the Health and Safety Regulations for Open Pit Mining; and Decree 035 of 1994 on mining safety provisions. These instruments regulate various aspects pertaining to the operating conditions of mining operations in the country, including mine design, the atmospheric conditions of underground mining, the use of equipment and means of transport, and the responsibilities mining companies to ensure acceptable safety conditions in mining operations (article 59 of the Mining Code), among other aspects.[98] These instruments are currently undergoing revisions and modifications.

There are also other technical and legal provisions defined by other ministerial portfolios, which are related to workers' safety and are mandatory for the mining sector:[99]

- Resolution 2400 (of May 22, 1979): Establishes certain provisions on housing, health, and safety in work establishments.
- Decree 2222 (of November 5, 1993): Issues regulations on hygiene and safety in opencast mines.
- Decree 035 (of January 10, 1994): Lays down provisions in the field of mining safety.
- Decree 1295 (of June 22, 1994): determines the organisation and administration of the General System of Occupational Risks.
- Decree 2090 (of July 28, 2003): Defines high-risk activities for the health of the worker and modifies and indicates the conditions, requirements and benefits of the pension scheme for workers who conduct these activities.
- Resolution 1401 (of May 14, 2007): Regulating the investigation of incidents and accidents at work.
- Resolution 181467 (of September 7, 2011): Adopts a National Mining Safety Policy.
- Memorandum 18014 (of May 5, 2011): Sets guidelines pertaining mining safety.
- Decree 723 (of April 15, 2013): Regulates the affiliation to the General System of Labour Risks of the persons linked through a formal contract of provision of services with public or private entities or institutions or private entities or institutions and independent workers who work in activities high-risk activities.
- Concept 201420001232321 (of July 29, 2014): States concerns related to mining accidents.
- Decree 1443 (of July 31, 2014): Lays down provisions for the implementation of the Safety and Health and Safety Management System at Work (SG-SST).

- Concept 20151200090901 (of April 10, 2015): Consultation on mining health and safety and occupational health standards.
- Decree 1886 (of September 21, 2015): Establishes Safety Regulations for Underground Mine Workings.
- Resolution 368 (oof May 26, 2016): Regulating the technical characteristics of self-rescuer equipment underground mining personnel.
- Decree 052 (of January 12, 2017): Transition to the implementation of the Health and Safety Management System.
- Resolution 1111 (of March 27, 2017): Defines the minimum standards of the management and safety system at work for employers and contractors.
- Concept 20171200163811 (of April 4, 2017): Consultation on safety protocol.
- Technical Guidance (of July 1, 2017): Technical Implementation Guide of the SG-SST System for Small-scale Mining.
- Guidance (of December 1, 2017): Safety Guide for Ventilation of Underground Mines.
- Resolution 1796 (of April 27, 2018): Updates the list of hazardous work activities.
- Concept 20181200266371 (of July 9, 2018): Concept on training of emergency brigades for mining companies.
- Decree 1496 (of August 6, 2018): Adopts the national chemical safety system.
- Technical Guidance (of August 1, 2019): Technical Safety Guide for the Use and Handling of Explosives
- Concept 20191200272691 (of November 11, 2019): Consultation related to compliance with health and safety standards in Special Reserve Areas[v] applications.

Competent authorities

In addition to the legal framework above, a set of general norms have been developed to address workplace safety risks and to realise workers' right to occupational safety and health. In this context, Decree 1295 of 1994 (as amended by Law 1562 of 2012), established the organisation and administration of the General System of Professional Risks (Sistema General de Riesgos Profesionales, SGRP), a set of public and private entities, rules and procedures designed to prevent, protect, and care for workers from the effects of diseases and accidents that may occur during or as a consequence of their work. [100]

