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*RESEARCH ARTICLE*

# THE IMPORTANCE OF STATISTICS ON OCCUPATIONAL ACCIDENTS AND OCCUPATIONAL DISEASES IN THE WORLD AND IN TÜRKİYE BETWEEN 2000-2020

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## ABSTRACT

Increasing industrialization with the developing technology has brought the risk factors that negatively affect the employees in the working environment. Occupational accidents and occupational diseases occur due to these risk factors. With the effective implementation of occupational health and safety rules, occupational accidents and occupational diseases can be prevented. It is very important to regularly record all data related to work accidents and occupational diseases and to take necessary measures by analyzing these data. In particular, the data on the number of work accidents, death rates after work accidents, occupational diseases, and death rates due to occupational diseases are an indicator of the economic and social development of countries. In this study, evaluations were made about preventive and remedial activities by comparing statistical data on work accidents and occupational diseases in our country and in the world.

**Keywords:** *Occupational Disease, Occupational Accident, Year 2000 and After, World, Türkiye*.

## 1. INTRODUCTION

Occupational accidents caused by unconscious or unexpected mistakes in business life and occupational diseases arising from the nature of work, which are increasing by industrialization, continue to be an important problem for employees, employers and governments. According to the data of the International Labor Organization (ILO), every year over 2.3 million women and men die at work from an occupational injury or disease. Over 350,000 deaths are due to fatal accidents and almost 2 million deaths are due to fatal work-related diseases. The ILO also estimates that 160 million cases of non-fatal work-related diseases occur annually. These estimates imply that every day approximately 6,400 people die from occupational accidents or diseases and that 860,000 people are injured on the job[1]. The main reason for this is the inadequacy of the inspections for occupational health and safety, and the economic invoice to be created by the cost to be spent for these audits is damaging the economy of employers and states due to occupational accidents and occupational diseases [2],[3] In our country, which is placed near the top of the world ranking in the field of

occupational accidents and occupational diseases, according to the data of the Social Security Institution in 2020; there are more than 17 million 4a status employees in Türkiye in 2020 and 384,262 work accidents and 1,231 deaths occurred due to work accidents in the same year. 908 occupational diseases were diagnosed and 5 of them resulted in death [4].

The whole purpose of occupational health and safety practices is to prevent the occurrence of work accidents and occupational diseases. Prevention of occupational accidents and occupational diseases ensures significant gains from the point of employees, employers and government. The loss of people with occupational accidents and occupational diseases, which is the core element of the production, should not be considered only a loss of life and injury. Besides, it creates plenty of unfavorable pictures for employers, employees, and governments such as a decrease in productivity of enterprises, an increase in costs, indemnity payments, treatment, care and recovery expenditures. Occupational health and safety services are becoming an increasingly important issue. The researches on the subject revealed the fact that all occupational accidents could be prevented unless it is a result of unexpected incidents such as natural disasters. Besides, due to the solution to the essential problem is human-oriented, it necessitates the implementation of all preventative practices and carefully monitoring and examination. Preventive approaches related to occupational health and safety have been intensively discussed in public, especially after work accidents in the mining and construction sectors that have occurred in our country in recent years. Under the guidance of the Ministry of Labor, more examinations and research are being made by universities, non-governmental organizations, professional associations, employers and unions to take all precautions about the subject and reports are being published. It is of great importance to act with the logic that taking all kinds of precautions related to occupational accidents and occupational diseases is cheaper than paying the costs of death, disablement and illness which are resultant of the state of not taking precautions. Work accidents have great importance in terms of the sustainability of enterprises due to both costs and environmental impacts and cause serious social and economic problems as a consequence of injuries and loss of lives.

Determining the existing hazards in the workplace and controlling the risks that may occur is effective in reducing work accidents and occupational diseases [5]. In this study, statistical data on occupational accidents and occupational diseases that occurred in the world and in our country were compared. Our positive and negative aspects have been tried to be determined in the view of these obtained data. Evaluations on the subject have been made.

## 2. GENERAL CONCENPTS RELATED to OCCUPATIONAL HEALTH and SAFETY

### 2.1. Occupational Health and Safety

According to the principles of the World Health Organization (WHO) and the International Labor Organization (ILO), occupational health and safety is defined as bringing physical, mental and common health, safety and prosperity of all workers to the highest level and preserving this level regardless of their contract types, extinguishing the unhealthy results that may arise from work environment, environmental impacts and production, removing the risk factors that affect mental and physical integrity of workers, creating work environments that protect mental and physical health of employees. There are many estimative or incalculable hazards and risks in every work. This situation

threatens employees, employers, machinery-equipment on the factory floor and environment. Occupational health and safety is essential to remove or reduce these hazards and risks to the lowest level. According to the International Labor Organization and World Health Organization Expert Committee, occupational health is "An area of work in public health to promote and maintain the highest degree of physical, mental and social well-being of workers in all occupations". Five basic principles have been defined for the success of occupational health systems. These; protection and prevention, adaptation, promotion and development, treatment and recovery and primary care health services. As understood from these definitions, occupational health and safety is a multidisciplinary science that requires occupational health and safety specialists, workplace doctors and allied health personnel to collaborate with business officials and act as a team in our country's conditions [6].

### 2.2. Occupational Accident

There are many definitions of occupational accidents according to each institution. According to WHO, an occupational accident is defined as an "Unplanned event that often leads to personal injuries, damage to machines, tools and equipment, and causes production to stop" [7]. ILO defines it as "Job accident is an unexpected event that leads to a certain harm or injury".

In our country, according to the Social Security and General Health Insurance Law No 5510, the occupational accident is defined as; "It is an event that occurs while the insured is at the workplace, due to the work carried out by the employer, if the insured works independently on his/her own behalf and account due to the work performing, when the insured working for an employer is sent to another place outside the workplace as an employee without performing his/her main job, in the times allocated for breastfeeding insured woman to give milk to her child in accordance with the labor legislation, during the insured's travel to and from the place of work with a vehicle provided by the employer and causes an insured person to become physically or mentally handicapped immediately or afterward [8].

According to the Occupational Health and Safety Law No 6331, "Occupational accident is an event that occurs in the workplace or due to the conduct of the business, causing death or resulting bodily integrity to become mentally or physically disabled". Law No 5510 stipulates that three elements must be together for an incident to be considered as a work accident: "being insured, having encountered an incident, and becoming physically or mentally disabled due to the incident".

Among the dangerous situations that may cause occupational accidents, situations can be listed such as inappropriate protective equipment, using defective tools and equipment, unsafe tools and machines, insufficient or excessive lighting, insufficient ventilation, and unsafe methods and conditions. Examples of dangerous behaviors are unsafe and unnecessary fast work, unsafe loading, transportation, stacking, working in dangerous places, unsafe attitude, not using personal protective equipment, confusion, jokes, and anger.

