Araştırma Makalesi

The Status of Occupational Diseases in Türkiye and Their Relationship with Socioeconomic Development: An Analysis of the 2013-2022 Period

Mahmut KILIÇ[1]
ORCID: 0000-0002-8921-1597

Lale KARASU[2]
ORCID: 0000-0001-9278-8779

Aysun GÖKALP[3]
ORCID: 0000-0001-9535-4669

Esra ÇINARLI[4]
ORCID: 0009-0005-1466-9818

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[1] Prof. Yozgat Bozok University Faculty of Medicine Department of Public Health, Yozgat, Türkiye. mahmutkilic@yahoo.com

[2] Lecturer. Erciyes University, Halil Bayraktar Health School, Kayseri, Turkey. lalekarasu@erciyes.edu.tr

[3] Lecturer. Tokat Gaziosmanpasa University, Artova Vocational School, Tokat, Turkey. aysun.bakir@gop.edu.tr

[4] Lecturer. Kırşehir Ahi Evran University, Central Research and Application Laboratory, Kırşehir, Turkey. e.cinarli@ahievran.edu.tr

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Abstract: This study aims to examine the relationship between occupational diseases and socioeconomic variables in Türkiye during the ten-year period following the enactment of the Occupational Health and Safety Law (2013–2022). Data were obtained from publicly available sources provided by the Social Security Institution (SSI), the Turkish Statistical Institute (TURKSTAT), and the World Bank. According to the findings, the incidence rate of occupational diseases increased from 2.67 per 100,000 workers in 2013 to 6.8 in 2019, followed by a decline to 4.81 in 2022, likely due to the impact of the COVID-19 pandemic. A significant positive correlation was found with the Human Development Index (r=0.759), while a significant negative correlation was observed with per capita income ($r = –0.903$, $p < 0.01$). The highest incidence rates were recorded in Eastern Marmara, Istanbul, and the Aegean regions, where industrial activity is most concentrated. These results indicate that occupational diseases are influenced not only by workplace conditions but also by broader economic and social factors. Therefore, preventive measures should address both sector-specific risks and regional socioeconomic disparities.

Keywords: occupational diseases; economic indicators; social factors.

Türkiye'de Meslek Hastalıklarının Durumu ve Sosyoekonomik Gelişmişlik ile İlişkisi: 2013-2022 Dönemine Yönelik Bir İnceleme

Öz: Bu çalışma, Türkiye'de 2013 yılında yürürlüğe giren İş Sağlığı ve Güvenliği Kanunu sonrasındaki 10 yıllık dönemde (2013–2022) meslek hastalıkları ile sosyoekonomik değişkenler arasındaki ilişkiyi analiz etmeyi amaçlamaktadır. Çalışmada kullanılan veriler, Sosyal Güvenlik Kurumu (SGK), Türkiye İstatistik Kurumu (TÜİK) ve Dünya Bankası'nın kamuya açık kaynaklarından temin edilmiştir. Bulgular, meslek hastalıkları insidansının 2013 yılında her 100.000 çalışan için 2,67 iken, 2019 yılında 6,8'e yükseldiğini; ancak COVID-19 pandemisinin etkisiyle 2022 yılında 4,81'e gerilediğini göstermektedir. Meslek hastalıkları ile İnsani Gelişmişlik Endeksi arasında pozitif yönde ($r = 0.759$), kişi başına düşen gelir ile ise negatif yönde anlamlı bir ilişki ($r = –0.903$, $p < 0.01$) tespit edilmiştir. En yüksek vaka oranları, sanayileşmenin yoğun olduğu Doğu Marmara, İstanbul ve Ege bölgelerinde görülmüştür. Elde edilen bulgular, meslek hastalıklarının yalnızca işyeri ortamına bağlı olmadığını, aynı zamanda ekonomik ve sosyal faktörlerden de önemli

ölçüde etkilendiğini ortaya koymaktadır. Bu nedenle, koruyucu politikaların yalnızca sektörel riskleri değil, aynı zamanda bölgesel sosyoekonomik farklılıkları da göz önünde bulundurması gerekmektedir.

Anahtar Kelimeler: meslek hastalıkları; ekonomik göstergeler; sosyal faktörler.