The SGRP is made up of the entities in charge of the Direction, Control and Surveillance of the System: The Ministry of Health and Social Protection, the Ministry of Labour, the National Council of Occupational Risks, the National Superintendence of Health and the Financial Superintendence of Colombia; the public and private Occupational Risk Administrators (Administradoras de Riesgos Ocupacionales, ARL); the employers; and the workers. The responsibilities of the SGRP are shared between the company, the ARL, and the worker. In this context, the company affiliates workers to the System, develops programmes for the prevention and control of occupational risks. The role of the ARL is to advice and provide technical assistance to the company aiming at the development of prevention programmes. It also tends to workers who have suffered accidents or occupational diseases. The worker is responsible for caring for their health and complying with the OSH standards set by their employer.[101]

[v] Special Reserve Areas are areas declared by Colombia's National Mining Agency in favour of a mining community, in a free area where there are traditional informal mining operations whose concession will only be granted to the same community that has exercised the traditional mining activity, without prejudice to the mining titles in force (Law 685 of 2001, art. 31, modified by art. 147 of Decree 019 of 2012).

Affiliation to the SGRP is a Social Security insurance scheme whose purpose is to protect the health of workers and address contingencies arising from working conditions. Workers affiliated to the SGRL who suffer an accident at work, or an occupational disease are entitled to the recognition of welfare benefits (health services) and economic benefits (financial recognition). Affiliation to the SGRP is mandatory for dependent employees, retired workers reincorporated as dependent workers, public servants, workers on a service contract with a duration of one month or more, students undergoing a mandatory internship or students generating income for their educational institution, self-employed workers who work in high-risk sectors, members of cooperatives, and active members of the National First Response Subsystem (e.g., Colombian Civil Defence, Colombian Red Cross, and Fire Brigades) [102]

Colombia's healthcare coverage system is called the Sistema General de Seguridad Social en Salud (SGSSS) is universal (meaning that every person must be affiliated) and two-tiered. It consists, on the one hand, of a mandatory public health insurance offered by several insurance companies called Entidades Promotoras de Salud (Health Care Providing Entities, EPS).[103] The other tier is a free government subsidised healthcare system called SISBEN (System of Identification of Social Programme Beneficiaries), which covers impoverished or homeless Colombians.[104] In addition to the public system, wealthier Colombians often purchase private health insurance known as *Prepagada*.

EPS and SISBEN affiliates are entitled to the same benefits. The Compulsory Health Plan (Plan Obligatorio de Salud, POS) establishes a single plan or package of services, consisting of interventions aimed at health promotion, prevention, and medical and medical care, including medicines, for affiliates and their families. The POS also includes monetary sick or maternity leave benefits. EPS is financed through compulsory contributions from employers, salaried and self-employed workers and pensioners. Participants contribute according to their contributory capacity. SISBEN is financed through taxes and transfers from the Contributive Regime. The Colombian State transfers a per capita payment for the delivery of the POS to the EPSs, according to the number of affiliates in each EPS.[105]

Barriers of Colombian legislation to comprehensive OSH

In 2011, Colombia adopted the National Policy on Safety in Mining, seeking to mainstream safety in mining operations using a preventive approach, increasing technical standards, fostering the participation of all stakeholders, and consolidating a public information system on mining safety. While the National Policy lays out activities that contribute to the achievement its objective, there is no action plan to serve as a tool to follow up in terms of targets, responsible persons, and deadlines.[106]

Moreover, according to the National Trade Union Academy of Colombia (Escuela Nacional Sindical, ENS), the current safety regulations for open-pit mining workers are outdated and neglect new risks (for example, COVID-19 and psychosocial risks exacerbated by rising costs of living) and changes in work processes and new forms of production, including the prevalence of outsourcing. In this context, ENS acknowledges the development of a preventive approach of recent years. However, this approach continues to focus on damage prevention and risk mitigation but falls short of championing decent and dignified conditions for the sector's workers.[107]

Further, while Colombian law generally protects workers' rights to remove themselves from situations that endanger health or safety without jeopardy to their employment, violations of this right have been reported in recent years.[108] Although the Ministry of Labour is in charge of conducting inspections to ensure OSH standards are respected, the government has not hired enough inspectors, the level of training of these inspectors was found to be below par, and the failure to collect fines after penalties were assigned have failed to prevent health and safety violations.[109]