The main cause of all occupational accidents that result in serious injury or death is dangerous situations and behaviors and near miss incidents that no precautions are taken. Although 300 dangerous situations and behaviors do not cause any harm; If no measures are taken, it will cause 29 loss of limbs and injuries, and if the same negative situation and behavior continues and no

precautions are taken and ignored, it will lead to 1 fatal work accident or serious injury. When every work accident that causes serious injury or death is examined, according to the Work Accident Pyramid. On the basis of 1 serious injury or fatal accident, there are 29 minor injury incidents, and 300 simple non-injury incidents (1-29-300 ratio principle - Heinrich Principle). The causes of all 'near-miss' incidents should be investigated in detail, and all causes of incidents should be corrected and eliminated. A very important feature of this rule is that it allows us to make a projection about the accidents that may occur in the enterprise and gives us an opportunity to think beforehand. Recording and keeping statistics of occupational accidents gives the opportunity to estimate the frequency of accidents in enterprises compared to previous years and to take precautions [9].

### 2.3. Occupational Disease

Occupational diseases are called the "silent epidemic" of modern times. It is estimated that 7500 people die every day in the world as a result of work accidents or occupational diseases. 6500 of these deaths are due to work related and occupational diseases, and 1000 of them are due to injuries as a result of work accidents. Occupational health and safety related issues come to the fore in the society and the press mostly due to occupational accidents and industrial disasters. However, deaths as a result of occupational diseases and work related diseases are much higher than deaths from work accidents. 2.3 million deaths per year from occupational diseases are much more than deaths from tuberculosis, AIDS and traffic accidents. Cases are more common in low and middle income countries, where manufacturing is most intensive and occupational health and safety rules and practices are often poorly enforced [10][11] Occupational diseases are the common name of diseases that occur primarily due to factors caused by the workplace environment [12]. In international sources such as the World Health Organization and the International Labor Organization, occupational diseases are defined as a group of diseases in which a cause-effect and action-reaction relationship specific to the work being studied can be revealed between a harmful factor and the human body affected by it [13].

According to the Social Security and General Health Insurance Law No 5510, occupational disease is defined as “temporary or permanent illness, physical or mental disability, which the insured person suffers due to a recurring reason due to the nature of the work he/she performs or due to the conditions of the business”. Symptoms of occupational diseases may appear one week or years after the employee's first contact with the factor [14].

### 2.4. Diagnosis, detection and classification of occupational disease

Occupational diseases are in the group of completely preventable diseases. Occupational diseases are not caused by a single cause, but also by many causes. Nutrition, personal sensitivity, genetic changes, drug use, alcohol and cigarette use and obesity can be counted as causes. With the onset of occupational diseases, personal, familial, social and societal effects occur in employees. Since the effects may occur years later, the diagnosis of occupational diseases depends on the awareness of the employee, specifying the field of work in the hospital, receiving training on this subject, organizations and legal regulations in this regard. Because occupational diseases can only be found if they are sought with a high level of awareness, skepticism and questioning. Another difference in occupational diseases is the existence of their own diagnostic and screening methods. With regular periodic environmental measurements, employment and periodic health examinations, as per the legislation,

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occupational diseases can be detected in employees without any symptoms and all necessary precautions can be taken. It is very important to inform employers and employees about occupational diseases specific to the field of work, to raise awareness and to increase their sensitivity. If one of the employees is diagnosed with an occupational disease, all colleagues working in the same environment and in a similar way should be evaluated in terms of early diagnosis and treatment. In case of diagnosis of occupational disease, it can be tried to be covered up with a false belief as it brings financial and moral compensation to the employee, additional payments according to incapacity for work, new investments to evaluate and improve the working environment, and criminal responsibilities.

In our country, there are certain legal processes for the diagnosis of occupational disease. There should be a compulsory causal link between the occupational disease and the work itself or the working environment, the person should be covered by SSI, the disease should be included in the list of occupational diseases, the person should be exposed to more than the relevant disease exposure value, the disease should occurred within the period of obligation, the occupational disease must be determined by a doctor report in authorized hospitals, it must be approved by the SSI Health Board and must be from diseases that can be produced experimentally under the same conditions. Exceptionally; The Social Security Institution Supreme Health Council can examine a disease not included in the list and individual differences and accept it as an occupational disease, and can change exposure values according to the personal situation [12].

Health service providers authorized for occupational diseases are Ministry of Health Occupational Diseases Hospitals, Training and Research Hospitals and State University Hospitals. According to the Social Security and General Health Insurance Law, it is determined by the Institution Health Board by examining the following documents that the insured person has an occupational disease due to his work; The health board report duly prepared by the health service providers authorized by the institution, the basis of this report and other medical documents and, if deemed necessary by the institution, the audit reports and other necessary documents revealing the working conditions in the workplace and the medical results related to it [15].

Occupational Diseases in Türkiye are grouped under 5 main groups according to the Regulation on Determination of Working Power and Loss of the Earning Capacity in Occupation. This classification is given in Table 1.

**Table 1.** Classification of Occupational Diseases [16].

| | | |
|---|---|---|
| **Group A** | **Occupational Diseases Caused by Chemical Substances** | **Carbon monoxide, Cadmium, Chromium, Mercury, Lead, Benzene, Arsenic, Organic Phosphorus, Ammonia etc.** |
| **Group B** | Occupational Skin Diseases | Skin Cancers and other Skin Diseases etc. |
| **Group C** | Pneumoconiosis and Other Occupational Respiratory System Diseases | Coal Miner's Lung, Bronchial Asthma, Silicosis, Asbestosis, Byssinosis etc. |

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| | | |
|---|---|---|
| **Group D** | Occupational Contagious Diseases | Bacteria, Viruses, Parasites |
| **Group E** | Occupational Diseases Caused by Physical Factors | Noise, Vibration, Pressure, Radiation, Thermal Factors etc. |

### 2.4.1. Medical and legal diagnosis process of occupational diseases

When establishing a work-related disease or occupational disease connection, it is very important to make a clinical evaluation, question the work history in detail, perform the physical examination wholly and completely, make all laboratory evaluations related to the patient's clinic and make workplace environment measurements when necessary.

Occupational disease is not only related to health processes, at the same time, it is a situation in which legal processes are also involved. With this diagnosis, it is proved that all risks of work cannot be fully and completely managed by the employer in the workplace, and therefore the worker is affected, his/her health condition worsens, illness begins or suffers a loss of function. For this reason, during the diagnosis process, there should be people who have been specially trained on this subject, who can act as experts when necessary, and these competent and health institutions.

