

Do Employees Lives Safe at Workplace: A Case Study of Coal Mine
Explosions in Balochistan Highlighting Occupational Safety, Human
Rights and Social Work Perspectives

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Abstract

Coal mine explosions are among the most serious occupational hazards facing mining communities, particularly in developing countries where inadequate safety measures, weak regulatory enforcement, unsafe working conditions, and limited emergency preparedness continue to threaten miners' lives. Balochistan, Pakistan, has extensive coal-mining activities and thousands of workers depend on mining for their livelihoods. However, recurrent coal mine explosions and related accidents have resulted in deaths, serious injuries, disabilities, psychological distress, and severe socioeconomic consequences for miners and their families. This article examines coal mine explosions in Balochistan from an interdisciplinary perspective, focusing on occupational safety, labor rights, human rights, disaster management, public health, and social work. It explores major factors contributing to mining disasters, including inadequate ventilation, methane accumulation, coal dust, unsafe mining practices, insufficient protective equipment, poor enforcement of safety regulations, and inadequate emergency response mechanisms. The article also examines the consequences of mine disasters for surviving workers, widows, children, and dependent family members, particularly in relation to poverty, loss of livelihood, healthcare needs, psychological trauma, and disruption of education. Furthermore, it highlights the role of professional social workers in psychosocial support, family rehabilitation, social protection, community awareness, advocacy, referral services, and post-disaster recovery. The article argues that coal mine explosions should not be viewed solely as industrial accidents but as preventable occupational, human rights, public health, and social justice concerns. It recommends stronger regulatory enforcement, improved workplace safety standards, effective emergency preparedness, adequate compensation and social protection for affected families, regular safety training, and greater accountability of mine owners and relevant authorities. A coordinated, rights-based and multidisciplinary approach is essential to protect miners' lives, promote decent working conditions, and reduce the long-term social and economic consequences of mining disasters in Balochistan.

Keywords: Coal mining, Mine explosions, Occupational safety, Human rights, Disaster management, Social work, Balochistan, Pakistan

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Introduction

Coal mining has historically played an important role in industrial development, energy production, employment generation, and local economic activity in many countries. However, mining remains one of the most hazardous occupations, particularly in underground coal mines where workers are exposed to multiple physical, chemical, mechanical, and environmental hazards. The International Labour Organization (ILO, 2019) recognizes mining as a high-risk sector in which workers may be exposed to mine collapses, fires, explosions, harmful gases, dust, machinery-related injuries, and other occupational hazards. Among these risks, coal mine explosions are particularly devastating because they can occur suddenly, affect multiple workers simultaneously, and result in fatalities, serious injuries, permanent disabilities, and long-term socioeconomic consequences.

Coal mine explosions are generally not caused by a single factor; rather, they often result from the interaction of geological, technical, environmental, organizational, and human factors. Methane accumulation is one of the most significant hazards in underground coal mining because methane can form an explosive mixture with air when adequate ventilation and gas monitoring are not maintained. The ILO (2019) emphasizes that effective ventilation, gas monitoring, explosion prevention, dust control, emergency preparedness, and worker training are essential components of occupational safety in underground coal mines. Similarly, the International Labour Organization (2023) has emphasized the importance of strengthening occupational safety and health systems in Pakistan's mining sector.

Coal dust can further increase the severity of an underground explosion because suspended combustible dust may ignite and propagate an explosion through mine workings. Inadequate ventilation, defective electrical equipment, unsafe blasting practices, poor maintenance, insufficient safety training, and failure to follow established safety procedures can further increase the likelihood of catastrophic accidents (ILO, 2019). Consequently, mine explosions should not automatically be regarded as unavoidable accidents. Many risks associated with mining can be identified, controlled, and reduced through appropriate engineering measures, effective workplace supervision, regulatory enforcement, and worker participation in safety management.

The problem is particularly serious in developing countries, where mining operations may be characterized by limited technological resources, inadequate infrastructure, informal employment arrangements, insufficiently trained workers, and weak institutional capacity. According to the ILO (2023), occupational safety and health challenges in Pakistan's mining sector are associated with deficiencies in regulatory implementation, inspection capacity, worker protection, and safety practices. Where regulatory standards are poorly implemented, workers may remain exposed to preventable risks despite the existence of formal legislation. Pakistan has a long history of coal mining, with important coal-producing areas located in Balochistan and other parts of the country. Coal mining provides employment and income to thousands of workers and contributes to the livelihoods of numerous families. However, the sector has also experienced repeated fatal accidents involving explosions, mine collapses, fires, gas poisoning, and other occupational hazards. The Human Rights Commission of Pakistan (HRCP, 2024) has highlighted serious occupational safety and human rights concerns in Balochistan's coal mines, including inadequate safety measures, weak inspection mechanisms, insufficient emergency facilities, and poor working conditions.