Lastly, reports of non-compliance by EPS have increased in recent years, which has spurred a rigorous evaluation of 10 EPS that have failed to comply with basic financial and legal parameters. In this context, the government has given seven years of opportunities and benefits to companies in the social security health system to recover, but if they fail to do so by 2022, they will have to exit the market, which would cause problems for the health system and for the affiliated people who would have to switch to EPSs that do comply with the standard. In addition, a large amount of the portfolio, which could exceed US$ 2 million is expected to be left up in the air, threatening the stability of public hospitals.[110] This shows the vulnerability of the country's social security health system and its inability to guarantee the fundamental right to health (see Box 2 for data of access to EPS of SINTRAMINERGETICA workers). Most of the EPS that would be liquidated are in the subsidised regime.

Box 2. Health and safety of mine workers affiliated to SINTRAMINERGETICA

The results of a survey conducted by SINTRAMINERGETICA in June 2019 among 230 workers (including 225 men and five women) on occupational diseases and accidents. Two hundred thirty workers, including 225 men and five women (for more information on the survey, see box 1), showed that 47% of the workers reported being affiliated to Coomeva, 36% to Salud Total and 12% to Nueva EPS, and to a lesser extent to the EPS of Famisanar, Sanitas, Medimás, Sanidad Militar and Suramericana. Since the survey was conducted, Medimás was liquidated due to non-compliance and the remaining EPS are under surveillance by the Health Superintendence for non-compliance too.

With regards to pension funds, 54% of the workers who responded to the survey were affiliated with Colpensiones, 29% with Porvenir, 14% with Colfondos, 2% with Protección and 1% with BBVA Horizonte.

3.1.3 Peru

Legal framework

Peru has ratified ILO C176 - Safety and Health in Mines Convention, 1995, but has not ratified C155 - Occupational Safety and Health Convention, 1981 (No. 155) nor C045 - Underground Work (Women) Convention, 1935 (No. 45).[111] The 2011 Occupational Safety and Health Law (Ley de Salud y Seguridad en el Trabajo, Law 29783) specifies the responsibilities of all employers to offer a safe and sanitary workplace. Particularly, the government establishes three levels of responsibility: inspection and supervision by the government, prevention by the employer, and participation of the worker. OSH regulation and implementation is supervised through joint councils between the Ministry of Labour and the Ministry of Health.[112]

In addition to the general OSH legislation, Peru has promulgated specific legislative specific for the mining sector:

- Occupational Safety and Health Regulations for the Mining Sector (2016, revised 2020): Published by the Ministry of Energy and Mines as Supreme Decree 024-2016-EM (Modified by Supreme Decree 023-2017-EM), approving a new Regulation on Occupational Safety and Health in Mining. Its objective is to prevent dangerous incidents, occupational accidents, and occupational diseases, and promote a culture of occupational risk prevention in mining. To this end, it relies on the participation of workers, employers, and the State, who will ensure its promotion, dissemination and compliance.[113]
- Directorial Resolution 005-2020-Inacal/DN: Sets the Peruvian Technical Standards on respiratory protection devices, gloves for protection against hazardous chemicals and micro-organisms, and medical materials are approved.[114]
- Law 31246: Modifies articles 49 and 60 of Occupational Safety and Health Law (Law 29783) and lays out the responsibilities of employers to cover the costs of PPEs in accordance with Peruvian technical standards as set out in Directorial Resolution 005-2020-Inacal/DN and the costs of the necessary screening tests accredited by the National Health Authority.[115]

- Supreme Decree No. 005-2012-TR approving the Regulation of Law 29783: Establishes the obligation of a policy, organization, planning and implementation of the occupational safety and health management system; the internal occupational safety and health regulations of each organization; the rights and obligations of both employers and workers; the notification of occupational accidents and occupational diseases in a work centre; the investigation of occupational accidents, occupational diseases and dangerous incidents.[116]

Competent authorities

The Peruvian authorities in charge of enforcing OSH legislation are attached to two ministries: the Ministry of Labour and Employment Promotion (MTPE) and the Ministry of Health. The Ministry of Labour and Employment Promotion (MTPE) operates through the Directorate of Occupational Safety and Health and the National Council of Occupational Safety and Health (CONSSAT).[117] The Ministry of Health participates in occupational safety and health through the General Directorate of Environmental Health and Food Safety and the National Centre for Occupational Health and Environmental Protection for Health (Centro Nacional de Salud Ocupacional y Protección del Ambiente para la Salud, CENSOPAS).

