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A study on precautions to be taken in the event of a pandemic in the mining industry in Turkey

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Abstract

The Covid-19 epidemic, a new species of coronavirus, has taken over the world. Like most industries around the world, the mining industry has a negative impact on this situation, such as stopping their business, loss of production, stopping new projects or postponing them, and their employees being infected by the epidemic. In this study, measures to be taken in the mining industry in Turkey have been attempted. In the study, the measures set out are to update the risk assessment according to the epidemic, identify the responsible people, arrange the work plan, set rules to be followed in vehicles, inform employees, organize training content, establish and apply hygiene rules, set rules to be observed in the workplace, limit interaction between employees and establish and apply rules related to common use. With the implementation of these rules, the Covid-19 outbreak is expected to reduce the impact on the mining industry in Turkey. The Covid-19 epidemic has no mining workers in Turkey who have been affected by this virus, but have died from this epidemic.

***Keywords**: Mining industry, Covid-19 outbreak, epidemic measures, occupational health and safety.*

Türkiye'deki madencilik sektöründe bir pandemi durumunda alınması gerekli önlemler üzerine bir araştırma

Öz

Koronavirüsün yeni bir türü olan Covid-19 salgını, bütün dünyayı etkisi altına aldı. Dünya'daki çoğu sektör gibi madencilik sektörü de bu durumdan işletmelerini durdurma, üretim kaybı, yeni projelerini durdurma veya ileri bir tarihe erteleme, çalışanlarının

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salgına yakalanması gibi olumsuz olarak etkileri olmaktadır. Bu çalışmada; Türkiye'de madencilik sektöründe alınması gereken önlemler belirlenmeye çalışılmıştır. Çalışmada, belirlenen önlemler; risk değerlendirmesinin salgına göre güncellenmesi, sorumluların belirlenmesi, çalışma planının düzenlenmesi, ulaşım araçlarında uyulacak kuralların belirlemesi, çalışanların bilgilendirilmesi, eğitim içeriklerinin düzenlenmesi, hijyen kurallarının belirlenip uygulanması, işyerinde kullanılan araçlarda uyulacak kuralların belirlenmesi, çalışanlar arasındaki etkileşimin sınırlandırılması ve ortak kullanım alanları ile ilgili kuralların belirlenip uygulanması. Bu kuralların uygulanmasıyla Covid-19 salgınının, Türkiye'deki madencilik sektöründeki etkilerinin azalacağı düşünülmektedir. Covid-19 salgın sürecinde, Türkiye'de bu virüsten etkilenen maden işçileri olmasına rağmen bu salgından ölen maden işçisi bulunmamaktadır.

***Anahtar kelimeler**: Madencilik sektörü, Covid-19 salgını, salgın önlemleri, iş sağlığı ve güvenliği*

1. Introduction

The New Coronavirus Disease (COVID-19) is a virus first identified on January 13, 2020 as a result of research conducted in a group of patients who developed respiratory symptoms (fever, cough, shortness of breath) in Wuhan Province, China, in late December. The World Health Organization (WHO) has declared an epidemic caused by the Covid-19 virus as a "pandemic", in which has seen many cases were observed worldwide and thousands of people died as of February 16, 2021. Most people infected with the Covid-19 virus have experienced mild and moderate respiratory disease. Older people and those with conditions such as cardiovascular, diabetes, chronic respiratory and cancer are more likely to be seriously affected by this disease [1]. As of August 07; 567.577.775 people have been diagnosed with this disease worldwide. Of these, 95.17% (561140938 people) recovered and 1.09% (6436837 people) died. In Turkey, where the first case was seen on March 11. As of August 01; 15889495 people contracted this disease, 0.63% (99341 people) died and 15487468 people recovered [2]. The top 10 countries with the most covid-19 pandemics in the world are respectively; USA (25.8%), and India (10.0%), Brazil (9.0%), Russia (3.7%), United Kingdom (3.7%), France (3.2%) Spain (2.8%), Italy (2.5%), Turkey (2.4%) and others (36.9%) [3]. International Labour Organization (ILO); ILO has created videos on Covid-19 for some industries. However, he gave advice on the global, regional or country effects of covid-19 and created policies.