According to the Social Security and General Health Insurance Law No 5510 published in the Official Gazette No 26200 on 16 June 2006; "It is obligatory to be determined by the Institution Health Board by examining the following documents that the insured person has an occupational disease due to his work; The health board report duly prepared by the health service providers authorized by the institution, the basis of this report and other medical documents and, if deemed necessary by the institution, the audit reports and other necessary documents revealing the working conditions in the workplace and the medical results related to it" [17].

If the occupational disease emerged after leaving the job and it was documented by the health board that it arose due to the job he/she worked as an insured, in order for the insured to benefit from the rights obtained by law, the period of time between leaving his job where he has an occupational disease and the emergence of the disease should not be longer than the period specified by the institution for the disease. Employees who suspect an occupational disease providing this situation can apply to the Social Security Institution with all necessary documents. In cases where occupational disease is determined by clinical and laboratory results and the factor causing occupational disease is determined by workplace examination, even if the liability periods specified in the list of occupational diseases have been exceeded, the detected occupational disease can be considered an occupational disease with the approval of the Social Security Institution or the SSI Higher Health Board upon the application of the employee or his representatives [17].

## 2.5. Work-Related Illnesses

Work-related diseases are diseases in which other risk factors play a role, along with many causative factors present in the workplace. The cause of the disease is complex and multifactorial. The cause of the disease is not only in the workplace, there may also be different sources together with the workplace. Although it is not directly caused by the workplace, the disease is affected by the causes in the workplace and its course changes. Due to the work done, the disease may start or become

aggravated, accelerated, or exacerbated. Therefore, work-related diseases are more common than occupational diseases. It can be seen widely in the general society as well as the workers [18].

Today, in our country and in the world, there is a health system for diagnosing not all work-related diseases in general, but occupational diseases that develop a clinical picture and cause disease, and the cause of exposure is completely work-specific. However, work-related diseases are defined as physical or mental illnesses and health problems that are partially or completely caused by working conditions or worsening the clinical picture [19]. This definition is more comprehensive and more accurate since it emphasizes not only the workplace but also all life conditions of the employee. For this reason, occupational diseases are only a subgroup of work-related diseases. Perhaps the most problematic aspect of the definition of occupational disease is that the employees only evaluate the disease they are exposed to due to the environment individually, and therefore it does not take into account that the work completely affects the health of the employees. In occupational disease, the main cause of illness is work-specific rather than personal. Occupational diseases; have a special or strong relationship with the profession, they are usually caused by only one factor and are determined by this feature. Work-related diseases; factors in the work environment are effective as well as other risk factors and may play a role in the development of such diseases with a complex etiology (musculoskeletal system diseases, stress). Diseases affecting workers; although there is no causal relationship between illness and work, these are diseases that may be aggravated due to occupational hazards (diabetes, hypertension)[20].

### 2.6. Frequency of Accidents and Death Rates Caused by Work Accidents

The concept of “accident frequency” is defined as the occupational accident per 100,000 employees and the “death rate” resulting from these accidents, and was developed by the Statistical Office of the European Communities (Eurostat) for the preparation of statistical data of occupational accidents, for comparison between countries, and for comparison of positive and negative changes over time [21].

### 2.7. Comparison Criteria of Occupational Accidents and Occupational Diseases

Since both the population and the number of employees of each country are different, it would be meaningless to compare the countries only according to the recorded work accidents, occupational diseases and deaths resulting from these. At the same time, since the number of employees changes over the years, it would be misleading to analyze the changes in work accidents, occupational diseases and related deaths in a country by only looking at the numbers in these data. What is important in statistics is the ratio of the number of employees who had an accident in the working group, rather than how many people have had an occupational accident. For this reason, various benchmarks are used between countries and years in comparisons related to work accidents and occupational diseases [21].

## 3. OVERVIEW of OCCUPATIONAL ACCIDENTS and OCCUPATIONAL DISEASES in TÜRKİYE

Depending on the development level of a country's occupational health and safety, the number of new occupational diseases to be detected in employment should be between 4-12 per thousand [14]. When calculating over 20 million compulsory insured in 2019 and 2020, if the value of 4 per thousand is

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taken, the expected number of occupational diseases should be 80,000 and if this value is taken as 12 per thousand, the expected number of occupational diseases should be around 240,000. In terms of the number of deaths, deaths due to work-related diseases should be expected to be 5-6 times more than deaths due to work-related accidents.

Numerical data on work accidents and occupational diseases, related deaths and death rates in Türkiye in 2000 and later are given in Table 2. All of these numerical data are statistical information announced annually only by the Social Security Institution. In Table 2, the number of work accidents, occupational diseases, deaths related to these and the death rates calculated according to 100,000 people in deaths after work accidents in Türkiye in 2000 and later are given. When the table is examined, after 2000, a serious decrease is detected in the general accident frequency value throughout Türkiye, although it varies over the years. This means that although there has been an increase in the number of reported accidents at workplaces in our country, there has been a significant decrease in death rates as a result of work accidents. In light of these data, it can be said that as a result of the measures taken and legal regulations, all our employees work in more reliable environments in terms of life safety compared to the beginning of the 2000s [22].

However, it should be noted that, unfortunately, most of the occupational accidents that occur in our country are not officially recorded. While more than 800,000 work accident reports are made annually in Germany, which has a population similar to our country, unfortunately, as seen in Table 2, this number was 70,000 in Türkiye in the 2000s. Although the Occupational Health and Safety Law No 6331 came into force in 2013, it only increased to 400,000 [23].

More importantly, this situation can be seen more clearly when the comparative data in Table 3 of the non-governmental organization named Health and Safety Labor Watch-Türkiye (HESA), which has been announcing deaths due to occupational accidents and occupational diseases in our country since 2012, together with the SSI, annually. According to this table, although it was stated that a total of 11,295 deaths occurred as a result of work accidents according to SSI data in the last eight years, this number was determined as 14,913 according to the HESA Labor Watch. Even more sadly, in the last eight years, only 5 deaths due to occupational diseases were reported in 2020 in our country, and no deaths due to occupational diseases were reported in the other seven years. However, according to the HESA Labor Watch, this number in the last eight years has been determined as 387 in total. One of the important issues in this difference is the length of the legal processes related to work accidents and occupational diseases [24].