Introduction

In the modern workplace, rapidly changing dynamics have increasingly underscored the significance of occupational diseases in relation to employee health and occupational safety and health (OSH). The International Labour Organization (ILO) defines occupational diseases as "all diseases arising from exposure to risk factors associated with work activities," as articulated in Convention No. 155 and the ILO Protocol of 2002 (ILO, 2013). This concept must be distinguished from the broader category of work-related diseases. While occupational diseases involve a specific causal relationship with identifiable occupational exposures, work-related diseases are multifactorial conditions in which working conditions contribute to disease development, progression, or severity without constituting the sole causal factor (Rosenstock et al., 2006; WHO, 1985). The development of these diseases is influenced by multiple factors, including chemical substances, physical agents, biological agents, ergonomic risks, and psychosocial elements.

From a contemporary theoretical perspective, occupational diseases are not solely the outcome of inadequate physical working conditions. Rather, they constitute one of the most significant yet least visible outcomes of working life. Unlike occupational accidents, occupational diseases are characterized by long latency periods, complex diagnostic pathways, and limitations in reporting systems, all of which contribute to substantial underestimation of their true magnitude. Despite this limited visibility, occupational diseases impose severe individual, social, and economic consequences, positioning them not merely as medical conditions but as structural problems embedded within labor relations and social policy frameworks.

Modern occupational health literature conceptualizes occupational diseases as the combined outcome of the work environment, working conditions, and employment relations, emphasizing their interdependent and structural nature (Rosenstock et al., 2006; Takala et al., 2024). The work environment encompasses physical, chemical, biological, and ergonomic hazards, while working conditions refer to organizational characteristics such as working hours, workload intensity,

shift systems, and remuneration. Employment relations include structural factors such as job security, subcontracting, informal employment, unionization, and power relations in the workplace. The interaction of these dimensions determines both the intensity and duration of exposure to occupational risks and plays a decisive role in the emergence, recognition, and reporting of occupational diseases.

At the global level, recent estimates by the ILO and the World Health Organization indicate that work-related injuries and diseases account for approximately 2.8–2.9 million deaths annually worldwide, with the majority attributable to work-related diseases rather than occupational accidents (ILO, 2023; Takala et al., 2024). Circulatory diseases, work-related malignant neoplasms, and respiratory diseases represent the leading causes of work-related mortality. This burden is disproportionately concentrated in low- and middle-income countries, where rapid industrialization often exceeds the development of effective occupational health and safety systems.

Cross-country variation in reported occupational disease incidence reflects not only differences in exposure patterns but also disparities in socioeconomic development, regulatory enforcement, and occupational health service capacity. Studies have demonstrated that indicators such as occupational physician-to-worker ratios, health expenditure, and income inequality are associated with observed occupational health outcomes (Krakov et al., 2023). Systematic reviews further emphasize persistent underreporting and substantial differences in national notification practices, indicating that officially reported figures may significantly underestimate the true disease burden (Khoe et al., 2024).

Within this global context, Türkiye presents a notable discrepancy between international estimates and national records. Despite rapid industrialization and a large workforce, officially reported occupational disease figures have historically remained far below global expectations. This discrepancy reflects structural limitations in diagnostic, notification, and registration systems rather than a genuinely low disease burden. Although the Occupational Health and Safety Law No. 6331, enacted in 2012, aimed to align national OSH principles with European Union and ILO conventions, underreporting remains a persistent challenge, particularly in less industrialized regions.[5]

National statistics in Türkiye continue to be dominated by occupational accident data, while occupational diseases remain largely invisible in official records. This contrast with global patterns underscores the presence of an "invisible burden" of occupational disease, in which structural barriers to diagnosis

[5] Please visit the official website Occupational Health and Safety Law No. 6331 https://www.resmigazete.gov.tr/eskiler/2006/06/20060616-1.htm .

and reporting obscure the true scale of occupational health risks. Occupational diseases often emerge under inadequate working conditions; however, contemporary research emphasizes that such conditions are embedded within broader structural contexts involving job security, regulatory enforcement, and access to occupational health services (Akkurt, 2007; Rosenstock et al., 2006; Takala et al., 2024). Risks associated with occupational environments, including dust exposure, excessive noise, and extreme temperatures, further contribute to disease development over time (Erol, 2020).