The mining industry has been hard hit by the Covid-19 pandemic around the world [4–11]. In Mongolia, it reduced production in copper and gold mines owned by Rio Tinto. Additionally, some companies have also decreased their production in South Africa. Workers at Endeavor Mining's Houndé mine in Burkina Faso, Anglo Gold Ashanti's Oboesi gold mine in Ghana and Lundin Mining's Candelaria business in Chile had positive tests and the companies began the quarantine process [12]. The Éléonore mine in Canada and the mines in Rouyn-Noranda, Eldorado Gold, Agnico Eagle, Iamgold, Hecla Quebec and Canadian Malartik mines have suspended production for a certain period of time. Additionally, Anglo American announced that it has indefinitely stopped the Qullaveco copper project in Peru [13]. Coal mines around the world have been affected by the Covid-19 pandemic, as have other mining fields. It has been seen to spread much more, especially among the workers in the underground mines. It is indicated that there are the most affected coal mines by covid-19 in India and the Czech Republic.

Moreover, it is stated that there are workers who had Co vid-19 in coal mines in Poland, USA, Turkey [14].

As the Covid-19 pandemic began to spread in Turkey, work in most public businesses was either stopped or flexible working hours were started. Accordingly, the mining sector has been affected by this disease. In mining, where working conditions are very severe, occupational diseases are also very high. Shortness of breath, asthma, chronic bronchitis, pneumoconiosis, silicosis, anthracosis, chronic obstructive pulmonary disease (COPD) and lung cancer are the examples of these diseases [15]. Since most of these diseases are respiratory disorders, mining is the occupational group that will be most affected by Covid-19. For this reason, coal production was stopped at the Turkish hard coal enterprise institution (TTK), a public institution within the scope of covid-19 precautions, between March 31 and June 1, 2020, and 695 people (in the form of 3 shifts and in 15-day periods) only performed the tasks such as repair maintenance, water lines and gas control. After June 1st, 2021, they started to work normal working hours. In addition, 14 private mining companies working in Zonguldak, Turkey's largest Coal production basin, have stopped production. Some of the staff in these private enterprises began to be given paid vacation rights while some attempts were made to benefit from the short work allowance for the staff [16]. However, the other public institution, the Turkish Coal Enterprises Authority (TKI), and private companies producing on behalf of this institution continue to produce. Production continues in other gold, copper, marble, quarry, etc. mining sectors. This is compulsory to take precautions against the covid-19 pandemic when producing continues in mines. So far, it has been known that there are no mine workers officially dying from the Covid-19 pandemic. But it is known that there are workers who have contracted this epidemic and that they are going through the quarantine process.

It is known that workers in mines are affected in other past outbreaks around the world [17–22]. 11445 (22.4%) of the workers at the diamond mine in Kiberley, South Africa, and about 200000 (0.6% of the population) of the workers in the gold mines died in 1918 after the Spanish flu epidemic [20,23]. In their studies, Smallman-Raynor and Cliff, (2017) found that an outbreak of meningococxic meningitis was effective in coal, copper and gold mines in the Countries of England and Wales between 1931-38. In 2004, a deadly pneumonia outbreak occurred at a mining camp in the Democratic Republic of the Congo, affecting 130 people and killing 57 others. These deaths were revealed to be caused by pneumonic plague according to clinical symptoms [17,24,25]. 2014 Ebola outbreak in West Africa; the planned cessation of planned expansions of ongoing projects has caused a significant decline in mining activities such as the reduction of production of several mining companies or the complete cessation of operations of some companies [26].

