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## Occupational Health Risks and Mining Practices: A Sociological Study of Chromite Mine Workers in District Killa Saifullah, Balochistan

<sup>1</sup>Ahmed Shah, <sup>2</sup>Dr. Saeed Akbar, <sup>3</sup>Dr. Anwar Ul Haq

### Article Details

### ABSTRACT

**Keywords:** Occupational Health, Workplace Safety, Chromite Mining, Industrial Labor, Mining-Related Diseases. This study investigates mining practices, associated health risks, and the availability of workplace safety measures among chromite mineworkers in District Killa Saifullah, Balochistan. Utilizing a quantitative research approach, data were collected from 250 mineworkers through convenience sampling at Muslimbagh the district's oldest and most active mining site. The findings reveal alarming conditions regarding occupational health and safety. Approximately 87% of respondents reported no access to even basic first aid facilities, while 64% lacked any form of protective equipment. Among those who did report access, most had only minimal items such as gloves or wooden tools; no workers reported the availability of standard protective gear such as helmets or respiratory masks. These unsafe working conditions have led to widespread occupational health concerns. Nearly 70% of respondents believed their work exposed them to serious illnesses including lung cancer, tuberculosis, hypertension, chronic headaches, and respiratory allergies. Furthermore, over 80% of the mineworkers acknowledged the risk of physical injuries and long-term disabilities, particularly related to spinal damage. The study highlights the urgent need for regulatory intervention, improved occupational safety standards, and health protections for mine laborers in Pakistan's extractive sector.

#### Ahmed Shah

MS Scholar, Department of Sociology, International Islamic University, Islamabad, Pakistan. [ahmedshah4913@gmail.com](mailto:ahmedshah4913@gmail.com)

#### Dr. Saeed Akbar

Assistant Professor, Department of Sociology, International Islamic University, Islamabad, Pakistan. [saeed.akbar@iiu.edu.pk](mailto:saeed.akbar@iiu.edu.pk)

#### Dr. Anwar Ul Haq

Lecturer, Department of Sociology, Government Associate College, Daultala, Pakistan. [haqanwar11@gmail.com](mailto:haqanwar11@gmail.com)

## INTRODUCTION

Chromite ( $\text{FeO Cr}_2\text{O}_3$  or  $\text{Fe Cr}_2\text{O}_4$ ) is a rare earth mineral which is oxide of iron and chromium. Chromium at commercial scales is obtained from chromite. Chromite is extracted from Baluchistan and Khyber Pakhtunkhwa in Pakistan (Siddiqi, 1968). Mining is globally a very vast and extensive business and only source of raw materials for many industries (Stewart, 2020). As the importance of the mining industry cannot be overstated, there are certain risks also associated with mining (Stephens & Ahern, 2001). Mineral mining is beneficial for industry but it is also harmful for environment of the surrounding areas. Similarly, too much extraction of minerals needs to be put under the scrutiny (Coelho, Teixeira, & Gonçalves, 2011). There are two main concerns in mining industry namely the environmental pollution and miners health (Faanu, Darko, & Ephraim, 2011) (Robson L. S., et al., 2012). Toxic pollutants associated with metal extraction and exposure to heavy metals in air can cause severe illnesses in miners (Abdu, Abdullahi, & Abdulkadir, 2017). These heavy metals also affect other living organisms and plants as well (Malik, Bashir, Qureashi, & Oandith, 2019).

The focus of this research is on chromite mining in District Killa Saif Ullah located in Baluchistan province of Pakistan. The primary aim of this study is to identify the health risks associated with chromite mining for mine workers and workplace safety of the workers. It is pertinent here to know briefly about the geography, chromite mines and history and culture of mining and especially chromite mining in Baluchistan with special focus on district Killa Saifullah.

## GEOGRAPHY AND MINING IN KILLA SAIFULLAH

Baluchistan has diverse geography from upper highlands to seashores. The Upper High Lands are primarily located in the districts of Zhob, Killa Saifullah, Pishin, Quetta, Ziarat, and Kalat. This region includes several mountain ranges such as the Sulaiman, Tobak Kakari, Murdar, Zarghoon, Takatu, and Chiltan ranges. Killa Saifullah is district located in northwestern Baluchistan. It was established as district in year 1988 by combining two areas Zhob and Badinai. It is located in Zhob Division. Total area of district Killa Saifullah is around 11600 square kilometers and has two Tehsils Killa Saifullah and Muslim Bagh. Total Population of Killa Saifullah is 380,200 as per 2023 census. Killa Saifullah is a mountainous area which is higher than 2200 meters in altitude.