Balochistan is particularly important in discussions concerning coal mine safety because coal mining provides livelihoods for workers in several districts of the province. Miners frequently work underground in physically demanding environments where they may

face poor ventilation, hazardous gases, unstable mine structures, inadequate protective equipment, and limited emergency facilities. The HRCP (2024) has reported concerns regarding the working conditions of coal miners in Balochistan and has called for improved mine inspections, better safety equipment, improved emergency services, and greater protection of workers' rights.

The recurring nature of mining accidents in Balochistan raises important questions about the effectiveness of occupational safety regulations and their implementation. Although Pakistan has laws and regulations governing mine safety, the existence of legislation alone cannot guarantee safe working conditions. Effective occupational safety requires regular inspection, monitoring, enforcement, appropriate penalties for violations, worker training, and accountability of mine owners and operators. The ILO (2023) has emphasized the need to strengthen the institutional capacity of labour inspection and occupational safety and health systems in Pakistan. HRCP (2024) similarly recommended stronger monitoring and enforcement mechanisms in Balochistan's coal-mining sector.

One of the most serious challenges is inadequate monitoring of methane and other hazardous gases. Methane can accumulate in underground workings when ventilation systems are inadequate or poorly maintained. An ignition source can then cause an explosion with potentially catastrophic consequences. According to the ILO (2023), the availability and effective use of gas-detection equipment are essential for preventing mining disasters. Regular monitoring can provide early warnings and allow workers to evacuate before dangerous concentrations develop.

Ventilation is therefore a fundamental component of underground mine safety. Adequate ventilation removes methane and other harmful gases, supplies oxygen, controls temperature, and reduces the concentration of airborne contaminants. Poor ventilation can increase both immediate explosion risks and long-term occupational health hazards. The ILO (2019) identifies ventilation as a central element of safe underground coal-mining operations, while evidence from coal-mining communities in Balochistan has highlighted concerns regarding exposure to hazardous gases and dust (Khan et al., 2013).

Another important challenge concerns the availability and appropriate use of personal protective equipment. Helmets, protective clothing, footwear, respiratory protection, lamps, self-rescuers, and other safety equipment can reduce occupational risks when they are appropriate, properly maintained, and correctly used. However, PPE cannot substitute for effective engineering and administrative controls. The ILO (2019) recommends a comprehensive hierarchy of occupational safety measures in which hazards are first eliminated or controlled at their source and PPE is used as an additional protective measure.

The organization of employment in coal mines also has implications for occupational safety. Contractual and subcontracting arrangements may create uncertainty regarding responsibility for worker training, equipment, wages, healthcare, compensation, and safety. The ILO (2023) has identified the structure of employment and the need for greater cooperation among workers, employers, contractors, and regulatory authorities as important considerations for improving safety in Pakistan's mining sector. Clear allocation of responsibility is essential because workers should not bear the consequences of institutional or managerial failures.

The socioeconomic vulnerability of miners further complicates the problem. For many mining households, the miner represents a major or primary source of income. Consequently, when a miner dies in an explosion or becomes permanently disabled, the effects are immediately transferred to the household. The loss of income can make it difficult for families

to afford food, healthcare, housing, and education. The ILO (2023) emphasizes that occupational safety and social protection are closely interconnected because occupational injuries and fatalities can have serious economic consequences for workers and their dependents.

The consequences are particularly severe for widows and children. The death of a breadwinner can increase women's household responsibilities while simultaneously reducing family income. Children may face disruption in their education, inadequate nutrition, poor healthcare access, and pressure to enter employment. Thus, a coal mine explosion can produce consequences that continue across generations. From a social-work perspective, the disaster therefore needs to be understood not only as an occupational accident but also as a social and economic crisis affecting the wider family system.