The Directorate of Occupational Safety and Health is the technical body of the Ministry of Labour. This entity coordinates with other entities the design of standards, policies, and national plans in this area. It also responds to inquiries from labour stakeholders and issues technical opinions on the matter, as well as analysing and systematising regional and national information on occupational safety and health.[118]

CONSSAT is a tripartite body that participates in designing, approving, and following national policy in occupational safety and health. CONSSAT also promotes and fosters cooperation among agencies and coordinates training for labour actors.[119] In addition to the National Council, there are regional OSH councils which, as the CONSSAT, are tripartite bodies that support the regional labour and employment promotion directorates of the regional governments.[120]

The Ministry of Health is attached to the General Directorate of Environmental Health and Food Safety. This entity assumes an operational role among the governing institutions, as it focuses only on conducting the certification and authorisation process in occupational health matters.[121]

Likewise, the National Superintendence of Labour Inspection (SUNAFIL) is a public entity attached to the MTPE in charge of labour inspection.[122]

Lastly, (CENSOPAS) is part of the National Institute of Health (INS) and is responsible for conducting evaluations, research, and recommendations for the prevention of diseases and damage to health, due to economic activities that may affect workers and the community.[123]

Barriers of Peruvian legislation to comprehensive OSH

One of the main barriers of Peruvian legislation to comprehensive OSH is that the government bodies in charge of enforcing regulations are national in scope and do not focus on a specific sector. In this context, the prevention of occupational risks in the mining sector does not have an institution specialising in occupational safety and health.

Moreover, the Peruvian mining sector has underscored the existing barriers to improving the effectiveness of norms in improving the OSH situation of the mining sector. In this context, the mining sector stressed the insufficient number of professionals and the lack of clarity in their accreditation, the reactive attitude towards accidents and the lack of alignment between sectoral regulations, as well as weaknesses in the investigation of accidents and the diagnosis of occupational diseases.[124]

By the same token, the failure of existing policies regulating OSH in the Peruvian mining sector has been linked to the way in which these policies fail to address the motivations that make workers engage in dangerous situations at work. In this context, although existing policies focus on prevention, they do not focus on creating a culture at the company level that values workers' training and participation in OSH matters.[125]

3.2 Voluntary international sustainability initiatives and agreements

The increase of mining sector and supply chain initiatives of the past decade reflects the growing number of sector-specific and cross-sectoral regulations and soft laws by international organisations such as the UN and the OECD. This section provides an overview of the main voluntary initiatives for the mining sector and their provisions regarding OSH.

3.2.1 The Responsible Minerals Initiative (RMI)

the RMI provides due diligence guidance, tools, and resources to improve regulatory compliance and support the responsible sourcing of minerals from conflict-affected and high-risk areas. It has over 400 member companies, predominantly from mid and downstream manufacturing sectors and brands, and publishes lists of processing sites for different minerals (both compliant and 'eligible').[126]

In 2021, the RMI launched an Environmental, Social and Governance (ESG) standard to improve working conditions in the mining sector. One of the four key elements of this standard is OSH. In this context, the OSH provisions set by the RMI's ESG standard seek to "address company hygiene, safe operation of equipment, personal protection requirements and access to first aid and canteens."[127]

To qualify for RMI ESG certification, companies are expected to put in place an OSH policy. This requires that the processor's top management define and endorse an environmental policy that is appropriate to the nature and scale of OSH hazards and risks to its activities, products and services. It should also include a commitment to providing a safe and healthy working environment and a commitment to participation (i.e., involving workers and workers' representatives, in decision-making processes regarding OSH).[128]