Chromite minerals are extracted from the Muslim Bagh ophiolitic complex and Khanozai. Balochistan is endowed with substantial reserves of chromite. The initial discovery was made at Muslim Bagh and Khanozai in the district of Killa Saifullah in 1901. Chromite deposits have also been identified in the Ras Koh Range in western Balochistan and Wad in the Khuzdar district. Currently, 300 to 500 tons of chromite are produced daily at Muslim Bagh and Khanozai (Fazl-e-Haider, 2008).



**FIGURE 1:** District Map of Killa Saifullah and Muslim Bagh Area where chromite mines are located

### SIGNIFICANCE OF THE STUDY

The main objectives of this endeavour are to explore the mining practices, health problems, and workplace safety of mineworkers of Killa Saifullah working in chromite mines. There are two main types of chromite mining on ground mining and underground mining. There are distinct risks associated with both of these types of mining. In this research effects of both these types have been discussed. Likewise, Mining involves three types of activities mainly Digging, extracting and loading. Impacts of all three activities on health of the miners has been explored in this study.

### METHODOLOGY

This research uses the quantitative methodology to explore the conditions of miners in district Killa Saifullah. Total number of households as per 2023 Census are 70,021 and total population of the district is 380,200 with average household size of 5.43. However, there is no sampling frame of the miners and labourers attached with mining is available. Unit of analysis for the current study were individual miners, involved in chromite mining in Killa Saifullah. As most mining operations take place in Muslim Bagh and problems faced by miners in Muslim Bagh are the worst so, this study focused on Muslim Bagh area. As Sampling frame was not available so, sample size of 250 miners was selected conveniently for data collection. Convenient sampling technique was used because of non-availability of the record of all miners. Some estimates show that there are more or less 13000 miners in the area. From these 13000 miners 250 were selected as sample conveniently.

As the researcher one in the study belonged to the same area, data was collected using Structured interview schedule. Survey was conducted using structured interview schedule because miners were unable to read English and Urdu. Interviews were mostly conducted in Pashto. Structured interview schedule collected demographic information, work conditions and health related physical and psychological issues. Data was directly obtained from mine workers.

As almost all of the mine workers are males, so data was only obtained from males. Data collection process with miners is so difficult. There are many social and ethical hurdles beside the physical hurdles. Data was collected from miners at the sites of extraction, and at the sites of loading and transportation.

This huge amount of data collected from miners was then entered into SPSS for data analysis. As the sample was selected using non-probability sampling techniques,

## RESULTS

The primary aim of this research was to explore the health problems and workplace safety related issues faced by miners in Killa Saifullah. Background information about different socioeconomic variables was also collected from miners as well. In the first section socioeconomic status of the miners is discussed which might have influence on their health and workplace safety.

**TABLE 1: DISTRIBUTION OF THE RESPONDENTS BY MONTHLY INCOME, AGE AND EDUCATION**

Monthly Income of Respondents		Age of the Respondents		Education of the Respondents	
Categories	%	Categories	%	Categories	%
Below 16000	30.4	Below 20	37	Illiterate	30.0
16001-20000	42.8	21-30	42.8	Primary	41.6
20001-25000	19.6	31-40	32	Middle	18.8
Above 25000	7.2	Above 40	16	Matric or above	9.6

Table 1 shows the distribution of the respondents by monthly income, age and education. There were total 250 respondents. First part of the table shows the monthly income of the respondents. Around 42% of the respondents are earning 16000 rupees to 20000 rupees. Earning of the 30% respondents is below 16000 rupees and 19.6% of the respondents are earning 20001 rupees to 25000 rupees. Only 7.2% of the respondents are earning more than 25000. The data indicates that the income of the miners is considerably low. Average salary approved by Government of Pakistan in recent budgets is 32000 rupees. A significant majority of the respondents around 93% are earning less than this figure. This means that mining is not high paying job or involves any financial rewards. This information is also important as it tells us that economic conditions of the miners is also very poor which can be a cause of their health problems as well as other socioeconomic problems.

Middle part of the table shows the distribution of the respondents by age. Age of the respondents in years is given, and majority of the respondents 49% were of age between 21-30 years. Similarly, 37% of the respondents were below 20 years of the age. Around 32% of the respondents belonged to age group 31-40 years while only 16% of the respondents were above 40 years old. This data shows that most of the mine workers are young, and mining is profession of the young people. Around 86% of the mine workers are below the age of 30 years old.