Mine explosions also produce significant psychological consequences. Survivors may experience fear, grief, anxiety, trauma, and uncertainty regarding their future employment and physical functioning. Family members of deceased workers may experience prolonged bereavement and financial stress. The World Health Organization (WHO, 2019) emphasizes that emergencies and disasters can generate substantial mental-health and psychosocial needs among affected populations. Therefore, disaster response should incorporate psychological first aid, psychosocial support, referral services, and longer-term mental-health interventions. From a human rights perspective, the issue of coal mine safety is closely connected with the right to life, health, dignity, and safe and healthy working conditions. The United Nations (1948) recognizes the right to life and security of person, while the International Labour Organization (2022) has recognized a safe and healthy working environment as a fundamental principle and right at work. Workers should not be forced to choose between earning a livelihood and protecting their lives. Where hazardous conditions are known but insufficiently addressed, questions of institutional responsibility and accountability become particularly important.

Labor rights are similarly central to the issue. Mine workers should have access to information about occupational hazards, appropriate safety training, protective equipment, emergency procedures, healthcare, compensation, and social protection. They should also be able to report unsafe working conditions without fear of retaliation. The ILO (2022) stresses that occupational safety and health should be integrated into decent work and fundamental rights at work. Strengthening workers' participation in safety decisions can also help identify hazards that may otherwise remain unreported.

Disaster management provides another important framework for understanding coal mine explosions. Disaster management should not begin only after an explosion occurs; rather, it should incorporate prevention, mitigation, preparedness, response, recovery, and rehabilitation. The United Nations Office for Disaster Risk Reduction (UNDRR, 2015) emphasizes the importance of reducing disaster risk through prevention, preparedness, resilience, and effective risk governance. In mining communities, this approach requires hazard identification, emergency plans, trained rescue personnel, communication systems, evacuation procedures, first-aid facilities, and coordination between mine operators and public emergency services.

Emergency preparedness is particularly important in underground mines because rescue operations are often complex and dangerous. Workers may become trapped underground, while rescuers themselves can be exposed to toxic gases, fires, roof falls, or secondary explosions. The HRCP (2024) has highlighted the need for improved emergency and rescue arrangements in Balochistan's coal mines, including accessible emergency medical

facilities and better preparedness. Effective emergency planning can reduce preventable deaths and improve the chances of survival following an accident.

Public health is another major dimension of coal mining. The health risks of mining extend beyond sudden explosions and accidents. Long-term exposure to coal dust and hazardous gases can contribute to respiratory and other occupational illnesses. Research among coal miners in Balochistan has identified exposure to methane, carbon monoxide, and coal dust and reported health concerns among mining workers (Khan et al., 2013). This demonstrates that mining safety must encompass both accident prevention and long-term occupational health protection.

Access to healthcare and rehabilitation is particularly important for miners who survive serious accidents. A worker who sustains permanent physical impairment may no longer be able to return to underground mining and may require medical treatment, rehabilitation, vocational training, assistive services, and alternative livelihood opportunities. The ILO (2019) emphasizes the importance of occupational health services, emergency preparedness, and rehabilitation within comprehensive systems of mine safety and worker protection.

The social consequences of coal mine disasters demonstrate the important contribution that professional social work can make. Social work adopts a person-in-environment perspective and recognizes the relationship between individual wellbeing and family, community, institutional, and socioeconomic conditions (International Federation of Social Workers [IFSW], 2014). In the context of mining disasters, social workers can conduct family assessments, provide psychosocial support, facilitate access to compensation and social-protection programs, assist injured workers with rehabilitation, support children's educational continuity, and connect families with healthcare and livelihood services.

Social workers can also play an important role in disaster preparedness and community resilience. Community-based interventions can help miners and their families understand occupational hazards, emergency procedures, workers' rights, and available support services. Social workers can collaborate with community organizations, healthcare institutions, government departments, labor organizations, and disaster-management agencies to develop coordinated responses. Such interventions are consistent with the broader social-work commitment to social justice, human rights, collective responsibility, and the empowerment of vulnerable populations (IFSW, 2014).

Another major concern is institutional accountability following mine disasters. Investigations should not focus exclusively on the immediate technical cause of an explosion. They should also examine whether safety regulations were followed, whether adequate ventilation and gas monitoring were available, whether workers had received safety training, whether inspections had been conducted, and whether previously identified hazards had been corrected. The ILO (2019) emphasizes systematic approaches to mine safety and accident prevention, while HRCP (2024) has called for stronger accountability and monitoring mechanisms in Balochistan.