Diseases seen among workers in mines in South Africa are silicosis, trauma, HIV/AIDS and tuberculosis (TB) [27]. In his Murray[28] study, Murray stated that silicosis and tuberculosis diseases increased among 16454 South African gold mine workers from 1975 to 1991, which was due to his work in the gold mine. They also stated that there is a strong relationship between HIV infection and tuberculosis. Parihar et al., [29] found some signs of Pneumoconosis in the studies of 43504 coal mine workers on chest X-rays. McCulloch [30], has determined asbesto-free disease in mines in Zimbabwe and Svaziland, South Africa. Lkhasuren et al. [31], states that 5154 of the 7600 occupational diseases detected in gold and coal mines in Mongolia between 1967 and 2004 were chronic bronchitis and Pneumoconosis (67.8%) caused by dust and these occupational

diseases continued to increase. Exposure to crystalline silica powder causes multiple occupational diseases such as tuberculosis, HIV and silicosis[32,33]. Silicosis also causes tuberculosis, the development of lung cancer or COPD. Pneumoconosis is the most common disease among mine workers in Turkey. Although the number of officially registered patients is below 200, the estimated number of patients is thought to be 20,000. Before 2013, it is not possible to determine whether workers in mines have occupational diseases such as pneumoconosis. The number of occupational diseases began to be determined after material sanctions and the decisions taken after 2013. However, it needs a little more time for the data of the correct occupational diseases to be formed in Turkey. There has been no study on the effects of outbreaks all over the world and Turkey in previous years and the precautions to be taken in case of an epidemic. In this study, it was tried to reveal what precautions should be taken against the covid-19 pandemic in the mining sector in Turkey.

2. Necessary precautions in mining

According to the data of 2019 in Turkey; There are 50 public and 6142 working places operating in the mining business line. In these working places; 12352 people work in the public sector and 110592 in the private sector. In this sector, work areas should have limited space, especially in the underground mining, and a large number of workers should work together. In any case of epidemics, the spread of the epidemic in these areas is faster and easier. In order to fulfill the healthy work in the mining sector, the following precautions must be taken.

2.1. Risk assessment

The existing emergency plans of the business should be re-addressed according to the new type of coronavirus outbreak. Moreover, the existing risk assessments should be revised by identifying the dangers and risks that may occur as a result of this virus outbreak. Risk assessment is required to meet the following objectives:

- Preventing the employee from entering the working area until the health situation becomes negatif,
- It must prevent the covid-19 from finding within the business and be sent to the hospital as soon as possible,
- Identify and isolate covid-19 employee as soon as possible,
- Cleaning all surfaces where contact may be transmitted, ensuring hygiene, preventing contamination of these surfaces,
- Protection of health-high risk workers,
- Prevention of infect within working area.

2.2. Determination of those responsible

In mining enterprises, a responsible personnel who can manage Covid-19 precautions must first be identified. It is stated in the law no. 6331, article 4: The employer shall have a duty to ensure the safety and health of workers in every aspect related to the work. In this respect, the employer shall take the measures necessary for the safety and health protection of workers, including prevention of occupational risks and provision of information and training, as well as provision of the necessary organization and means and shall ensure that these measures are adjusted taking account of changing circumstances and aim to improve existing situations. So, it's the employer, a subcontractor or representative of the employer who's really responsible. Nevertheless,

this person should be preferred among the workplace physician, occupational safety specialist or other health personnel [34]. Employees assigned to the precautions to be taken against the epidemic should be determined and the responsibilities of the person should be clearly stated by explaining what they will do in this context, what their duties are and who they will contact in case of the emergency. In order to ensure that these employees exchange sufficient information with each other and continue their work in a coordinated manner, the necessary communication and training should be provided and communication tools for the emergency should be supplied.

2.3. Working plan

Since mining provides the raw materials necessary for the industry, the mine, which is needed primarily, should first be tried to be provided by stocks. If the requested mine has stocks that can meet for a certain period of time, it would be more accurate to place other units on paid vacation except for the maintenance repair unit. If there is not enough stock and the demands will not be met, the business planning is carried out to ensure that mining activities compulsory can be carried out with the least number of employees possible. It can be ensured that the staff who can work at home do not come to work, or shifts can be created depending on the number of employees in each unit and employees can come to work at regular intervals. The most important point to note here is; people who work at regular intervals need to have their temperature measured and kept under control for a certain period of time every time they come to work. Because the person will have to connect with his family and the outdoor environment when he does not work. In this case, he may have contracted the virus and he has not noticed it.