The last part of the table shows the distribution of the respondents by education. Most of the respondents, 30% were illiterate, 42% of the respondents have completed only 5 years of schooling, only 19% of the respondents have completed middle school and only 10% of the respondents have completed matric. This data shows the respondent's educational level in which the majority of the respondents were either uneducated or only primary pass.

**MINING ACTIVITIES****TABLE 2: MINING PRACTICES OF THE RESPONDENTS**

Role of Mineworkers		Hard tasks in Mining		Dangerous for human health	
Categories	%	Categories	%	Categories	%
Digging	37.2	Digging	48.0	Digging	62.4
Loading	31.2	Loading	24.0	Loading	12.8
Extracting minerals	31.6	Extracting minerals	28.0	Extracting minerals	24.8

Table 2 shows the distribution of the respondents by mining practices of the respondents. The first section discusses role of the mineworkers. Most important tasks performed by mineworkers are digging, loading and extracting minerals from the ore. When the respondents were asked what role they perform in the mining industry, in response to this 37.2% of the respondents said they perform the role of digging, 31.2% of the respondents replied they perform the role of loading and 31.65% of the respondents said they perform the role of extracting the mineral from ore.

When asked by the respondents about the hardest tasks involved in the mining industry. Around 48% of the respondents replied that digging is the most difficult task. Digging involves going inside the mines and also winching which are the most difficult parts of the digging. Extracting minerals from the ores was considered the most difficult task by 28% of the respondents. 24% of the respondents considered loading the mineral as the most difficult task. However, there is a consensus among most of the miners that digging is the most difficult task. In reality the response of most of the miners was that all the tasks are hard and no task whether it is digging extracting or loading is easy.

The final part of the table shows that which task is most harmful for the human health in response to this question majority 62.4% of the respondents said that digging is the most harmful activity during the mining. 24% of the respondents considered extracting the minerals from the ore as the most dangerous activity for the human health. Around 13% of the respondents said that loading is the most dangerous activity involved in the process of mining. However, it can be said that digging is most harmful for human health and is considered by majority of the respondents as most dangerous activity for human health. Digging involves many such acts which are harmful for different organs of the body details of the harms of decking are given in the tables below. The following table shows how different activities of mining are causing health related problems in mine workers.

**HEALTH RISKS****TABLE 3: POTENTIAL HEALTH RISKS FACED BY CHROMITE MINEWORKERS**

Statements				Str disag	Disag	Neu	Agr	Str Agr	Total
Mining activities can cause Lung cancer	f	2	%	0.8	11	77	155	5	250
				0.8	4.4	30.8	62	2	100
Mining activities can cause hypertension	f	6	%	2.4	91	62	89	2	250
				2.4	36.4	24.8	35.6	0.8	100
Mining activities can cause Tuberculosis	f	2	%	0.8	8	57	167	16	250
				0.8	3.2	22.8	66.8	6.4	100
Mining Activities can cause respiratory diseases	f	5	%	2	17	53	149	26	250
				2	6.8	21.2	59.6	10.4	100
Mining activities can cause disability	f	1	%	0.4	5	36	174	34	250
				0.4	2	14.4	69.6	13.6	100



Mining activities can cause skin allergies	<b>f</b>	23	93	46	71	17	250
	<b>%</b>	9.2	37.2	18.4	28.4	6.8	100
Mining activities can cause nose and throat allergies	<b>f</b>	6	46	38	140	20	250
	<b>%</b>	2.4	18.4	15.2	56	8	100
Mining activities can cause eye pain	<b>f</b>	22	86	37	97	8	250
	<b>%</b>	8.8	34.4	14.8	38.8	3.2	100
Mining activities can cause headache	<b>f</b>	7	14	43	160	26	250
	<b>%</b>	2.8	5.6	17.2	64	10.4	100
Chromite is poisonous metal	<b>f</b>	38	39	48	114	11	250
	<b>%</b>	15.2	15.6	19.2	45.6	4.4	100

