

Work Accidents and Coal Mining in Turkey

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Abstract: In this study, an up-to-date evaluation of work accidents and occupational diseases in hard coal and lignite mining in Turkey has been made using the Social Security Institution (SSI) of Turkey statistics between 2013 and 2020. For this purpose, the number of insured employees who had work accidents and occupational diseases, the number of insured people who lost their lives as a result of work accidents, and the total temporary incapacity for work (standing + inpatient) were examined. Although the number of people who had work accidents, the number of deaths after work accidents, and the total duration of temporary incapacity in the lignite mining field of activity are higher than in the field of activity in hard coal mining, it is seen that the number of occupational diseases is lower.

Keywords: Coal mining, work accidents, occupational disease, occupational health, and safety.

Introduction

Coal has been used as an energy source for many years in the fossil fuel class because it is widely available in large reserves in the world.

Although renewable energy sources have made great progress in terms of technology and cost in recent years, fossil fuels still maintain their position in the first place. Although the share of oil in the world decreased from 46.2% to 34% between 1973 and 2017, the share of coal increased from 24.5% to 28% (TCME, 2020).

While the USA ranks first in the world in terms of coal reserves, the Russian Federation, China, Australia, India, Germany, Ukraine, Kazakhstan, and the Republic of South Africa are other countries with large coal reserves.

As of the end of 2019, coal reserves worldwide were 1.07 trillion tons, of which 749.17 billion tons of anthracite and bituminous coal, 320.47 billion tons of sub-bituminous and lignite. The distribution of world coal reserves is given in Figure 1 (BP, 2020).

Hard coal constitutes a large part of the world coal trade. The main purpose of hard coal are electricity generation and coke production. Due to low quality of lignite coal, its trade is not economical in today's conditions. While Indonesia, Australia, and Russia come first in world coal exports, Turkey, China, India, Japan, and South Korea are among the countries that import coal.

Coal Mining in Turkey

In Turkey, the policy of using domestic resources in energy in recent years has been included. Thus, by the end of 2020, the coal reserve has been updated as 20.84 billion tons, and 19.32 billion tons of lignite (TCB, 2021).

Hard coal in Turkey is located in the Zonguldak Basin and all of it is under the license of the Turkish Hard Coal Enterprises (THCE). Studies have been carried out to a depth of -1200 m in the basin, and approximately 48% of the total 1.52 billion tons of geological reserves identified are visible reserves. The share of coking coal in the total resource is around 57% (THCE, 2020).

Mining work continued during the epidemic in 2020, and the run-of-mine-coal production in Turkey decreased by only 3 million tons compared to 2019 and amounted to 87.5 million tons (85.9 million tons of lignite-asphaltite, 1.6 million tons of hard coal) (TCB, 2021).

Although the heating values of Turkish lignites vary between 1000 kcal/kg and 4200 kcal/kg, approximately 90% of them are below 3000 kcal/kg. As of the end of 2018, 73% of the lignite resources are in three public institutions and the remaining 27% are within the license limits of the private sector, but it is thought that this distribution has changed towards the private sector with the privatizations and license transfers made in recent years. Again, approximately 48% of lignite production in 2018 was carried out by the private sector in Turkey (TCME, 2020).

Turkey has approximately 2.1% of the world's coal reserves. Since 79% of lignite reserves are below 2500 kcal/kg calorific value, it is mostly used in thermal power plants (TCB, 2021). However, the share of domestic coal in electricity installed power and gross electricity generation is also decreasing rapidly in Turkey. The share in the installed power, which was 37.3% in 1986, decreased to 18.4% in 2004 and increased to 21% again with Çanakkale-Çan and Afşin-Elbistan B power plants commissioned in 2005 and 2006. Its share in power production was 13.5% and in 2014 it was 12.5%. In 2015, with two new thermal power plants commissioned in Adana and Bolu, the share of domestic coal-based power plants in

the total installed power increased to 12.9%, and as of the end of 2019, the share of domestic coal-based power plants is 12.4% in Turkey (Tamzok, 2020).