2.4. Transportation

The carrying capacity of service vehicles should be determined by considering social distancing. The number of employees working, which is 50 percent of the passenger carrying capacity specified in the service vehicle license, should get into the vehicle and enough service vehicles should be supplied accordingly to carry the number of employees. Moreover, the way passengers sit in the vehicle should be planned to prevent passengers from contacting each other. For example, if you want to use worker services; the side seat where the worker sits should be empty and arranged diagonally so that it does not come back-to-back [34]. Employees should pay attention to social distancing and and they should be prevented from connecting with each other when using the service. Additionally, employees should be provided with PPE when using the service.

Figure1. Precautions taken in service vehicles.

These vehicles should have some hand antiseptics and disposable masks. In particular, masks should be provided and the employee should wear them. Disinfection of service

vehicles should be carried out at regular intervals (Figure 1). In case of using company vehicles, masks are provided if there is more than one passenger. More than half of the capacity of these vehicles should be prevented from boarding and the seat on the right side of the driver should be empty and no more than 2 people should be allowed to sit in the back without gaps between them. Care should be taken to disinfect these vehicles at appropriate intervals.

2.5. Update instructions

On the first working day after the outbreak, employees should be informed about the outbreak and hygiene rules; every time a certain number of employees should be informed by paying attention to the social distancing rules about the new type of coronavirus outbreak. Besides, the information cards to be prepared in these subjects should be distributed to the employees, office, sink, work areas, etc. this information should be hung as banners (Figure 2). Follow-ups should be made to act in accordance with the rules in this regard and those who do not comply should be identified and warned about it. Visitors should not be allowed to enter in the production area except for requirements.

Figure 2. Hanging posters and posters related to covid-19 at building entrances and work areas.

2.6. Health check

It should be ensured that all employees, sub-employers, goods and service providers control their body temperature with contactless thermometer while entering mining enterprises. Those whose temperature is above normal should be observed and the temperature measurement should be monitored at regular intervals to see if it shows other symptoms (Figure 6). Temperature measurements should be monitored by recording daily. Employees should be ensured to avoid physical contact with each other. Especially at the beginning of each shift, employees should be provided with social distancing in the organized hall where the work they will do is explained. Each employee should be prevented from leaving their own work area and disconnected from other workspaces unless they have to be.

Figure 3. Measuring the temperature of employees.

2.7. Training

Basic occupational health and safety trainings (including initial trainings) given to employees should be given in the form of distance education and trainings in training halls should be given collectively. Trainings where methods such as distance education cannot be applied should be carried out with at least one person considering social distancing and hygiene rules. Moreover, short trainings should be planned on epidemic and hygiene rules at regular intervals and these trainings should be given to employees. For example, information about epidemic and hygiene can be kept fresh at all times by playing short information animations and films which will be prepared in waiting areas, changing rooms, transportation vehicle expected areas or service vehicles.

2.8. Hygiene

Adequate and appropriate amounts of water, soap and alcohol-based hand antiseptics should be provided for employees. Employees should be easily accessible to them. If the employee requests it without limitation, the request must be met immediately. Employees should be ensured to wash their hands with water and soap for at least 20 seconds at regular intervals before starting work and during the working period. It should be warned not to touch the face, eyes and nose without washing hands.

Figure 4. Disinfectant in all buildings, dining halls and sink entrances.

Pedal garbage cans that can be used without touching the sinks must be supplied and used (Figure 4). Alcohol-based hand antiseptics can be placed in the working area in places such as underground where there is no sink, or special small alcohol-based hand antiseptics can be distributed to employees at regular intervals (Figure 5).