Table 3 discusses in detail the health risks associated with and identified by miners in detail. First most dangerous risk associated with chromite mining is Lung cancer. When asked from respondents that chromite mining can cause lungs cancer 62% of the respondents agreed that chromite mining can cause lungs cancer. Around 31% of the respondents were of the opinion that they are not aware of this that chromite mining can cause lungs cancer or not. A significant majority of them agreed that it can cause lungs disease. Second indicator that was focused in the study was mining causes hypertension to the mine workers in response to this question, 36.4% of the respondents disagreed that hypertension is caused by the mine work. 24.8% of the respondents were neutral and said that they are unaware that hypertension is being caused by the mine work. Around 36% of the respondents agreed that hypertension is caused by the working in the mines. In response to this question, it can be said that an equal number of respondents disagreed, and equal number of respondents agreed that mine work results in hypertension. The third indicator that was focused on in the study was chromite mining can cause tuberculosis. In response to this question 67% respondents agreed that chromite mining work can lead to tuberculosis. It means that 67% of the respondents consider chromite mining as potential risk for cause of the tuberculosis. However, 22% of the respondents said that they are neutral and are not aware that chromite mining can lead to tuberculosis or not.

The fourth indicator that was focused on in the study was chromite mining can cause respiratory diseases. Around 60% of the respondents agreed that chromite mining is a potential cause of respiratory diseases. Respiratory diseases are common among the miners and one of the causes of this is activity is related to chromite mining. In response to this question 10% of the respondents strongly agreed with this statement that respiratory diseases are caused by mining activities. So, in total we can say 70% of the respondents agreed that respiratory diseases are due to mining activities. However, a significant number 21% of the respondents opted for the neutral option which means they either do not agree or disagree with this statement that respiratory diseases are due to mining activities. The next indicator focused on in this study was that mining activities can cause disabilities. Mining is a hard job and mine workers can face several type of disabilities, risk of disability is associated with mining. The potential risks involve lifelong losing of the fingers, hand, upper limbs and lower limbs. In response to this question that mining activities can cause disabilities to the miners 70% of the respondents agreed and 13.6% of the respondents strongly agreed that mining is the potential cause of the disabilities among the workers. This means that around 84% of the respondents agree that mining can cause disabilities to the workers.

In the next indicator when asked about the mining as the potential cause of the skin allergies to the mine workers, around 37.2% of the respondents disagreed with this statement. 37% of the respondents disagreed that skin allergies are caused by the mining activities. Around 10% of the respondents strongly disagreed with this statement that skin allergies are caused by

the mining activities. Which means that around 47% of the respondents do not consider mining as potential risk for skin allergies. However, 28% of the respondents agreed and 19% of the respondents had no opinion that skin allergies are caused by chromite mining.

The seventh indicator focused related to health conditions was mining activities can cause throat and skin allergies. Throat and skin allergies are also common among the mining community. When asked from mine workers that do they consider mining activities as the potential cause of skin and throat allergies, 56% of the respondents agreed and 8% of the respondents strongly agreed with the statement. Which means that 64% of the respondents agree that nose and throat allergies are caused by mining activities. Only 18% of the respondents disagreed with this statement and 15% of the respondents were neutral. These results mean that the majority of the workers consider their work as cause of the nose and throat allergies. Harmful gases and substances involved in chromite digging and extraction from ore can cause nose and throat problems among the workers.

In the next indicator response related to eye pain was acquired from the mineworkers. When asked that minework can cause eye pain 38.8% of the respondents agree with this statement. In their view eye pain can be caused by minework. However, almost similar number of respondents 34% disagreed and 8% strongly disagreed that eye diseases are caused by working in the mines. Around 42% of the respondents do not consider mine work as the potential cause of the eye pain or other illnesses. In response to question related to eye pain around 15% of the respondents were neutral.

When asked about the headache in the next indicator related to health problems due to mining 64% of the respondents agreed and 10% of the respondents strongly agreed with this statement that headache is being caused by the mining activities. This means that 74% of the respondents which is a significant majority agrees that mining activities are a potential cause for the headaches among the mine workers. 17% of the respondents in response to this question were neutral. Headache is a common problem faced by the mine workers and often mine workers complain about the headache. The last indicator that was focused related to the health activities was chromite is a poisonous metal when asked this question that chromite is a poisonous metal 15.6% of the respondents disagreed and 15.2% of the respondents strongly disagreed that chromite is a poisonous metal this means that around 30% of the respondents think that chromite is not a poisonous metal. Around 20% of the respondents were neutral and were undecided whether chromite is a poisonous metal or not. Around 50% of the respondents either agreed or strongly agreed that chromite is a poisonous metal. Extraction of chromite from the ore involves different activities and different chemicals that are harmful for human health. Some of these chemicals are very poisonous for humans and other animals.