**Table 2.** Number of Occupational Accidents and Occupational Diseases in Türkiye After 2000 [15].

| | **Number of Work Accidents** | **Death Due to Work Accidents** | **Occupational Accident Death Rate (Death Rate per 100,000 Persons)** | **Number of Occupational Diseases** | **Death Due to Occupational Diseases** |
|---|---|---|---|---|---|
| **2000** | 74,847 | 1043 | 24.6 | 803 | 6 |
| **2001** | 72,367 | 1008 | 20.6 | 883 | 6 |
| **2002** | 72,344 | 872 | 16.8 | 601 | 6 |

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| | | | | | |
|---|---|---|---|---|---|
| **2003** | 76,668 | 810 | 14.4 | 440 | 1 |
| **2004** | 83,830 | 841 | 13.6 | 384 | 2 |
| **2005** | 73,923 | 1072 | 15.8 | 519 | 24 |
| **2006** | 79,027 | 1592 | 20.5 | 574 | 9 |
| **2007** | 80,602 | 1043 | 12.3 | 1208 | 1 |
| **2008** | 72,963 | 865 | 9 | 539 | 1 |
| **2009** | 64,316 | 1171 | 11.9 | 429 | 0 |
| **2010** | 62,903 | 1444 | 13.3 | 533 | 10 |
| **2011** | 69,227 | 1563 | 14.4 | 688 | 10 |
| **2012** | 74,871 | 744 | 5.8 | 395 | 1 |
| **2013** | 191,389 | 1360 | 8.3 | 371 | 0 |
| **2014** | 221,366 | 1626 | 9.4 | 494 | 0 |
| **2015** | 241,547 | 1252 | 6.9 | 510 | 0 |
| **2016** | 286,068 | 1405 | 7.5 | 597 | 0 |
| **2017** | 359,653 | 1633 | 8.2 | 691 | 0 |
| **2018** | 430,985 | 1541 | 7.9 | 1044 | 0 |
| **2019** | 422,463 | 1147 | 5.9 | 1088 | 0 |
| **2020** | 384,262 | 1231 | 6 | 908 | 5 |

Although we have insufficient data on occupational diseases, some inferences can be made from more reliable data (according to the number of employment and occupational accidents) in the world and in our country. For example; According to ILO data, the total number of workers in the world in 2008 was 3.09 billion, and the number of people who died as a result of occupational diseases was 2,022,570. The death rate due to occupational diseases in the world is 65.5 per 100,000. If we evaluate these data for our country, according to the death rate, at least 15,363 out of 23,470,000 employees in our country must have died due to occupational diseases in 2008. This constitutes 4.4 percent of all deaths over the age of 15, according to the Turkish Statistical Institute death statistics for 2008. For better understanding, this rate is equal to all non-illness deaths (murder, accident, poisoning) in the same year [24].

The situation in our country is even more dire in the detection of deaths as a result of occupational diseases (Table 3). In the last nine years, the number of deaths due to occupational diseases was determined as 6 according to the SSI data, while this number was determined as 387 according to the data of the HESA Labor Watch. The fact that the number of occupational diseases has been shown to be zero in recent years, even healthcare workers who died during the Covid-19 pandemic were not included in the list in 2020, bringing the obligation to prove the disease-death causal link of the employees who died in the pandemic by the relatives of the deceased, even the difference in the HESA Labor Watch - SSI data shows that we are in a dire situation that cannot be compared with other countries [15] [25].
Comparing only the data of SSI and HESA Labor Watch shows that work accidents and occupational diseases in our country cannot be recorded sufficiently and carefully. In order to reduce work accidents, occupational diseases and their negative consequences that occur in our country, first of all, it is necessary to record the numerical data related to them in a healthy way.

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**Table 3.** Occupational Accident and Occupational Disease Deaths Table of SSI and HESA Labor Watch [15] [25].

| | Deaths Due to Occupational Accidents | | Deaths Due to Occupational Diseases | |
|---|---|---|---|---|
| **Years** | **SSI DATA** | **HESA LABOUR WATCH DATA** | **SSI DATA** | **HESA LABOUR WATCH DATA** |
| **2012** | 744 | 878 | 1 | 0 |
| **2013** | 1360 | 1235 | 0 | 3 |
| **2014** | 1626 | 1886 | 0 | 29 |
| **2015** | 1252 | 1730 | 0 | 13 |
| **2016** | 1405 | 1970 | 0 | 15 |
| **2017** | 1633 | 2006 | 0 | 4 |
| **2018** | 1541 | 1923 | 0 | 10 |
| **2019** | 1147 | 1736 | 0 | 8 |
| **2020** | 1231 | 2427 | 5 | 305* |
| **Total** | 11295 | 14913 | 6 | 387 |

*Deaths of Healthcare Workers in the Covid-19 Pandemic in 2020

## 4. COMPARISON of TÜRKİYE and VARIOUS COUNTRIES in TERMS of OCCUPATIONAL ACCIDENTS and OCCUPATIONAL DISEASES

### 4.1. Comparison of Occupational Accident and Occupational Accident Death Rates

Death rates resulting from work accidents compiled from the data of the International Labor Organization, Eurostat, Ourworldindata.org and Social Security Institution for various countries are presented as numerical data in Table 4 and Table 5, and graphically in Figure-1 and Figure 2. The low number of deaths and death rates as a result of work accidents is important for the morale and motivation of occupational health and safety professionals in countries, as it shows the severity of the accidents and is a reference and control indicator of the effectiveness of protective measures.

According to ILO statistics, approximately 110 million occupational accidents occur in the world every year, and 1.2 million people die as a result of work accidents or occupational diseases. Occupational accidents and occupational diseases continue to be one of the most important economic and social problems, especially in developing countries such as ours, as a result of countries' deficient implementation of occupational health and safety in enterprises and failure to fully fulfill their supervisory duties within the state mechanism. Occupational accidents and diseases increase as a result of ignoring the measures for occupational health and safety due to reasons such as the increase in competition at the global level, the inability to take preventive actions in parallel with the speed of technological changes, and the uncontrolled reduction of expense costs. The desire to use cheap labor due to costs, lack of knowledge of employers, and deficiencies in occupational health and safety training for employees are also some of the important reasons for the increase in occupational accidents and diseases. In Table 4, the data on average death rates per 100,000 as a result of work accidents in our country and in some countries in the world between the years 2000-2020 are given. In our country, the number of people who died as a result of work accidents per 100,000 employees is

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seen, which is important in terms of understanding the seriousness of the situation related to deaths as a result of work accidents [15] [25].