3.2.2 The European Partnership for Responsible Minerals (EPRM)

EPRM is a partnership of governments, supply chain actors and civil society organisations; the EPRM advocates for responsible sourcing along minerals supply chains entering Europe. Participating governments include Germany, the UK, the Netherlands, and France. The EPRM focuses on tin, tantalum, tungsten, and gold (3TG).[129] Both tin and gold are minerals mined in Peruvian and Bolivian mines with supply links to the European market.[130]

The EPRM also provides support to mine sites in conflict-affected and high-risk areas worldwide, including gold mines in Peru and Bolivia, and keeps the Due Diligence Hub, which provides access to targeted information to improve companies' supply chain due diligence.[131] Regarding resources for EPRM members regarding OSH, the Due Diligence Hub has published the ICMM Good Practice Guidance on Occupational Safety and Health and a few case studies with good OSH practices. Information regarding how EPRM integrates OSH issues into its activities (i.e., awareness raising at mine sites, capacity building of mines, and support for mid- and downstream companies) is not publicly available.

3.2.3 The Extractive Industries Transparency Initiative (EITI)

The Extractive Industries Transparency Initiative (EITI) is a global standard for the good governance of oil, gas and mineral resources. It seeks to address the key governance issues in the extractive sectors. The EITI standard is implemented in 55 countries worldwide. EITI member countries commit to disclose information along the extractive industry value chain – from how extraction rights are awarded, to how revenues make their way through government and how they benefit the public. EITI members undergo a Validation at least every three years. The Validation is a quality-assurance mechanism that assesses members' performance towards meeting the EITI standard. The Validation is assessed against the EITI Requirements.[132]

The EITI Requirements encompass the requirements for EITI implementation and form part of the EITI Standard. Occupational safety and Health are not in the focus of the EITI Requirements, but the terms "health and safety" are mentioned occasionally through some of its guidance notes, including EITI Requirements 1.4, 2.4, 6.3, 7.1 and 7.4 (the latter four, on gender-responsive implementation).

3.2.4 The Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development (IGF)

The IGF's overarching objective is to enhance the capacities in participating countries to achieve sustainable development objectives through good governance in the mining sector. This effort is largely framed by its flagship Mining Policy Framework (MPF), which sets out concrete objectives and processes for good governance, including occupational health and safety.[133] Governmental partners include the Netherlands, Peru, Bolivia, and Colombia.[134]

In terms of OSH, the MPF sets expectations for its members to ensure high standards, including enforcing the acceptance of mining companies of their responsibility for the health and security of their workers and fulfilling their mitigation and remediation obligations.[135]

3.2.5 International Council on Metals and Mining (ICMM)

The ICMM includes major mining companies and associated mining associations such as the Colombian Mining Association (ACM), Euromines, and the Mining Engineer Institute of Peru (IIMP). Other members are parent companies of mining operations in Bolivia, Colombia, and Peru (such as Glencore and Minsur, among other). Together, the members account for a third of the global metals and mining industry,[136] and all commit to the 10 ICMM principles and guidelines on human rights and environmental protection, including OSH.

ICMM recognises OSH as one of its primary focuses for the mining industry. ICMM's work in this context aims to achieve breakthrough progress in eliminating harm and promoting operational and technical innovations to eliminate fatalities and preventable injuries.[137]

3.2.6 Initiative for Responsible Mining Assurance (IRMA)

The IRMA is a multi-stakeholder initiative governed by labour unions, mining-affected communities, environmental and social justice organisations, as well as mining companies and businesses that buy mined materials. Its main activity is in developing and implementing a voluntary standard for responsible mining, which includes criteria on OSH and refers to the ICMM Guidelines on occupational health and safety.[138]

3.2.7 The International Finance corporation's (IFC) Environmental and Social Performance Standard and the Environment, Health & Safety (EHS) guidelines for mining.