The implications of occupational diseases extend beyond the physical health of workers, affecting their social and economic well-being and placing sustained pressure on healthcare systems and labor markets. In Türkiye, addressing the prevention and reduction of occupational diseases is therefore of critical importance, not only for protecting worker health and safety but also for maintaining economic resilience and productivity. Achieving meaningful progress in this area requires coordinated, evidence-based policies and the active involvement of all stakeholders.

Against this background, this study aims to provide an in-depth analysis of trends in occupational disease incidence in Türkiye, with a particular focus on socioeconomic determinants. By examining the decade following the enactment of the Occupational Health and Safety Law No. 6331, the study seeks to contribute empirical evidence to ongoing debates on occupational disease visibility, reporting, and structural determinants in a rapidly transforming middle-income economy.

Methods

This study was designed as a retrospective, record-based analysis examining trends in occupational diseases in Türkiye between 2013 and 2022. The analysis was conducted in 2024 and focused on the period following the enactment of the Occupational Health and Safety Law No. 6331, which entered into force in 2013. This timeframe was selected to allow for the assessment of occupational disease trends under the current legislative framework.

Data were obtained from publicly available official sources. Information on occupational disease cases, permanent incapacity due to occupational diseases, and the number of actively insured workers was retrieved from the statistical yearbooks published by the Social Security Institution (SSI) of Türkiye. Socioeconomic indicators, including gross domestic product (GDP) per capita, economic growth rates, and inflation, were obtained from the World Bank database, while income inequality data measured by the Gini coefficient were sourced from the Turkish Statistical Institute (TURKSTAT).

The analysis was restricted to employees insured under the 4/1-a category, which covers dependent wage earners. This restriction was applied because SSI statistical yearbooks provide occupational disease case counts, permanent incapacity data, and insured worker numbers in a consistent and disaggregated format only for the 4/1-a category. Although individuals insured under the 4/1-b category (self-employed) are legally covered by occupational accident and disease insurance, occupational disease statistics for this group are not reported separately in publicly available datasets. Consequently, all incidence rates and analyses presented in this study were calculated exclusively using 4/1-a data to ensure internal consistency and data reliability.

The selection of socioeconomic and occupational health variables was guided by a review of national and international literature on occupational diseases and their structural determinants. Socioeconomic indicators included GDP per capita, economic growth rate, inflation, the Gini coefficient, and the Human Development Index (HDI). These indicators were selected based on evidence demonstrating that macroeconomic conditions and economic cycles influence occupational health and safety outcomes, often described as the pro-cyclical nature of occupational accidents (Asfaw et al., 2012; Boone & van Ours, 2006). Furthermore, indicators such as GDP per capita, income inequality, and broader development measures serve as key proxies for socioeconomic development and social protection capacity, which are closely associated with occupational health trends (Hämäläinen et al., 2009; ILO, 2019; Takala et al., 2024).

Occupational disease incidence and permanent incapacity due to occupational diseases were selected as outcome variables in accordance with ILO recommendations and prior empirical studies examining national and regional occupational health trends (Hämäläinen et al., 2009; ILO, 2019). Variable selection was guided by considerations of theoretical relevance, empirical comparability, and consistency with existing research.

To ensure comparability with international standards, two outcome measures were calculated using formulas recommended by the ILO. The incidence rate of occupational diseases (IH1) was defined as the annual number of occupational disease cases per 100,000 active insured workers:

IH_1 (Occupational Disease Incidence Rate): The value for the incidence rate of occupational diseases within a year (per 100,000 workers):

$$IH_1 = \frac{\text{Number of Occupational Diseases} * 100{,}000}{\text{Number of Active Insured Workers}}$$

IH_2 (Permanent Incapacity Incidence Rate): The value for the incidence rate of permanent incapacity resulting from occupational diseases within a year (per 1000,000 workers):

$$IH_2 = \frac{\text{Number of Permanent Incapacity Recipients Due to Occupational Disease} * 1000000}{\text{Number of Active Insured Workers}}$$

The use of both denominators was intended to enhance analytical precision, particularly for rare outcomes such as permanent incapacity, and is consistent with international occupational health reporting practices (ILO, 2019).