**Table 4.** Occupational Accident Death Rates in Türkiye and Some Countries in the World (Death Rates per 100,000 Workers) [25].

| | **Türkiye** | **Argentina** | **South Korea** | **Canada** | **Spain** | **Russia** |
|---|---|---|---|---|---|---|
| **2000** | 24.6 | 18.6 | 14.3 | 3.4 | 9.2 | 14.9 |
| **2001** | 20.6 | - | 12.3 | 3.3 | 8 | 15 |
| **2002** | 16.8 | 15.2 | 12 | 3.2 | 6.1 | 13.8 |
| **2003** | 14.4 | 15.2 | 13.3 | 2.9 | 5.3 | 13.1 |
| **2004** | 13.6 | 15 | 13.5 | 2.9 | 4.9 | 12.9 |
| **2005** | 15.8 | 14.3 | 11.7 | 3 | 4.5 | 12.4 |
| **2006** | 20.5 | 14.9 | 10.6 | 2.7 | 4.4 | 11.9 |
| **2007** | 12.3 | 14.1 | 9.1 | 2.3 | 3.6 | 12.4 |
| **2008** | 9 | - | 8.7 | 2.7 | 3.3 | 10.9 |
| **2009** | 11.9 | 10.6 | 8.2 | 2.1 | 2.6 | 9 |
| **2010** | 13.3 | 10.9 | 7.9 | 2.2 | 2.3 | 9 |
| **2011** | 14.4 | 7.7 | 7.9 | 2.1 | 2.5 | 9 |
| **2012** | 5.8 | 6.8 | 7.3 | 2 | 2.2 | 9 |
| **2013** | 8.3 | - | 7.1 | 2 | 1.9 | 8 |
| **2014** | 9.4 | 4.7 | 5.8 | 1.7 | 2 | 8 |
| **2015** | 6.9 | 4.9 | 5.3 | 1.7 | 2.3 | 7 |
| **2016** | 7.5 | 4.2 | 5.3 | 1.8 | 1.9 | 6 |
| **2017** | 8.2 | 4.4 | 5.2 | 1.8 | 2 | 6 |
| **2018** | 7.9 | 3.7 | 5.1 | 1.9 | 2 | 5 |
| **2019** | 5.9 | - | 4.6 | 4.9 | 1.8 | 5 |
| **2020** | 6 | - | 4.7 | - | - | 5 |

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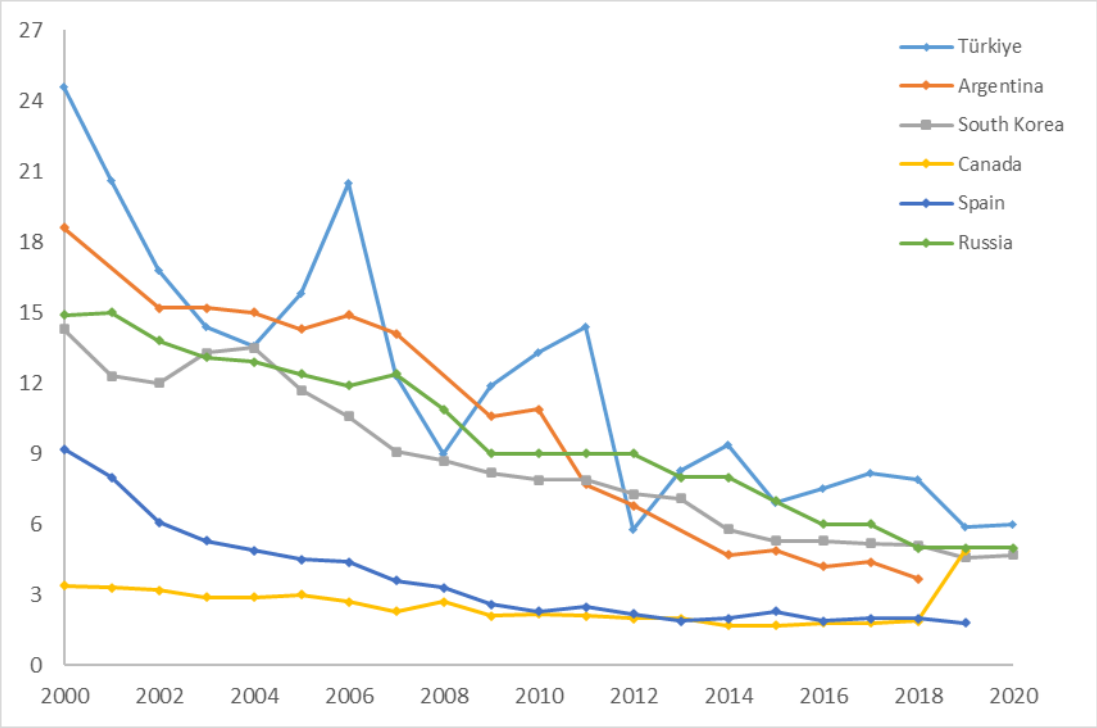


**Figure 1.** Occupational Accident Death Rates in Türkiye and Some Countries in the World.

According to Table 4 and Figure-1, it can be mentioned that there is a significant decrease in death rates after work accidents in the world, but although there is a decrease in the death rate in Türkiye compared to the countries given in the table, there is no decrease in parallel with other countries. When the death rates of Türkiye, Argentina, South Korea, Canada, Spain and Russia are examined, it is seen that the death rate after a work accident in Spain, which is in the European Union, is lower than other countries, and a constant curve is seen in the figure. It can be said that this depends on the occupational health and safety culture in the European Union countries. After Spain, the lowest post-work accident death rates are seen in Canada. In this country, there is an established occupational health and safety culture compared to other countries. On the other hand, in South Korea, Argentina and Russia, there is a decreasing death rate and shape curve in recent years. However, when compared to other countries, the ups and downs in Türkiye 's numbers and curve draw attention. This shows the existence of an occupational health and safety culture that has not yet settled compared to other countries.

When the Occupational Accident Death Rates in Türkiye and some European Countries in Table 5 and Figure 2 are compared, although the death rate as a result of work accidents in our country has decreased in recent years, it continues to be several times that of these countries. Our death rate after an occupational accident is 3 times the European Union average in our best period and 8 times in our

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worst period. According to the European Union, the low number of deaths in England can be explained by the good implementation of the occupational health and safety culture in this country.