Compensation is an important component of post-disaster assistance, but compensation alone cannot replace effective prevention. Financial assistance may help families address immediate economic needs, but it cannot restore a lost life or fully compensate for permanent disability. A comprehensive response therefore requires timely compensation alongside healthcare, psychosocial support, rehabilitation, education, livelihood assistance, and social protection. The ILO (2023) emphasizes the importance of worker welfare and social protection within a broader occupational safety and health framework.

The issue is also connected to poverty and livelihood insecurity. Many miners depend on coal mining because alternative employment opportunities may be limited in mining communities. Consequently, improving safety must be accompanied by broader socioeconomic measures. Skills development, vocational training, livelihood diversification, educational opportunities, and social-protection programs can reduce household dependence on hazardous employment. A sustainable mining policy should therefore combine occupational safety with socioeconomic development.

Community participation is another essential component of effective safety governance. Miners possess valuable knowledge about workplace conditions and may be among the first people to identify unsafe practices. Meaningful worker participation in occupational safety committees, reporting systems, and emergency planning can strengthen prevention. The ILO (2019) recognizes worker participation and consultation as important components of effective occupational safety and health management.

The recurring occurrence of coal mine explosions in Balochistan therefore requires a shift from a predominantly reactive approach toward a preventive, rights-based, and multidisciplinary model. Government authorities, mine owners, contractors, labor organizations, healthcare providers, disaster-management institutions, civil society organizations, local communities, and social workers all have important roles to play. Improved mine design, modern gas-monitoring systems, adequate ventilation, protective equipment, worker training, effective inspection, emergency preparedness, and enforcement of safety regulations should be accompanied by social protection and family rehabilitation. In this context, coal mine explosions should not be viewed solely as technical or industrial accidents. They represent a complex social problem involving occupational safety, labor rights, human rights, public health, disaster management, poverty, family welfare, and social justice. The loss of a miner affects not only the worker but also spouses, children, parents, dependents, and the wider community. A comprehensive response must therefore address both the prevention of accidents and the long-term needs of affected populations.

Against this background, the present article examines coal mine explosions in Balochistan through an interdisciplinary framework encompassing occupational safety, labor rights, human rights, public health, disaster management, and professional social work. It explores the major structural, technical, organizational, and socioeconomic factors contributing to mining disasters and examines their consequences for miners, survivors, families, and communities. Particular attention is given to the vulnerabilities of widows, children, and dependent family members following the death or disability of a miner. The article also considers the role of social workers in psychosocial support, family rehabilitation, advocacy, social protection, community awareness, and post-disaster recovery.

Ultimately, protecting coal miners requires a transition from a culture of reaction to a culture of prevention. Economic development and employment generation cannot be considered sustainable when workers are routinely exposed to preventable occupational hazards. Every miner has the right to a safe and healthy workplace and to return home safely after work. Strengthening mine safety in Balochistan is therefore not only a matter of industrial regulation but also a question of human dignity, social justice, public health, and the protection of fundamental rights.

Coal Mining in Balochistan: Challenges

Coal mining is an important source of employment and livelihood in Balochistan, but it remains one of the most hazardous occupations in the province. The sector is characterized largely by small and privately operated mines, difficult underground working conditions,

inadequate safety infrastructure, and persistent weaknesses in regulatory enforcement. The International Labour Organization (ILO, 2025) identifies Pakistan's mining sector as facing outdated regulations, weak enforcement, inadequate worker welfare, and frequent occupational accidents. These challenges are particularly significant in Balochistan, where repeated mine explosions, gas-related incidents, roof collapses, and other accidents continue to threaten workers' lives.

Hazardous Working Conditions

One of the most fundamental challenges confronting coal miners in Balochistan is the hazardous nature of underground working environments. Miners frequently work in narrow and deep tunnels where they may be exposed to methane gas, coal dust, toxic gases, unstable roofs, fires, explosions, excessive heat, and inadequate ventilation. The ILO's safety guidance for coal mines emphasizes that underground mining requires effective ventilation, control of gases and dust, protection against fires and explosions, appropriate equipment, emergency preparedness, rescue arrangements, and continuous worker training (ILO, 1986). However, evidence from Balochistan indicates that many mines continue to operate below appropriate safety standards.

The Human Rights Commission of Pakistan (HRCP, 2022) documented serious concerns regarding the working conditions of coal miners in Balochistan and emphasized the need for improved ventilation, regular inspections, functioning emergency services, and better enforcement of safety requirements. The persistence of these conditions demonstrates that the problem is not simply the existence of occupational hazards but the failure to adequately identify, control, and manage those hazards.