Regional incidence rates were calculated based on the NUTS-1 regional classification defined by TURKSTAT, which divides Türkiye into twelve statistical regions: Istanbul, Western Marmara, Eastern Marmara, Aegean, Western Anatolia, Western Black Sea, Central Anatolia, Mediterranean, Eastern Black Sea, Northeastern Anatolia, and Southeastern Anatolia. Regional distributions of occupational disease incidence were visualized using thematic mapping techniques to illustrate spatial variation across regions.

Statistical analyses were performed using Spearman's rank-order correlation analysis to assess the relationships between occupational disease incidence rates and selected socioeconomic development indicators. Spearman correlation analysis was selected because the number of annual observations was limited and several variables exhibited non-normal distributions, conditions under which nonparametric methods are recommended (Conover, 1999; Field, 2018). In addition, the associations under investigation were expected to be monotonic rather than strictly linear, given the complex and potentially non-linear relationships between socioeconomic indicators and occupational disease reporting patterns. Under these conditions, Spearman's method provides a robust alternative to parametric correlation techniques.

Parametric alternatives such as Pearson correlation analysis were not preferred because their assumptions of normality and linearity could not be reliably satisfied by the available dataset (Field, 2018). More complex multivariate techniques were also not applied due to the limited number of observations and the increased risk of overfitting. Statistical significance was evaluated at the 0.05 and 0.01 levels.

Results

In this descriptive study, data were obtained from the statistical yearbooks regularly published by the SSI. To identify scholarly articles related to occupational diseases in Türkiye between 2013 and 2022, searches were conducted in the TÜBİTAK-

ULAKBİM TR Index and DergiPark databases, both of which are recognized as major sources of peer-reviewed scientific publications. Additionally, the Council of Higher Education (YÖK) Thesis Center was examined to identify all relevant postgraduate theses, as it serves as the primary repository for the mandatory registration of graduate research in Türkiye.

This study compiled various datasets, including the incidence of occupational diseases recorded in Türkiye between 2013 and 2022; numerical data on employees insured under the 4/1-a category of the SSI (hereafter referred to as 4/1-a); demographic indicators; and provincial-level distributions. Data regarding the number of occupational diseases and employment rates were obtained from SSI publications. A comprehensive data retrieval and integration process was conducted to consolidate all relevant information into a unified dataset. Furthermore, Türkiye's socioeconomic and development indicators were analyzed and statistically correlated with the incidence of occupational diseases.

Table 1. Data Influencing Occupational Diseases in Türkiye from 2013 to 2022.

Years	Number of Occupational Diseases	Number of Actively Insured 4/1-a Workers	Number of Permanent Incapacity Cases Due to Occupational Disease	Occupational Disease Incidence Rate (IH1)	Permanent Incapacity Incidence Rate (IH2)	Gini Coefficient	Human Development Index (HDI)	GDP per Capita (USD)
2013	351	13.136.339	3	2,67	0,23	0,4	0,802	12.578
2014	494	13.967.837	17	3,53	1,22	0,391	0,812	12.165
2015	510	14.802.222	11	3,44	0,74	0,397	0,821	11.050
2016	597	15.355.158	35	3,88	2,28	0,404	0,826	10.970
2017	691	16.369.073	32	4,22	1,95	0,405	0,833	10.695
2018	1044	16.054.759	46	6,5	2,87	0,408	0,838	9.568
2019	1088	16.010.002	51	6,79	3,19	0,395	0,842	9.215
2020	908	17.358.140	49	5,23	2,82	0,41	0,835	8.638
2021	1207	18.399.864	52	6,55	2,83	0,401	0,841	9.743
2022	953	19.814.531	53	4,8	2,67	0,415	0,855	10.674

As presented in Table 1, the incidence of occupational diseases in Türkiye exhibited a steady increase between 2013 and 2022. The incidence rate, which was 2.67 in 2013, reached its highest level at 6.79 in 2019 before showing a decline in 2022. A similar upward trend was observed in the incidence rate of permanent incapacity resulting from occupational diseases, which rose from 0.23 in 2013 to a peak of 3.19 in 2019, followed by a relatively stable pattern thereafter.

Regarding income inequality, the Gini coefficient showed no substantial fluctuations throughout the study period, maintaining an overall parallel trend. The HDI, on the other hand, displayed a gradual improvement, increasing from 0.802 in 2013 to 0.855 in 2022. In contrast, GDP per capita (in USD) declined over the same period, decreasing from $12,578 in 2013 to a low of $8,638 in 2020, before recovering slightly to $10,674 in 2022.