**Table 5.** Occupational Accident Death Rates in Türkiye and Some European Union Countries [25].

| | **Türkiye** | **Austria** | **France** | **Italy** | **Hungary** | **EU Average** |
|---|---|---|---|---|---|---|
| **2000** | 24.6 | 5.3 | 4 | 7 | 4 | 3.2 |
| **2001** | 20.6 | 4.5 | 4.2 | 6 | 3.2 | 3.1 |
| **2002** | 16.8 | 4.7 | 3.8 | 5 | 4.2 | 2.9 |
| **2003** | 14.4 | 3.8 | 3.7 | 5 | 3.4 | 2.9 |
| **2004** | 13.6 | 5 | 3.5 | 5 | 4.1 | 2.7 |
| **2005** | 15.8 | 4.6 | 2.7 | 5 | 3.2 | 2.5 |
| **2006** | 20.5 | 3.9 | 3 | 5 | 3.1 | 2.8 |
| **2007** | 12.3 | 3.9 | 3.4 | 4 | 3 | 2.7 |
| **2008** | 9 | 4.1 | 2 | 4 | 3 | 2.4 |
| **2009** | 11.9 | 4.8 | 2.2 | 3 | 2.7 | 2 |
| **2010** | 13.3 | 4.5 | 2.4 | 3 | 2.7 | 2.1 |
| **2011** | 14.4 | 3 | 3.1 | 2.7 | 2.4 | 2 |
| **2012** | 5.8 | 3.4 | 2.5 | 2.6 | 1.7 | 1.95 |
| **2013** | 8.3 | 3.5 | 2.4 | 2.3 | 1.4 | 1.8 |
| **2014** | 9.4 | 3.1 | 2.7 | 2.3 | 2.3 | 1.8 |
| **2015** | 6.9 | 3.2 | 2.6 | 2.4 | 2.3 | 1.8 |
| **2016** | 7.5 | 2 | - | - | 1.8 | - |
| **2017** | 8.2 | - | - | - | - | - |
| **2018** | 7.9 | - | - | - | - | - |
| **2019** | 5.9 | 2.5 | 3.5 | 2.1 | 2.1 | 1.7 |
| **2020** | 6 | - | - | - | 1.4 | - |

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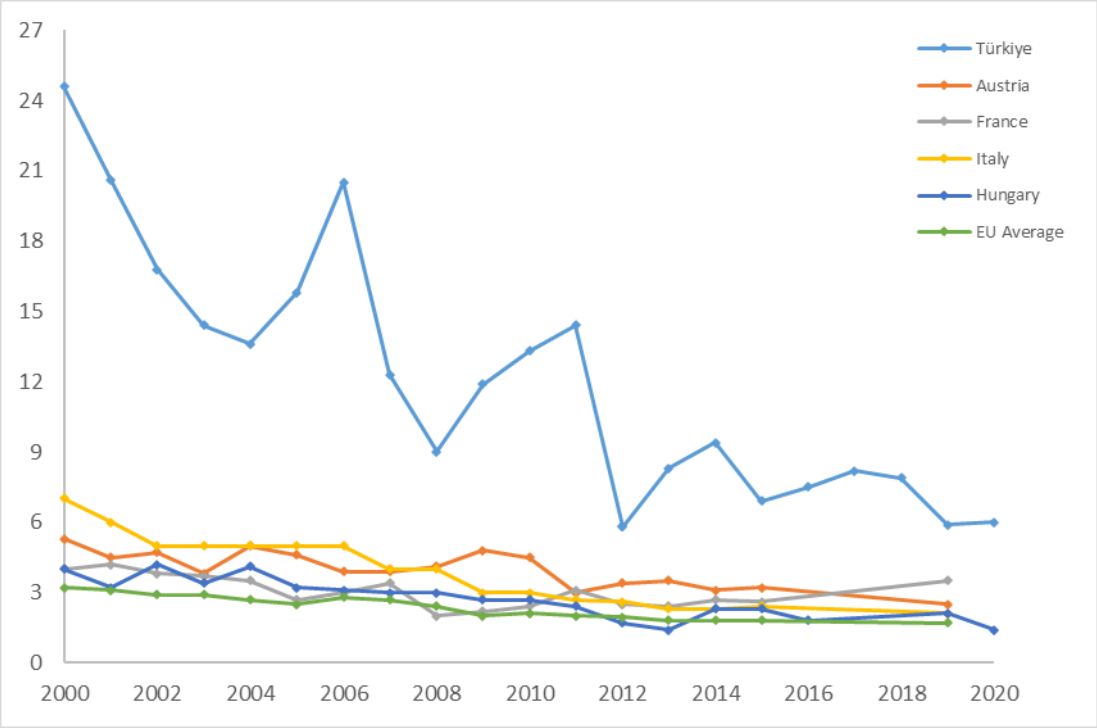


**Figure 2.** Occupational Accident Death Rates in Türkiye and Some European Union Countries.

The fact that the numbers in the European Union countries show parallelism with each other in a decreasing manner can also be attributed to the same reason. Although Germany, which is the locomotive of the Union, has the same population and number of employees as our country, the number of reported work accidents is 2 to 13 times higher than our country. This shows that the occupational health and safety culture in the country is implemented in a disciplined way, that even the smallest accident notifications are made and measures are taken and as a result, the number and speed of fatal occupational accidents are low. The same can be said for other member states of the European Union.

When we interpret according to the Heinrich Accident Prevention Pyramid, which has been used to prevent accidents since 1931; Table 4 shows 1171 fatal occupational accidents in 2009. When we multiply 1171 by 330 in the pyramid, it can be interpreted that 386,430 occupational accidents have occurred in our country. However, the number of occupational accidents reported in 2009 is seen as 64,316. Almost 5 out of 6 occupational accidents were not reported. When we make the same comment with the 2020 data, 1231 fatal work accidents have occurred and while there should be 406,230 work accident reports, 384,262 case reports were made. The HESA Labor Watch, which was formed by non-governmental organizations that objected to the SSI data and collected their own data, determined that there were 2427 fatal work accidents in 2020. When we multiply this number with the

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constant multiplier in the Heinrich Accident Pyramid, it is seen that 800,910 occupational accidents occurred in 2020. This number is similar to the number of occupational accidents in Germany. This also shows that; Although it is seen that the Occupational Health and Safety Law No 6331, which came into force in 2013 in our country, has positive effects, it is not possible to detect occupational accidents at a sufficient level when compared to other countries. Unfortunately, it is seen that these data announced annually by SSI do not reflect the truth. Due to the underreporting of the number of work accidents, continues to be the biggest obstacle in preventing deaths as a result of work accidents, which are completely preventable [15] [25].

### 4.2. Occupational Diseases and Comparison of Deaths Due to Occupational Diseases

As mentioned at the beginning, while the rate of occupational diseases is expected to be high in our country, our inadequacy arises due to many factors such as low capacity to diagnose occupational disease, lack of occupational knowledge of employees, lack of adequate and accurate information about occupational disease, fear of losing rights and positions as a result of the diagnosis of occupational disease, the deterioration of the employee's relationship with the employer, the fear of losing job and the difficulties arising from the occupational disease diagnosis process, so very few diagnoses are made due to reasons such as these. With the rate of economic development among countries, it is expected that between 4 and 12 new occupational diseases per 1000 workers will be seen per year. Considering the rates calculated according to the number of employees in Table 6, the number of occupational diseases in the last twenty years in our country is very low compared to the rate of 4-12 per thousand.