These standards are not only applied to World Bank and IFC financed projects but also to publicly supported export projects from OECD member states and to around 80 international private and public banks committed to the Equator Principles.[139]

3.2.8 The Minamata Convention on Mercury

The Minamata Convention is a global treaty to protect human health and the environment from the adverse effects of mercury. The Convention entered into force in 2017 and includes a ban on new mercury mines, the phase-out of existing ones, the phase-out and phase-down of mercury use in a number of products and processes, control measures on emissions to air and on releases to land and water, and the regulation of the informal sector of artisanal and small-scale gold mining.[140]

3.2.9 Limitations of voluntary sustainability initiatives and agreements

The majority of mining companies in Bolivia, Colombia and Peru are members of voluntary sustainability initiatives, either through their parent companies or through direct affiliation. These companies and the countries where they operate have pledged to follow the requirements set by those initiatives, including reporting on progress. While this has undoubtfully increased disclosure of performance results, a lack of transparency in supply chains has been identified as a major obstacle for downstream actors to assess responsible sourcing practices among their suppliers.[141]

Many civil society organisations have criticised sustainability initiatives for the lack of accountability mechanisms with truly transformative potential. In this context, civil society has repeatedly emphasised that participating in sustainability initiatives is not sufficient for a company to address its social and environmental risks.[142]

With regards to OSH, one of the main limitations of the sustainability initiatives shown here is that they do not emphasise or altogether do not include considerations of workers' safety and health in their requirements or guidelines. This finding is in line with other assessments of mining industry sustainability initiatives, which underscore that most of these initiatives focus on a risk-based approach in supply chain management (particularly, human rights violations) and, to a lesser extent, on occupational safety and health.[143]

4

Conclusions and recommendations

This section presents conclusions drawn from the findings of the study and provides recommendations for different stakeholders.

4.1 Conclusions

This report summarises the main OSH risks as perceived by the mining sector workers in Bolivia, Colombia, and Peru that informed this research. Based on the results of the digital survey, mining workers in Bolivia, Colombia, and Peru perceive hold a mix of positive and negative views about the OSH standards at their workplace.

On the one hand, a large proportion of the survey respondents considered that they were exposed to high levels of dust and particulate matter, gases, and fumes. Likewise, a small number of workers perceived the temperature at work to be normal (therefore pointing to a majority experiencing thermal discomfort). By contrast, the majority of workers found illumination and the condition and maintenance of machineries to be good or regular (i.e., neither good nor bad).

With regards to psychosocial risks, the surveyed workers reported conditions that could increase the risk of workplace accidents if left unattended. For example, almost 40% of workers reported sleeping 6 hours or less, and almost 40% also reported experiencing microsleep at work. In Colombia, the incidence of microsleep is of particular concern, with 77% of respondents reporting it. Moreover, while the apnoea, restless leg syndrome, narcolepsy, and depression rate reported by the surveyed workers was relatively low, most of the workers who self-reported these conditions had not been officially diagnosed with them. This is situation highlights the relation between the profit-making model of mining companies in the mining sector and the inadequate management of OSH risks, whereby the growing demand for minerals exacerbates psychosocial risks at work. Avoiding that this demand negatively impacts the occupational safety and health of workers is not only a moral obligation of employers, but also a measure to avoid poor overall business performance, increased absenteeism and presenteeism (workers turning up for work when sick and unable to function effectively) and increased accident and injury rates.[144]

While the majority of surveyed workers had not been involved in a workplace accident, those who were involved in accidents reported these to be incapacitating. Moreover, two thirds of workers reported accidents at the workplace in which they had not been involved to be either disabling or fatal. In this context, the highest rate of fatal accidents was reported in Peru. It is possible that the fact that surveyed workers had mostly not been involved in workplace accidents is due to the work of trade unions raising awareness and advocating for sufficient attention by employers to OSH risks. After all, the majority of surveyed workers were affiliated to trade unions in the mining companies where the digital survey was deployed. This underscores the importance of workers' unions in realising labour rights, including workers' rights to a safe and healthy work environment.

Moreover, over half of the surveyed workers reported facing retaliation when taking breaks outside of the agreed resting times, and over 60% did not feel treated fairly at work. While there were no relevant differences between the direct and subcontracted workers who did not feel treated fairly at work, it is notable that almost two thirds of Afro-descendant workers felt treated unfairly but most women felt fairly treated at work. Apart from pointing at the possibility of systemic racial discrimination at work, this situation also constitutes an important OSH risk.