#### **WORKPLACE SAFETY**

**TABLE 4: *WORKPLACE SAFETY MEASURES AVAILABLE IN THE MINING AREAS***

Availability of safety measures		Types of safety equipments Available		Availability of First Aid	
Categories	%	Categories	%	Categories	%
Yes	36.8	Gloves	3.6	yes	13.6
No	63.2	Timber	33.2	No	86.4
		Not at all	63.2		

Table 4 shows the distribution of the respondents by availability of safety measures at workplace. Safety measures are essential requirement of International Labor organization (ILO) for mining work. Safety standards approved by ILO require many such requirements for workers safety that

are not available at all in Killa Saifullah chromite mines. When asked about the availability of any safety measures during the mining work, around 63% of the respondents said that there are no safety measures available at all. Only 37% of the respondents said that the safety equipments are available to them. When asked about the availability of types of safety equipments only 3.6% of the respondents had gloves to protect the hands and only 33.2% had timber to support the roofs of the mines. None of the respondents had helmets to protect the head. When asked about the availability of first aid, around 86.4% of the respondents confirmed that first aid is not available near the mining area. Only 13.6% of the respondents had access to first aid near the mining area.

## **DISCUSSION**

The results of this study clearly indicate that mine workers do not have complete safety equipments and even the safety equipments that are available are not enough to provide save mining experience. The non-availability of safety measures and first aid results in many types of injuries, disabilities and diseases. Most of the problems faced by mine workers stem from the non-availability of safety equipments. The problem of different kinds of diseases faced by miners can we attribute it to lack of availability of safety equipments. Globally such mining practices are rarely prevalent.

In various earlier studies related to chromite mining globally and in pakistan it has been reported that chromite mining is harmful for human beings. In a study in year 2024 it has been reported that metal toxicity in chromium mines is very high and is dangerous for human health (Khan et al., 2024). Similar findings have been reported in this study that chromium metal is toxic, and its toxicity is harmful for the mineworkers.

In a recent study related to radiological hazards, it found that although the values of nuclear and gamma radiation are within the safe limits (Ahmad et al., 2025) but however, exposure for long time can be harmful for the mineworkers without proper safety equipments. Our study also reports similar findings that most of the issues faced by miners result from non-availability of the safety equipments.

Diseases caused by chromite mining are also reported in earlier studies. Earlier studies related to different types of mines also support the findings of this study related to health conditions. Various health conditions due to mining experience are reported in varying degree in earlier research. However, most of the previous research only focused on the conditions of the mines and safety equipment or environment. The unique element of this study was direct interaction with the mineworkers and understanding health problems faced by them.

It is pertinent here to discuss some of the standards of international labor organization related to workplace safety in mining. It is essential to provide these safety equipments to the workers besides availability of first aid and other basic utilities. The facilities mentioned on ILO website include “roll-over and falling object protective structures, equipment seat belts and harnesses; fully enclosed pressurized cabins; self-contained rescue chambers; emergency showers and eye wash stations” (ILO, 2025). It was reported by the mineworkers in the Muslim bagh that no such facilities are available to them. As 86% of the respondents do not even have access to first aid, the situation of mineworkers is very worst and need serious attention and improvement.

## **CONCLUSION**

The primary focus of this study was to identify the mining practices, health related problems and workplace safety issues faced by mineworkers of district Killa Saifullah. It was found that there are very severe problems faced by mineworkers. The conditions of workplace safety are much below the internationally acceptable standards. 87% of the respondents do not have even access to the first aid facilities. 64% of the respondents do not have access to any safety equipment. Those who have safety equipments they only have gloves or timber. None of the workers have



head gear or covering to protect injuries. So, the conditions of the workplace safety are extremely poor. Secondly, these poor safety arrangements result in different kinds of injuries, disabilities and diseases. It was reported by around 70% of the respondents that their work can lead to Lung's cancer, tuberculosis, hypertension, headaches, nose and throat allergies and other respiratory conditions. Similarly, more than 80% of the respondents have agreed that their work can result in injuries and disabilities especially to backbone.

## RECOMMENDATIONS

There are three basic recommendations of this study.

1. It is essential for government of Baluchistan to ensure the availability of the basic health facilities for mineworkers. There is dire need to establish minimum 3 basic health units (BHUs) in the vicinity of the Muslim Bagh area near the mining locations.
2. Government must ensure that proper mining and adequate safety equipments are available to the mineworkers. Contractors must also realize the importance of this and safety equipments should be provided to the mineworkers.
3. Mineworkers welfare is associated with education and income. It is needed to provide education, training and use of modern technology to ensure safety of mineworkers and also to enhance the efficiency of mining process.

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