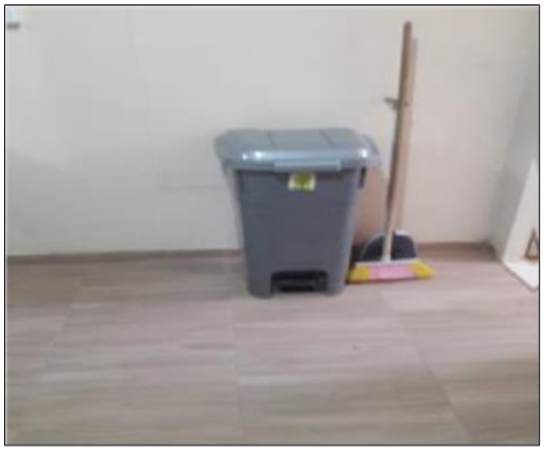

Figure 5. Placing buckets of pedals.

2.9. Precautions in transportation vehicles

It should be used in accordance with social distancing in the use of elevators, monorails, wagons, etc. and wheeled vehicles at the entrances and exits to the underground and overground production area. Employees who do not comply with social distancing should be warned and they should ensure supervision under the control of operators using these vehicles. While human transportation is carried out in elevators (cages) that provide access to the underground, employees should be transferred to the production area with as many employees as they can be transported in accordance with social distancing. It should be noted that workers are not face-to-face when transporting workers in cages [34]. Social distancing rules should be ruled in the pile-ups that will occur while waiting for elevator lines at well heads and well bottoms. Additionally, it should be ensured that the employees are transported by distancing the employees in human transportation by means of transportation vehicles such as monorails, belt conveyors, etc. Cross-seating should be allowed by preventing workers from sitting face to face [34]. Care should be taken to disinfect these tools at regular intervals even if it is not after each use.

2.10. Precautions in working areas

The number of hand and face washing stations in production areas should be increased. Signs indicating the locations of these stations should be placed in the necessary places and the employee should be informed about this. In each unit, employees should be prevented from contacting other units unless they have to, and the the worker should be prohibited from leaving work area unless they have to. In particular, production workers working in the underground and above ground should be provided special small alcohol-based hand antiseptics. If there are too many workers in the working areas, the work should be carried out with the least number of workers. Otherwise, the number of shifts should be increased and the number of employees in the work department should be carried out with the appropriate number of workers. Especially during entrance and exit hours in the underground, workers should be prevented from gathering at the bottom of the well or at the well head by paying attention to social distancing [34].

2.11. Interaction

It is necessary to prevent employees from leaving the areas where they are an officer and frequently switching places unless they have to. Especially during the shift period, including interim rests, employees should be ensured to have minimal interaction with each other and necessary precautions should be taken in this regard. People who are not in charge of the mining company should not be allowed to be taken into the working areas unless there are compulsory situations. Systems such as encrypted door entrances and fingerprint reading should be disabled to reduce the interaction of the outbreak in question [34]. It is necessary to ensure that workers who are required to return from domestic travel and/or work in the mining company are quarantined if possible and that those who do not show symptoms of the Covid-19 pandemic (fever, cough, shortness of breath and similar complaints) at the end of this quarantine period should be allowed to work[35].

2.12. Ventilation

Ventilation systems should be looked through in the underground mining enterprises and checked up by taking precautions to prevent the transmission of the epidemic. Working places and the other buildings (all other areas such as sinks and toilets, kitchen, dining hall, dormitory, laundry, showers, dressing dressing places and cabinets and mechanical workshops) should be considered for proper and adequate natural ventilation. However, if you don't want, it should be noted that when employees enter and exit the underground, fresh air enters the stove. Besides, the main and medical ventilation systems should be operated without interruption and the dirty air should be allowed to leave the stove in the shortest ways. Auxiliary ventilation aspirators must be placed in areas where there is fresh air. Necessary precautions should be taken as soon as possible by following the gas monitoring center above ground of the interruptions that may occur in the ventilation system [34].