Regarding the mining companies' management of OSH risks, despite of the fact that the majority of surveyed workers indicated that OSH protocols had been socialised, still, almost a third of them said that these were not socialised or were not aware whether these policies were socialised (see 2.2). This indicates that mining companies in Bolivia, Colombia, and Peru need to overcome the lag in OSH training among their employees.

Likewise, from the key informant interviews, there are indications that the competent authorities, and, to a lesser extent, the companies, are not fulfilling their obligations to report workplace accidents. when implementing process standardisation, together with job design, and behavioural safety contribute to reducing accidents and incidents in the workplace and can be used in any sector.

About the effectiveness of national legislation, overall, the regulatory frameworks for the mining sector in Bolivia, Peru and Colombia do not seem to allocate targets, responsible persons and deadlines to their intended objectives. Likewise, the lack of resources and capacities to enforce those regulations challenge their effectiveness and impact.

Lastly, the current implementation of international regulations and voluntary mining sector initiatives, only a few of them address OSH issues as part of their requirements or guidelines. Instead, most voluntary initiatives take emphasis the prevention of human rights risks and to a lesser extent of human rights breaches such as child labour. Neglecting OSH considerations hinders the potential impact of such initiatives, especially since OSH risks are still rife in the mining sector.[145]

4.2 Recommendations

Based on the conclusions above, the following recommendations are made:

- The competent authorities in Bolivia, Colombia and Peru should step up their efforts to to enforce mining companies' compliance with OSH regulations, including their accident reporting responsibilities, as well as the adequate implementation of protocols and procedures, and strengthen the bodies in charge of labour inspection In this context, competent authorities must increase their involvement and guarantee workers' participation in investigating severe workplace accidents and following up on progress toward accident prevention and compensation. Moreover, the competent authorities must increase their efforts to aggregate and publish data related to workplace accidents and to collect and publish gender disaggregated data and data disaggregated by sector and employment status of mining employees (i.e., direct and outsourced workers).
- IMVO-metaalsector members and other Netherlands-based downstream buyers of minerals mined in Bolivia, Colombia, and Peru should engage with suppliers and governments in the origin countries to find collective solutions and share not only best practices but also the financial costs of addressing the most pressing OSH issues in the mineral supply chain. In applying this shared responsibility model, workers' unions, women, LGBTQ+ people, and outsourced workers must be guaranteed a seat at the table.
- As much as possible, CNV Internationaal and its partners in Bolivia, Colombia, and Peru should increase efforts to include a more diverse and larger number of workers in the future iterations of its participatory digital monitoring project. Particular attention should be paid to increasing the participation of outsourced workers and women and LGBTQ+ people.

- CNV Internationaal and its partners in Bolivia and Colombia, with the support of IMVO-metaalsector members and other downstream buyers in the Netherlands should advocate for the governments of Colombia and Bolivia to ratify the main ILO OSH Conventions that they have not yet ratified.
- Mining sector companies in Bolivia, Colombia and Peru must increase their efforts to socialise and implement policies and protocols and ensure that workers understand the purpose of these policies, the benefits of complying with them, and the dangers of not observing them. In this context, increasing worker training on these policies and protocols is critical. It is also important to ensure that policies do not lead to discriminatory practices against workers with occupational diseases. It is also recommended to review existing policies that adequately address psychosocial risks arising from the pressures faced by workers in their social, personal and work environment. If policies have not been implemented, prioritise their drafting following the requirements and recommendations of relevant international standards and national regulatory frameworks.
- In drafting policies and protocols, employers should involve unions to determine how employers and workers can collectively implement and monitor these policies and protocols. Some of the mining companies covered in this study already have joint OSH committees. These companies could share best practices with their peers in an effort to improve the OSH performance of the sector as a whole. National governments and other stakeholders, including those downstream in the minerals value chain, could provide in-kind support to mainstream these practices.