Methane Gas and Explosion Risks

Methane accumulation represents one of the most serious dangers in underground coal mining. Methane is highly flammable and can produce catastrophic explosions when it reaches an explosive concentration and encounters an ignition source. Effective ventilation and continuous gas monitoring are therefore essential components of underground mine safety. The ILO (1976) identifies ventilation, gas detection, control of ignition sources, fire prevention, and coal-dust control as central measures for preventing underground coal-mine explosions.

In Balochistan, inadequate gas-detection equipment has repeatedly been identified as a safety concern. During occupational safety consultations involving mine workers, mine owners, and the Mines Inspectorate, participants specifically identified the limited availability of effective gas-detecting equipment as a major challenge (ILO, 2021). The absence or inadequate use of reliable monitoring systems means that dangerous concentrations of methane may not be detected before an explosion occurs.

The continuing occurrence of methane-related accidents demonstrates the consequences of these deficiencies. In January 2025, twelve miners became trapped following a methane gas explosion at the Sanjdi coal mine in Balochistan, and their bodies were recovered after a six-day rescue operation. Following the incident, the provincial government ordered an investigation and emphasized the need for modern safety measures and regular inspections (Shahid, 2025).

Inadequate Ventilation

Poor ventilation is closely associated with the accumulation of methane and other harmful gases. Adequate ventilation is necessary to provide fresh air, remove hazardous gases, control temperature, and reduce the concentration of combustible materials. The HRCP (2022) specifically recommended that mining tunnels in Balochistan should be properly constructed

and adequately ventilated to facilitate the entry of clean air and prevent methane accumulation.

The continued concern regarding ventilation indicates a major gap between recommended safety standards and actual mining practices. Where ventilation systems are inadequate, miners may face both immediate risks of explosions and longer-term exposure to harmful gases and dust. Therefore, ventilation should be regarded as a fundamental preventive measure rather than an optional safety facility.

Weak Regulatory Enforcement

Although Pakistan has legislation and regulatory mechanisms governing mining safety, effective enforcement remains a major challenge. The ILO (2025) identifies weak safety enforcement as one of the major structural problems affecting Pakistan's mining sector. The organization has also emphasized the need for stronger institutional mechanisms to improve occupational safety and health standards in the industry.

The HRCP (2022) similarly recommended increasing the number and frequency of inspections by trained government safety inspectors in Balochistan. The organization argued that regular external inspections, together with internal safety inspections conducted by mine owners and contractors, are necessary to reduce accidents and protect workers.

The continuing gap between legislation and implementation is particularly concerning because occupational safety regulations can only protect workers when they are effectively monitored and enforced. In the absence of regular inspections and meaningful penalties for violations, mine operators may have limited incentives to invest in costly safety improvements.

Shortage of Mine Inspectors

Insufficient inspection capacity is another major challenge. Effective mine safety requires technically qualified inspectors who can regularly visit mining sites, assess working conditions, identify violations, and require corrective action. HRCP reported in 2021 that only 27 mine inspectors were available to oversee health and safety across more than 6,000 mines in Balochistan, highlighting the enormous gap between regulatory responsibilities and available human resources (HRCP, 2021).

More recently, concerns regarding inspectorate capacity have continued. Following the Sorange mine disaster in August 2026, the National Labour Federation of Balochistan reported that approximately 3,000 coal mines were being monitored by only 17 mine inspectors and described this level of staffing as grossly inadequate (Shahid, 2026).

Such figures illustrate a fundamental institutional challenge: even well-designed safety regulations cannot be effectively implemented when the regulatory authority lacks sufficient personnel, technical resources, equipment, and administrative capacity.

Outdated Mining Technology

The continued reliance on traditional and outdated mining methods is another major concern. HRCP (2022) called for greater attention to technological advancement in Balochistan's coal-mining sector and argued that mine operators should be encouraged to move away from archaic and dangerous methods of extraction.

Modern mining technologies can improve safety through automated monitoring, gas detection, improved ventilation, communication systems, emergency alarms, safer extraction techniques, and improved rescue equipment. However, the adoption of such technologies may be limited by the financial constraints of small mine operators and the absence of effective regulatory incentives. The ILO (2025) similarly identifies modernization and improved enforcement as important elements of mining-sector reform.

Inadequate Personal Protective Equipment

The availability and proper use of personal protective equipment (PPE) remain important concerns in Balochistan's coal mines. During consultations organized by the ILO, mine workers and other stakeholders identified limited availability of specific PPE as one of the major challenges confronting miners (ILO, 2021).