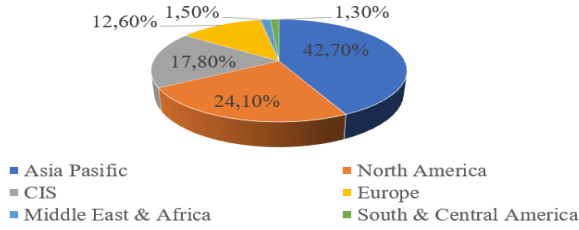


Fig. 1 Total proved reserves of coal in the world at the end of 2019

Evaluation of Accidents at Work in Coal Mining in Turkey

Coal mining around the world is an area of activity where work accidents that can cause mass deaths due to spontaneous combustion, mine fire, roof collapse, and slope shift can occur (Chunli et al., 2014; Wang et al. 2014; Fu et al., 2017; Wang and Meng 2018; Zhu et al., 2019).

Occupational Health and Safety Law entered into force on 20/06/2012 in order to reduce occupational accidents and ensure occupational health and safety in Turkey. With this law, there are obligations on many issues from education to health, from risk assessment to the supervision of the worker (Official Gazette, 2012). The largest occupational accidents that have occurred in mines in Turkey since 1983 are given in Table 1. It is seen that almost all of these accidents occur in coal mining (Yaşar et al. 2015; TCME, 2021, Çınar et al. 2021).

Table 1. Some mining accidents and their causes occurred in Turkey

Place of Accident	Date of Accident	Reason of Accident	Number of Fatality	Place of Accident	Date of Accident	Reason of Accident	Number of Fatality
Armutçuk	1983	Methane	103	Dursunbey	2010	Methane	17
Kozlu	1983	Methane	10	Karadon	2010	Methane	30
Yeni Çelteç	1983	Methane	5	Keşan	2010	Roof collapse	3
Kozlu	1987	Roof collapse	8	Elbistan	2011	Slope shift	11
Amasra	1990	Methane	5	Kozlu	2013	Methane	8
Yeni Çelteç	1990	Methane	68	Soma	2014	Mine fire	301
Kozlu	1992	Methane	263	Ermenek	2014	Flooding	18
Sorgun	1995	Methane	37	Yeşilova	2015	Poisoning	2
Aşkale	2003	Methane	8	Şirvan	2016	Landslide	16
Ermenek	2003	Methane	10	Kemer	2017	Methane	2
Küre	2004	Mine fire	19	Şırnak	2017	Landslide	7
Bayat	2004	Methane	3	Kilimli	2017	Roof collapse	2
Gediz	2005	Methane	18	Milas	2019	Block sliding	3
Dursunbey	2006	Methane	17	Ağlı	2019	Stone fall	2
Mustafa Kemalpaşa	2009	Methane	19	Soma	2020	Roof collapse	3

According to SSI data, 30154 occupational accidents occurred in coal mining enterprises in five years, and they constitute approximately 8% of total occupational

accidents in all sectors (SSB, 2011).

The number of insured employees who had a work accident in the fields of hard coal and lignite mining activities in Turkey between 2013 and 2020 is given in Figure 2, and the number of insured employees who had an occupational disease is given in Figure 3 (SSI, 2022).

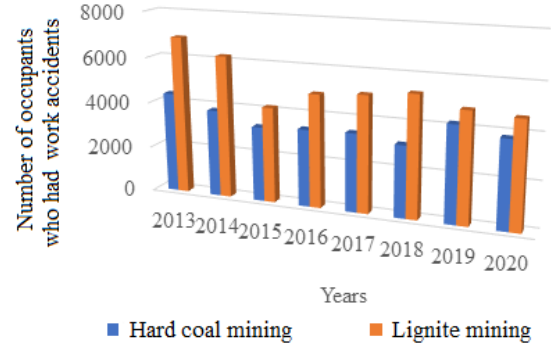


Fig. 2 Number of insured employees who had work accidents in the fields of hard coal and lignite mining

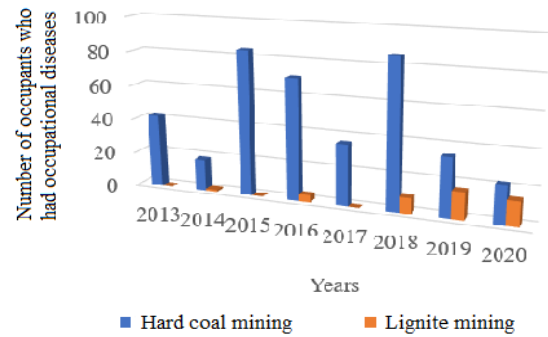


Fig. 3 Number of insured employees who had occupational diseases in the fields of hard coal and lignite mining.