**Table 6.** Frequency of Occupational Diseases in Türkiye (2000-2020) [15] [25].

| | NUMBER OF OCCUPATIONAL DISEASES | NUMBER OF EMPLOYEES X1000 | OCCUPATIONAL DISEASE RATE (PER 100,000 PEOPLE) |
|---|---|---|---|
| **2000** | 803 | 5,254 | 15.3 |
| **2001** | 883 | 5,456 | 16.1 |
| **2002** | 601 | 5,789 | 10.4 |
| **2003** | 440 | 6,231 | 7.1 |
| **2004** | 384 | 6,954 | 5.5 |
| **2005** | 519 | 7,651 | 7.5 |
| **2006** | 574 | 8,582 | 7.3 |
| **2007** | 1,208 | 9,198 | 14.2 |
| **2008** | 539 | 9,574 | 6.1 |
| **2009** | 429 | 9,618 | 4.8 |
| **2010** | 533 | 10,575 | 5.3 |
| **2011** | 688 | 11,547 | 6.3 |
| **2012** | 395 | 12,527 | 3.2 |
| **2013** | 371 | 13,136 | 3.1 |
| **2014** | 494 | 13,967 | 3.5 |
| **2015** | 510 | 14,802 | 3.4 |
| **2016** | 597 | 15,535 | 3.8 |

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| | | | |
|---|---|---|---|
| **2017** | 691 | 16,369 | 4.2 |
| **2018** | 1,044 | 16,054 | 6.5 |
| **2019** | 1,088 | 16,010 | 6.7 |
| **2020** | 908 | 17,857 | 5 |

In Table 7, the expected and detected numbers of occupational diseases in our country and some countries between 2000-2020 are given. As can be seen in this table, there are serious problems in the detection of occupational diseases not only in our country but also all over the world. This is due to the reasons of the employee, the employer and the state and this problem is growing even if not enough attention is paid. However, according to the rate of an occupational disease that should be seen between 4-12 in a thousand cases, unfortunately, an occupational disease can be detected in only one of every 100-300 cases that should be detected annually. The rest are treated without an occupational disease diagnosis due to the lack of occupational health and safety culture. Due to those who could not be diagnosed with an occupational disease, necessary measures cannot be taken to prevent the occurrence of the disease. This has a serious negative impact on employee health.

**Table 7.** Number of Occupational Diseases Detected in Some Countries in 2000-2020 [15][25][26].

| | | **Countries** | | | | | |
|---|---|---|---|---|---|---|---|
| | | **Sweden** | **Finland** | **Norway** | **Latvia** | **Germany** | **Türkiye** |
| **Expected Number of Occupational Diseases by Number of Employees (4-12 per 1000 employees)** | | 17,604-30,144 | 10,048-30,144 | 9,772-29,316 | 4,476-13,428 | 152,492-457,476 | 43,000-130,000 |
| **Years** | 2000 | 23,444 | 4,991 | 3,649 | 495 | 18,689 | 803 |
| | 2001 | 26,440 | 4,923 | 3,587 | 726 | 18,599 | 883 |
| | 2002 | 22,339 | 4,807 | 3,521 | 883 | 18,352 | 601 |
| | 2003 | 25,565 | 6,329 | 3,423 | 965 | 17,425 | 440 |
| | 2004 | 20,787 | 6,132 | 2,870 | 1,888 | 17,413 | 384 |
| | 2005 | 17,107 | 7,035 | 2,737 | 1,673 | 16,519 | 519 |
| | 2006 | 14,186 | 6,956 | 3,051 | 1,111 | 14,732 | 574 |
| | 2007 | 11,608 | 6,487 | 2,881 | 1,591 | 13,932 | 1208 |
| | 2008 | 10,412 | 6,312 | 2,688 | 2,118 | 13,546 | 539 |
| | 2009 | 8,881 | 6,271 | 2,439 | 3,128 | 16,657 | 429 |
| | 2010 | 9,074 | 2,507 | 2,797 | 3,471 | 15,926 | 533 |
| | 2011 | 9,534 | 2,106 | 2,340 | 2,335 | 15,880 | 688 |
| | 2012 | 10,144 | 1,998 | 2,862 | 2,054 | 15,949 | 395 |
| | 2013 | 11,088 | 1,871 | 2,835 | 2,845 | 16,413 | 371 |
| | 2014 | 11,827 | 1,625 | 2,878 | 3,906 | 16,969 | 494 |
| | 2015 | 12,136 | 1,614 | 2,364 | 3,652 | 18,041 | 510 |
| | 2016 | 11,696 | 1,571 | - | 5,175 | 22,320 | 597 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 2017 | 10,228 | 1,242 | - | 5,757 | 21,772 | 691 |
| 2018 | 8,894 | 1,067 | - | 6,709 | 21,794 | 1,044 |
| 2019 | 10,573 | 930 | - | 7,710 | 20,422 | 1,088 |
| 2020 | 19,899 | - | - | 6,648 | 39,551 | 908 |

When we look at Table 6 and Table 7, there is a situation in the world where occupational diseases are solved by hiding**.** This is even more evident for our country. As a result, hazards and risks in workplaces cannot be determined. Unfortunately, most of the cases are not recorded unless they are associated with permanent damage, disability, fatal work accident, occupational disease or work-related illness. This situation is not fully reflected in the records of healthcare providers in our country. In our country, the length of the processes of diagnosis of occupational disease and the length of judicial processes in the case of resorting to legal remedies when necessary, exhausts the employees who are victims both financially and morally. In fact, all work-related diseases and occupational diseases can be shown by a causal link by trained specialists of SSI or an insurance institution. This process is both easier and will result in less attrition for the injured employee financially and morally and will provide relief as soon as possible [15][25][26].

The highest decrease was in vocal cord diseases, occupational hearing loss and infectious diseases (30%, 51% and 40%, respectively). Vocal cord pathologies are not considered among occupational diseases in the European Union member countries and the United States of America. It should be especially noted that hoarseness is not considered an occupational disease for teachers in our country. The fact that the definition and detection of occupational diseases are different in each country is the main reason for the inconsistency in the data between countries. Table 8 shows the most common occupational diseases in different countries. Despite the insufficient numbers in our country, it is thought-provoking that pneumoconiosis and musculoskeletal system disorders, which are preventable diseases, are the leading ones. If necessary occupational health and safety measures are taken, these diseases and related deaths can be completely prevented [15][25][26].