PPE such as helmets, protective footwear, gloves, respiratory protection, protective clothing, lamps, and self-rescue equipment can reduce occupational risks. However, PPE alone cannot eliminate hazards. It must form part of a broader safety system that includes engineering controls, ventilation, gas monitoring, training, inspection, emergency preparedness, and worker participation (ILO, 1986).

Inadequate Safety Training

Lack of adequate training and awareness is another major challenge. The ILO (2021) reported that mine workers, owners, and inspectors identified insufficient training and awareness among workers regarding occupational safety and workers' rights as important concerns.

Mining workers need regular training on gas hazards, ventilation, use of equipment, emergency evacuation, first aid, fire prevention, roof stability, use of PPE, and reporting of unsafe conditions. Training should not be limited to newly recruited workers; it should be continuous and updated whenever mining methods, equipment, or workplace conditions change.

Contractor and Subcontracting System

The employment structure of coal mining can also create challenges for safety and accountability. The ILO (2021) identified the subletting of mines to contractors as one of the issues discussed by workers, owners, and inspectors in Balochistan.

Contractual arrangements can create uncertainty regarding who is responsible for worker safety, training, equipment, wages, medical care, and compensation. The ILO (2023) also reported concerns that casual and contract workers in Pakistan's mining sector may not receive appropriate social protection because they are not always formally recognized as mine employees.

A fragmented employment structure can therefore increase workers' vulnerability and make accountability more difficult following accidents.

Lack of Social Security and Worker Registration

Coal miners and their families face significant social protection challenges. The ILO (2021) reported concerns regarding the absence of registration of mine workers with government institutions and limited access to social-security benefits.

Similarly, HRCP (2022) recommended that coal miners should be formally registered and made eligible for benefits under institutions such as the Employees' Old-Age Benefits Institution (EOBI) and the Workers' Welfare Fund.

The lack of registration becomes particularly devastating when a worker dies or becomes permanently disabled. Without adequate social protection, families may have to rely on informal assistance or charitable support. This can increase poverty and expose widows, children, elderly parents, and other dependents to long-term socioeconomic insecurity.

Poor Emergency and Rescue Facilities

Emergency preparedness remains another serious weakness. Coal mine accidents require rapid and technically sophisticated rescue operations because workers may be trapped hundreds or thousands of feet underground. Rescue teams need specialized equipment, trained personnel, communication systems, breathing apparatus, medical support, and safe access to underground workings.

HRCP (2022) recommended that mine owners and contractors ensure functioning ambulance services, onsite emergency health workers, and regular internal safety inspections at mining sites.

The seriousness of this problem was again highlighted following the 2026 Sorange mine tragedy. Reporting on the incident raised concerns regarding the condition of emergency transportation and called for improved rescue equipment, emergency exits, modern gas-monitoring systems, and adequate emergency preparedness (Shahid, 2026).

Occupational Health Problems

The dangers of coal mining extend beyond explosions and acute injuries. Miners may experience long-term exposure to coal dust, methane, carbon monoxide, excessive heat, and physically demanding conditions. Such exposure can contribute to respiratory, musculoskeletal, and other occupational health problems.

The ILO (2025) identifies occupational diseases and permanent disabilities as significant concerns within Pakistan's mining sector. Therefore, mine safety policies need to incorporate both accident prevention and occupational health surveillance, medical screening, early diagnosis, treatment, rehabilitation, and long-term healthcare.

Economic Vulnerability of Mining Families

The consequences of mining accidents extend beyond the workplace. Many miners are major or sole income earners for their families. When a miner dies or becomes disabled, the household can immediately experience a substantial loss of income. This may affect food security, healthcare, housing, children's education, and overall family wellbeing.

The social consequences are particularly serious because the victims of mine accidents may belong to the same village or extended family. Following the 2026 Sorange tragedy, labour representatives reported that many of the deceased workers were sole breadwinners and that several victims belonged to the same family and community (Shahid, 2026).

This illustrates how mining disasters can produce collective community-level consequences rather than affecting individual households alone.

Poverty, Women and Children

The death of a miner can increase the economic and social vulnerability of women and children. Widows may suddenly become responsible for household management, childcare, education, and income generation. Children may face interruptions in schooling because of financial difficulties, while families may be forced to depend on relatives or informal employment.