2.13. The Use of personal protective equipment

Employees should be provided with personal protective equipment in accordance with the standards and what they do. Personal Protective Equipment (PPE) should be supplied by preventing the common use of personal protective equipment by employees. Making sure that the masks to use have N95/FFP2 capability is important. It should be prevented from re-using materials that have lost their hygienic properties or are disposable materials. In particular, the masks of those working in the underground or in dusty environments should be changed frequently and the masks should be given to enough employees during the shift. The gloves given to the employee should be appropriate and in sufficient numbers [34]. Employees should be informed about the usage, replacement and disposal of personal protective equipment. Necessary information should be given to dispose of the personal protective equipment used in the appropriate waste bins and to remove them out of the working places under appropriate conditions. Signs and boards indicating the locations of waste boxes should be hung, and used PPEs should be prevented from being thrown into the places other than these areas.

2.14. Disinfection

In particular, public areas such as dining halls, dormitories, changing rooms, sinks, bathrooms and toilets should be used by paying attention to the social distancing rule

Figure 6. Disinfection of dining halls (a), office buildings (b), all vehicles and work machines (c).

Employees who do not pay attention to this rule should be warned and provided that they are constantly checked by those responsible for these areas. These places should be cleaned and disinfected at regular intervals.

2.15. Common areas

Dining halls, dormitories, changing rooms and offices should be ventilated regularly and the materials to be used in these areas should be provided to meet the basic hygiene requirements. When using these areas, it should be implemented in accordance with social distancing (Figure 7-8). In dormitories, arrangements should be made depending on the space available and the number of beds. The staff by half of the number of beds should be allowed to stay there by paying attention to social distance. In addition, attention should be paid to the positioning of the bed or bunk beds side by side as a head and foot [35]. Meals and beverages should be distributed in the form of disposable food and it should be considered not to have food and beverages in the working places. Making sure that all dining hall employees and service personnel use masks and gloves while working, and ensuring that they are checked by medical staff of working place before each shift is very important in this period. Kitchens and teahouses, especially those in office units, need to be closed (Figure 9). Moreover, the following precautions should be taken in the dining halls: special glasses of water should be preferred instead of the water commonly used in the dining halls. Disposable forks and spoons are used. Bread is provided by the dining hall staff with appropriate stelization. Commonly used ingredients such as salt shakers, spices, ketchup, etc. should be deprespiced.

Figure 7. Precautions taken in the dining hall.

Figure 8. Precautions taken in the dining hall.

Figure 9. Use of kitchen and teahouse.

2.16. Change cabinets

Work uniforms such as overalls, T-shirts, pants, socks, etc. worn by employees should be placed in the boxes predetermined in advance at the end of the shift and washed at the optimum temperature every day. Additional cabinets should be supplied to employees if necessary by making arrangements to keep work uniforms and casual clothes separate.

2.17. Care

In cases where it is not possible to implement social distancing in studies such as the tasks performed by the maintenance team, additional attention should be paid to the use of masks and other personal protective equipment.

2.18. Coordination

The notifications made by the relevant institutions and organizations, especially the Ministry of Health, Ministry of Energy and Natural Resources and Ministry of Family,

Labor and Social Services, should be regularly monitored, the necessary information should be transferred to the employees as soon as possible and the currentness of the precautions taken should be continuously considered. When the employee has fever, cough, shortness of breath and similar complaints while at work, it should be detected by shift supervisors and brought to the isolation room and the employee should be worn a mask with N95/FFP2. Then, the Workplace Health Unit should be informed and 184 or 112 should be called and the provincial/district health directorate should be contacted [35].

2.19. Emergency actions

The employee with COVID-19 symptoms such as fever, cough, shortness of breath should be isolated from other workers and social isolation should provided by wearing a mask. ALO 184 should be dialled and acted on the guidance of health authorities. People with whom this employee is in contact or may be in contact should be quarantined by performing health checks. An isolation room or area should be created to be used in possible cases (Figure 10).

Figure 10. Isolation room.