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Appendix 1 Methodology used for the digital survey

The opinions of workers in Bolivia, Colombia and Peru mining sectors were captured through an online survey conducted in the context of CNV Internationaal's participatory digital monitoring between May and July 2022. The CNV Internationaal team in Latin America and the regional coordination of participatory digital monitoring designed the survey. In addition, consultations were held with union leaders in Bolivia, Colombia, and Peru to identify questions of interest to the unions and union leaders. The questions sought to collect baseline data for Key Performance Indicators (KPIs) that will be used for the first annual report of CNV Internationaal's Labour Rights Observatory for the Latin American mining sector, to be published in 2023.

The online survey consisted of general questions about the participants' demographic characteristics, followed by two main themes (Social Dialogue and Rights at Work) and several sub-themes, including freedom of association, decent wages, occupational health and safety, child labour, forced labour and gender. The survey contained cascading select questions with 123 basic questions, of which 79 pertained to occupational safety and health issues. Moreover, the survey characterised mineral mining in five stages: Administration/services, excavation, processing/industrial transformation, refining, and transport/haulage. Moreover, survey respondents were given the opportunity to mention other functions not captured in the survey questionnaire.

The online survey also presented open-ended questions to explain the selected answers, which allowed for contextualising or expanding on the workers' responses. The survey was administered using the KoBoToolbox platform and its KoBoCollect mobile application. The KoBoToolbox system ensures the anonymity of respondents and secure data storage. Similarly, the names of the companies for which the survey respondents worked were anonymised.

In total, 367 mine workers answered the survey. Of these, 35 worked in Bolivia, 129 in Colombia, and 203 in Peru. The Peruvian and Bolivian surveyed workers were employed at operations mining copper, lead, zinc, tin, gold, and silver. This project only surveyed Colombian workers employed in coal mines. An overview of the respondents' demographic profiles is provided in the tables below.

Companies and country of survey respondents

Country	Nr of companies covered in the study	Nr of survey respondents			
		Men	Women	LGBTQ+*	Total
Bolivia	5	33	2		35
Colombia	4	121	7	1	129
Peru	5	201	2		203
Total	**14**	**355**	**11**	**1**	**367**

* Although sexual orientation is different from gender identity, the questionnaire included an option for workers to indicate their LGBTQ+ status. In some companies, LGBTQ+ workers have self-organised to raise awareness of the they face in the workplace. The collection of data disaggregated by sexual orientation and gender identity supports these efforts and responds to the ILO's call to collect reliable and timely statistics on discrimination against LGBTQ+ workers in the workplace.

Ethnic background of survey respondents

Ethnicity of respondents	Country			
	Bolivia	Colombia	Peru	Total
Indigenous	14	10	29	53
Mixed ethnicity	20	81	172	273
Quechua	1		1	2
Afro-descendant		37	1	38
Caucasic		1		1
Total	**35**	**129**	**203**	**367**

Age range of survey respondents

Age range	Country			
	Bolivia	Colombia	Peru	Total
Between 18 and 25		1	1	2
Between 26 and 34	5	15	42	62
Between 35 and 44	17	47	94	158
Between 45 and 59	13	65	62	140
60 years or more		1	4	5
Total	**35**	**129**	**203**	**367**

Stage of the mining process and working relationship of surveyed workers

Stage of the mining process	Bolivia		Colombia		Peru		
	DW	OW	DW	OW	DW	OW	Total
Excavation	28		62		99	53	242
Transport/haulage	2		31	1	7	6	47
Administration/services	3		12	1	9	15	40
Processing/transformation	2		22		9	1	34
Refining					1	1	2
Other (Maintenance)					2		2
Total	**35**		**127**	**2**	**127**	**76**	**367**

DW = direct workers, OW = outsourced workers

Appendix 2 Profile of key informants interviewed

Stakeholder group	Bolivia (M/F)	Colombia (M/F)	Peru (M/F)	Total
Government			1M	1M
Trade union	3M	3 (2M/1F)	5M	11 (10M/1F)
Health sector			2M	2M
Mining company/sector association	1M	1F	1F	3 (1M/2F)
Total	**4 (4M/0F)**	**4 (2M/2F)**	**9 (8M/1F)**	**17 (14M/3F)**

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