The ILO (2023) has emphasized that significant numbers of workers in Pakistan's mining sector, particularly casual labourers, may not have adequate access to social protection. This absence of protection can increase the vulnerability of families after occupational death or disability.

From a social-work perspective, therefore, mine disasters should be examined in relation to family resilience, poverty, social protection, children's welfare, women's economic vulnerability, and community recovery.

Lack of Social Dialogue and Worker Participation

Worker participation is an important component of occupational safety, yet limited social dialogue remains a concern. The ILO (2021) reported limited social dialogue among mine workers, employers, and other stakeholders in Balochistan and emphasized the importance of cooperation between employers, workers, and the Mines Inspectorate.

Workers possess direct knowledge of workplace hazards and should have meaningful opportunities to report unsafe conditions without fear of retaliation. Stronger worker

representation, trade-union participation, safety committees, and consultation mechanisms can contribute to early identification of risks.

Fragmented Ownership and Informal Mining Practices

The structure of the mining industry presents another challenge. The ILO (2022) reported concerns regarding fragmented ownership, illegal ownership arrangements, contract systems, and the failure to implement rules and regulations in parts of Pakistan's mining sector.

Small-scale and fragmented operations may lack the financial and technical capacity to invest in modern safety systems. HRCP has similarly observed that some coal mines have been operated by individuals without sufficient financial resources or technological expertise to provide adequate operational safety or emergency response (HRCP, 2020).

Failure to Implement International Safety Standards

Pakistan's mining safety framework also faces the challenge of insufficient alignment with international standards. The ILO has repeatedly encouraged Pakistan to ratify the Safety and Health in Mines Convention, 1995 (No. 176). In 2023, the ILO reported that Pakistan had not yet ratified Convention No. 176 and highlighted the importance of the convention for improving occupational safety and social protection for mine workers (ILO, 2023).

HRCP (2022) likewise called for ratification of ILO Convention No. 176 and emphasized that minimum occupational safety and health standards need to be effectively established and implemented.

The issue is not simply ratification itself; international standards must be translated into effective national and provincial policies, inspection systems, workplace practices, and accountability mechanisms.

Weak Accountability After Mining Disasters

Another challenge is ensuring accountability after accidents. An effective investigation should determine not only the immediate technical cause of an explosion but also whether adequate ventilation existed, whether gas monitoring was functioning, whether safety equipment was available, whether inspections were conducted, and whether previous safety violations had been corrected.

The continued recurrence of major accidents suggests that lessons from previous disasters have not always been translated into effective preventive action. Following the Sanjdi tragedy in January 2025, the provincial government ordered an inquiry and stressed the need for modern mining safety practices and regular inspections (Shahid, 2025).

Similarly, following the 2026 Sorange disaster, labour representatives called for an independent inquiry and stronger institutional capacity for the Mines Inspectorate (Shahid, 2026).

Social Work and Community-Level Challenges

The challenges of coal mining in Balochistan extend beyond occupational safety and require a broader social-development response. Social workers can play an important role in supporting miners and their families before, during, and after disasters. Their responsibilities can include psychosocial counselling, family assessment, grief support, rehabilitation, social-protection referrals, assistance with compensation claims, educational support for children, livelihood assistance, community awareness, and advocacy.

A social-work approach is particularly relevant because the consequences of mining disasters are multidimensional. The loss of a miner can simultaneously create bereavement, poverty, psychological distress, disability, family instability, and educational disruption. Consequently, interventions should not focus exclusively on the injured worker but should assess and address the needs of the entire family and community.

Overall Assessment

The challenges confronting coal mining in Balochistan are interconnected rather than isolated. Poor ventilation increases methane risk; inadequate gas monitoring reduces early warning; weak inspection allows unsafe practices to continue; outdated technology increases exposure to hazards; inadequate emergency facilities increase fatalities; informal employment reduces access to social protection; and poverty makes workers more dependent on hazardous employment. These factors can reinforce one another and create a cycle of occupational vulnerability.

Recent evidence demonstrates that these problems remain highly relevant. The ILO (2025) continues to identify outdated regulations, weak safety enforcement, environmental degradation, and inadequate worker welfare as major challenges within Pakistan's mining sector. More recently, reporting following the August 2026 Sorange mine disaster highlighted concerns about the shortage of inspectors, inadequate emergency response, and insufficient modern safety equipment in Balochistan (Shahid, 2026).