When it is looked at the data of the last 8 years, an average of 3670 employees per year have had occupational accidents in hard coal, while this number is 5246 employees in lignite mining. However, this situation differed in the number of people who had an occupational disease, while an average of 49 workers in the hard coal industry were diagnosed with the occupational disease, while in the lignite mining the annual average was 5.5 employees. The reason why occupational disease is seen at a very low level compared to occupational accidents in lignite mining, the deficiencies in the diagnosis and notification of occupational diseases make us think that the real picture cannot be accurately reflected. However, according to the literature, although the number of occupational diseases is between 4-12 per thousand of employment, it is seen that this number is well below the number in the records (GDLST, 2013).

The number of insured persons who lost their lives as a result of work accidents in the fields of hard coal mining and lignite mining activities in Turkey between 2013 and 2020 is given in Figure 4, and the total

temporary incapacity periods (standing + inpatient) are given in Figure 5 (SSI, 2022).

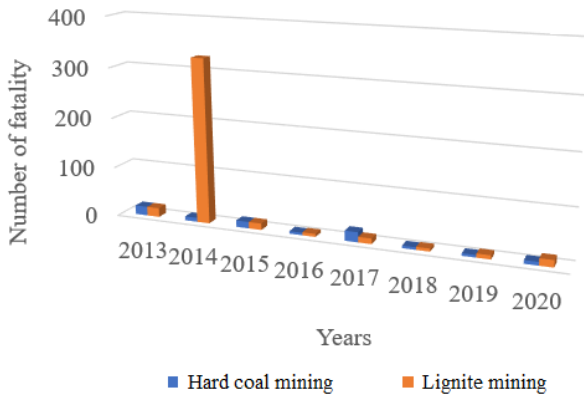


Fig. 4 Number of insured employees who lost their lives in the fields of hard coal and lignite mining

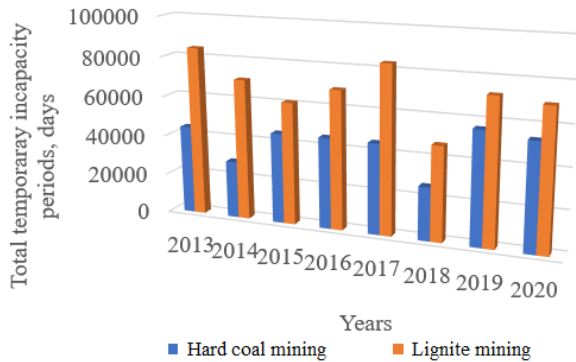


Fig. 5 The total temporary incapacity periods in the fields of hard coal and lignite mining

With the exception of the Soma disaster in 2014, in which 301 employees lost their lives, the average annual number of insured persons who died as a result of work accidents in hard coal and lignite mining were determined as 10.13 and 10.85, respectively.

When the total duration of temporary incapacity for work (standing + inpatient) is considered, the annual average is 43180.38 in hard coal mining, while this value is 69766.75 days in lignite mining.

Results and Discussion

Leaving coal mining activities, which is within the scope of heavy and very dangerous work for the private sector and subcontractors, pressures to increase production, and the failure to provide the necessary conditions for occupational health and safety are seen as the main cause of major accidents in the sector. Employing fewer, inexperienced, untrained, and temporary workers, in order to reduce the cost causes non-usage of personal protective equipment and moving away from the occupational safety culture.

It is seen that the number of insured employees in the

fields of hard coal mining and lignite mining activities is close to each other, and the number of insured employees who have occupational diseases is very low in lignite mining. Considering the fact that hard coal is under the responsibility of the Turkish Hard Coal Enterprises (THCE) of which the complete records are kept, and the fact that the mines operated under the responsibility of the Turkish Coal Board (TCB) in lignite mining are very low compared to the private sector activities. It reveals the idea that there may be problems in reporting the records to the SSI. This indicates that occupational safety and the records kept accordingly will be healthier in institutionalized enterprises.

The occupational safety approach against the risk of work accidents and occupational diseases should take a proactive approach rather than a reactive one. The detection of occupational diseases, which is encountered as a problem throughout the world, can only be solved by expanding occupational diseases hospitals, making them suitable for their functions, and working in coordination with all workplaces in order to detect occupational diseases.

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