**Table 8.** Most Common Occupational Diseases in Different Countries [27].

| **Country** | **Most Common Occupational Diseases** | **Second Most Common Occupational Diseases** |
|---|---|---|
| **Argentina** | Hearing Loss | Respiratory Diseases |
| **China** | Pneumoconiosis | Acute and chronic poisoning |
| **Germany** | Skin Diseases | Back diseases - Hearing Loss |
| **South Korea** | Musculoskeletal Diseases | Pneumoconiosis |
| **Portugal** | Hearing loss | Musculoskeletal Diseases |
| **Russia** | Respiratory Diseases | Musculoskeletal Diseases |
| **Sweden** | Musculoskeletal Diseases | Diseases Related to Chemicals |
| **Zimbabwe** | Pneumoconiosis | Hearing loss |
| **Türkiye** | Pneumoconiosis | Musculoskeletal Diseases |

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## 5. CONCLUSIONS and RECOMMENDATIONS

In this study, work accidents and occupational diseases that occurred in Türkiye and some countries in the world between the years 2000-2020, as well as the number of deaths due to these, were examined; The changes in the accidents over the years were examined by making comparisons according to the death rates in 100,000 cases. As a result of the comparisons made in the research, the following findings were obtained:

While there has been a significant increase in the number of work accidents in Türkiye over the years, there has not been a remarkable decrease in the number of deaths. However, due to the increase in the number of occupational accidents, a significant decrease in the death rate per 100,000 was observed.

It is thought that the main problem in our country is the reporting of occupational accidents to the Social Security Institution. As a matter of fact, the increase in case reporting after the Occupational Health and Safety Law No 6331, which came into force on January 1, 2013, shows this. Despite this, it has been determined by comparisons and calculations that there are still deficiencies in the reporting. The inability to determine the actual numerical data is the biggest obstacle in front of the real dimensions of occupational health and safety problems and the measures that can be taken in our country.

Among the main reasons for the emergence of these results, various factors such as employing uninsured workers, the lack of employment of occupational physicians and occupational safety specialists due to the postponement of the implementation of some articles of the existing law in small-scale enterprises, ignorance of the employer and employees about work accidents and occupational diseases, and inadequacy of current inspections are thought to be effective.

Türkiye has a higher accident frequency than the other world countries examined in the study and the European Union average, in terms of the fatal accident rate, which is calculated as per 100,000 as a result of work accidents.

Our country is in a worse situation than occupational accidents in terms of detection and follow-up of occupational diseases. In occupational diseases that can occur due to multiple reasons, there is a situation almost like ignoring occupational diseases by considering non-occupational reasons. This situation becomes even more evident when comparing the data of the HESA Labor Watch and the SSI data.

When it is expected that between 4 and 12 new occupational diseases will be detected per 1000 workers, depending on the number of employees, between 50,000 and 150,000 new occupational diseases are expected to be detected annually in our country. However, the annual detection of occupational diseases in our country is not even 1000.

In terms of the number of work accidents, Türkiye seems to be in a better situation than South Korea, Germany, France, Spain and European Union countries, but the high rate of death after work accidents per 100,000 can be considered as a contradiction. This is a result of the fact that occupational health

and safety is implemented more carefully and diligently in the mentioned countries than in our country, and even the smallest occupational accident is recorded.

The only source from which we can obtain information on work accidents and occupational diseases in Türkiye is the annual statistics of SSI. However, due to both the fact that the occupational accidents resolved in the workplace health units are not reflected in these data, and due to the reservations to avoid possible inspector examination, they are not reflected by the enterprises. Some of the occupational accidents cannot be added to the system by treating the employees with undeclared practices in public or private health institutions.

Not to employ uninsured workers, to carry out necessary analysis and tests at the start of employment and during periodic examinations, to ensure all necessary health conditions in the workplace, to ensure a clean air flow in the workplace environment, to remove all kinds of harmful factors that come out during the work with appropriate methods, to take into account the warnings of the occupational safety specialist and the workplace doctor, to fully implement the recommendations specified in the reports of occupational health and safety inspections are important in terms of preventing work accidents and occupational diseases.

Not evaluating preventive medicine practices as a priority in the presentation of occupational health, work accidents and occupational diseases are not a priority area in the training policies and programs of occupational physicians and allied health personnel, the inadequacy of the knowledge and sensitivity of the occupational physicians are among the issues that need to be corrected.

Difficulties experienced in the diagnosis of occupational diseases and not paying attention to the importance of this issue in health service providers are also important and need to be corrected.

In addition to providing statistical unity between countries in terms of all health ministries with the ICD-10 (International Statistical Classification of Diseases and Related Health Problems), an international agreement should be reached on occupational accidents and diseases. Any statistical comparison without this provision will be incomplete and meaningless.

The fact that diagnostic guidelines for occupational diseases have not yet been fully developed, systemic inadequacy in occupational disease records, lack of occupational disease diagnosis standards, physicians working in the primary and secondary health care systems are not sensitive to occupational diseases and do not know the procedure are among the issues that need to be corrected.

Considering that employees do not have sufficient and accurate information about work accidents and occupational diseases and do not know their legal rights, fear of loss of rights and positions should be eliminated in the diagnosis of work accidents and occupational diseases and in the following processes and employees should be taught all their rights.

The target of increasing the number of expected but undetected occupational disease cases by 500%, which was targeted in the National Occupational Health and Safety Policy Document previously

prepared by the Ministry of Labor, should be met. The stagnation in the number of occupational disease detections after 2008, when this was targeted, is thought-provoking.

The expected increase in the detection of occupational diseases can be achieved by disseminating and facilitating the procedures related to the diagnosis of occupational diseases, which are one of the indicators of occupational health and safety, which can lead to different negative pictures if no precautions are taken, increasing the knowledge and sensitivity of occupational physicians and all health personnel, all employers and employees, all trade union organizations and professional organizations, providing information in the written and visual media about the subject.

The only data source on work accidents and occupational diseases in Türkiye is the annual statistics of SSI. However, it is obvious that these data do not reflect the real picture, due to the accidents that are not reflected in these data by the enterprises with different reservations and the health examinations and treatments of employees being carried out without notification in official or private health institutions. As all parties of the Employee-Employer-State, this issue and the creation of different statistical sources and auto-control of SSI data are also very important in terms of diagnosis, examination, treatment and measures that can be taken.

In summary, if we were to synthesize all the findings and predictions, thousands of our people lost their lives and lost their rights due to unreported work accidents, occupational diseases and related deaths in our country in 2000 and later. Currently, deaths due to work accidents are under-reported by at least 30% compared to the number of non-governmental organizations, and deaths due to occupational diseases are almost never reported. Due to the fact that the data do not reflect the truth, no efficient analysis can be made for the past, present and future. This will result in failure to take the measures that can be taken in the context of occupational health and safety and will lead to new work accidents, occupational diseases and deaths. In addition to death and disability, billions of liras will be transferred from employees, employers and state treasury to analysis, examination, treatment and compensation.

As a result, the majority of work accidents, occupational diseases and related deaths are preventable. Employees, employers and occupational health and safety workers must work with the state to develop preventive occupational health and safety systems. Unfortunately, as in our country, if the facts continue to be concealed for any reason, all preventive actions to be taken will remain incomplete and defective, leading to new work accidents, occupational diseases, disability and death.

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