Therefore, coal mining in Balochistan should be addressed through an integrated framework combining occupational safety, labor rights, human rights, public health, disaster management, social protection, and social work. Improving mine safety requires more than providing protective equipment after an accident. It requires preventive regulation, modern technology, adequate inspection, effective worker training, functional emergency systems, formal worker registration, social-security coverage, transparent investigations, and accountability for violations. At the same time, families affected by deaths and disabilities require long-term psychosocial, economic, educational, and rehabilitation support.

The central challenge is therefore not the absence of knowledge about how to make mines safer, but the persistent gap between safety standards and their effective implementation. Protecting Balochistan's coal miners requires political commitment, institutional capacity, employer accountability, worker participation, technological modernization, and sustained investment in the welfare of mining communities.

Recommendations

1. **Strengthen Mining Safety Regulations and Their Enforcement:**

The government of Balochistan should ensure strict implementation of existing mining laws and occupational safety regulations. Regular and unannounced inspections should be conducted to identify unsafe working conditions, and mine owners who violate safety standards should face appropriate legal and financial penalties. Safety compliance should be treated as a mandatory requirement rather than a voluntary practice.

2. **Increase the Capacity of the Mine Inspectorate:**

The number of qualified and technically trained mine inspectors should be increased according to the number of operating mines. Inspectors should be provided with adequate resources, modern equipment, and professional training to effectively monitor mining conditions. The inspectorate should also have sufficient independence and authority to stop operations where serious safety violations are identified.

3. **Introduce Modern Gas Detection and Monitoring Systems:**

Since methane and other hazardous gases are major causes of underground mine explosions, all coal mines should be equipped with modern gas detection and monitoring systems. Methane, carbon monoxide, and oxygen levels should be continuously monitored, with warning alarms and appropriate emergency mechanisms to allow workers to evacuate before conditions become life-threatening.

4. **Improve Mine Ventilation and Underground Safety Infrastructure:**

Proper ventilation systems should be installed and regularly maintained to prevent the accumulation of methane, carbon monoxide, coal dust, and other hazardous substances. Mine tunnels, electrical systems, support structures, and emergency exits should also be regularly inspected to reduce the risk of explosions, collapses, fires, and other accidents.

5. **Ensure Safety Training and Provision of Personal Protective Equipment:**

Every mine worker should receive compulsory safety training before entering the mine and regular refresher training thereafter. Workers should be trained in hazard identification, emergency evacuation, gas-related risks, first aid, and the safe use of mining equipment. Appropriate and certified personal protective equipment (PPE) should be provided to workers free of cost and its proper use should be monitored.

6. **Strengthen Emergency Rescue and Medical Services:**

Every major mining area should have properly equipped rescue teams, emergency response plans, first-aid facilities, and readily available ambulances. Mine owners and government authorities should conduct regular emergency drills so that workers know how to respond during explosions, fires, collapses, and gas leaks. Nearby health facilities should also be prepared to provide immediate treatment to injured miners.

7. **Register and Provide Social Protection to All Mine Workers:**

All miners, including contract, temporary, and migrant workers, should be formally registered. Registration should enable workers and their families to access social security, health care, workers' compensation, pensions, and other welfare benefits. The informal and subcontracted employment of workers should be regulated to ensure that employers cannot avoid responsibility for worker safety and welfare.

8. **Ensure Timely Compensation and Support for Affected Families:**

Families of miners who are killed or permanently injured should receive compensation without unnecessary administrative delays. Particular attention should be given to widows, children, and other dependents who may lose their primary source of income. Educational assistance, livelihood support, vocational training, and financial counselling should be provided to affected families to reduce their long-term economic vulnerability.

9. **Promote Worker Participation and Professional Social Work Services:**

Mine workers should be actively involved in safety decision-making through workplace safety committees and effective channels for reporting hazards without fear of retaliation. Professional social workers should also be included in mining welfare and disaster-response programmes to provide psychosocial counselling, family support, rehabilitation, referral services, and community-based interventions for affected workers and families.

10. **Develop a Comprehensive Prevention-Based Mining Safety Framework:**

The Government of Balochistan, mine owners, workers, labour organizations, health institutions, and relevant civil society organizations should jointly develop a comprehensive Balochistan Coal Mining Safety and Social Protection Framework. The framework should integrate occupational safety, emergency preparedness, worker rights, social protection, health care, compensation, family welfare, and accountability. Its implementation should be regularly monitored and evaluated, with the overall objective of shifting mining policy from responding to disasters after they occur toward preventing avoidable deaths and protecting the dignity and well-being of mine workers and their families.

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