3. Discussion and results

In 2020, 2427 people died as a result of occupational accidents in Turkey. Of the dead, 148 were female workers and 2,279 were male workers. 3% of the work accidents experienced during 2020 occurred in the mining sector. The causes of these accidents are; Covid-19 (31%), Traffic/Service Accident (16%), Crush/Dent (12%), Fall (10%), Heart Attack (8%), Violence (4%), Electric Shock (4%) and Other Causes (4%) [36]. In the mining sector in Turkey, there was no employee information dying from Covid-19. It is not generally determined from where and whom employees infected during the outbreak. Those working in the mines can infect from their colleagues in the workplace or from family, relatives or friends outside of the working place.

While mining companies in Mongolia and South Africa have reduced their production, there has been a nearly 3-month decline in only one public company in mines in Turkey. Canadian and Peruvian mining companies like the public company in Turkey have suspended their production for a certain period of time. There will be no loss of production in other public and private sector companies. Besides, mine workers have tested positive for the covid-19 pandemic as the ones in mines in Ghana and Chile;

however, the death of workers from this epidemic has not been found in official records. On the other hand, workers working in the underground coal mines in India, the Czech Republic, Poland, the United States and Turkey have also been infected with the covid-19 pandemic.

When previous studies about the epidemic are reviewed, it is seen that mine workers are affected by these outbreaks and there are deaths [17–22]. Spanish flu, meningoxic meningitis, pneumonia (caused by pneumonic plague), ebola outbreaks are the examples. It is indicated that only mines have been closed to prevent these outbreaks. No information or studies have been carried out that wide-ranging precautions have been taken. Moreover, there is no information about whether there are mine workers dying from these outbreaks in Turkey.

Apart from the epidemic in the mining sector, silicosis, HIV/AIDS and tuberculosis (TB), pneumoconosis, asbesto-free, dust-induced chronic bronchitis are indicated to be related to the working environment of worker in mines [27,28,32]. In those diseases, covid-19 is one of the chronic diseases in which the epidemic is influential. Therefore, workers in mines should be protected against the outbreak, some necessary precautions should be taken and whether they obey the precautions or not should be checked during the period. In Turkey, additional precautions have been taken in Zonguldak province, where there are mine workers with this disease. During the period when the Covid-19 pandemic increased, some restrictions were invoked in and out of Zonguldak province and working was suspended at certain mining companies for a certain period of time.

The common way of transmission of the Covid-19 pandemic is the transmission from one employee to another. It occurs when droplets from the mouth or nose reach the surroundings while the employee having this virus is speaking, sneezing and coughing. The closed and narrow areas of the mining sector provide the effective environment for the covid-19 pandemic to be infected. Additionally, limited fresh air underground contributes to the spread of this epidemic. Chronic lung disease employees are very likely to get it because of occupational disease and dust caused by the working environment. Outbreaks such as Covid-19 are more severe among patients with chronic lung disease and can cause the death of the patient [35]. Workers with this type of chronic condition (high blood pressure, diabetes, heart and chronic lung disease, cancer treatment, immunosuring drug users and employees over 65 years of age) should be sent on paid administrative vacation if it is possible, or such employees should be followed up with care. One of the biggest problems that distinguishes the Covid-19 pandemic from other outbreaks in Turkey is that COVID-19 has still not been detected among the workers in mines. However, patients with Covid-19 are likely to contract the disease and be involved in the quarantine process as a result of contacting with workers. The failure to detect this condition may cause the Covid-19 pandemic to infect employees in a whole or specific area, or it may cause symptoms among the employees. As a result, in this study the necessary measures must be taken and implemented for topics such as; such as: Necessary precautions in mining, Risk assessment, Determination of those responsible, Working plan, Transportation, Update instructions, Health check, Training, Hygiene, Precautions in transportation vehicles, Precautions in working areas, Interaction, Ventilation, The Use of personal protective equipment, Disinfection, Common areas, Change cabinets, Care, Coordination and Emergency actions.

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