Table 2. Correlation Matrix of Occupational Diseases and Development İndicators in Türkiye from 2013 ta 2022.

		IH_1	**2**	**3**	**4**	**5**	**6**	**7**
1	IH_1	1,000						
2	IH_2	,976**	1,000					
3	Years	,806**	,758*	1,000				
4	HDI	,867**	,842**	,939**	1,000			
5	GINI Coefficient	0,261	0,285	0,612	0,479	1,000		
6	GDP	-,903**	-,903**	-,806**	-,794**	-0,467	1,000	
7	Inflation Rate	,794**	,770**	,964**	,927**	,673*	-,770**	1,000
8	Growth Rate	-0,418	-0,552	-0,188	-0,297	-0,079	0,576	-0,152

Notes. IH_1: Occupational Disease Incidence Rate, $İH_2$: Incidence Rate of Individuals Receiving Permanent Incapacity Income Due to Occupational Diseases, HDI= Human Development İndex, GDP= Gross Domestic Product (USD)

Spearman's rho **p <0.01, *p<0.05

Shown in Table 2, the results of the Spearman correlation analysis among the study variables are presented. A strong and statistically significant positive correlation was found between the incidence of occupational diseases (IH1) and the incidence rate of permanent incapacity due to occupational diseases (IH2) ($r = 0.976$, $p < 0.01$). Furthermore, the incidence of occupational diseases demonstrated a significant positive correlation with the passing years ($r = 0.806$, $p < 0.01$), indicating a steady increase over time.

A notable finding is the strong positive correlation between the incidence of occupational diseases and the HDI ($r = 0.867$, $p < 0.01$). Conversely, a strong negative correlation was identified between GDP per capita and the incidence of occupational diseases ($r = –0.903$, $p < 0.01$), suggesting that a decline in GDP per capita is associated with an increase in occupational disease incidence. Additionally, inflation displays a strong positive relationship ($\varrho = 0.794$, $p < 0.01$), implying that economic instability could exacerbate occupational health risks. The relationships between IH1 and both the Gini coefficient ($\varrho = 0.261$) and growth rate ($\varrho = –0.418$) are statistically insignificant, suggesting that income inequality and short-term growth fluctuations have limited direct effects on occupational disease incidence. Overall, the findings highlight that macroeconomic stability and socioeconomic development play a crucial role in shaping occupational health outcomes.

Likewise, the incidence rate of individuals receiving IH2 demonstrates a correlation structure closely aligned with that of IH1. Given the strong intercorrelation among year, HDI, GDP per capita, and inflation, the patterns likely reflect common time trends; during downturns, the incidence of occupational diseases tends to rise.

Figure 1. Incidence Map of Occupational Diseases Among 4/1-a category-Insured Individuals in Türkiye by Region, 2013-2022.

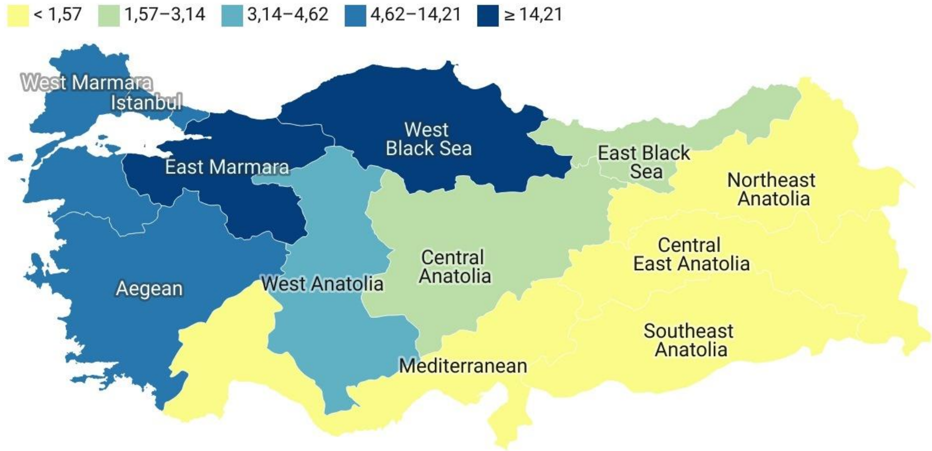
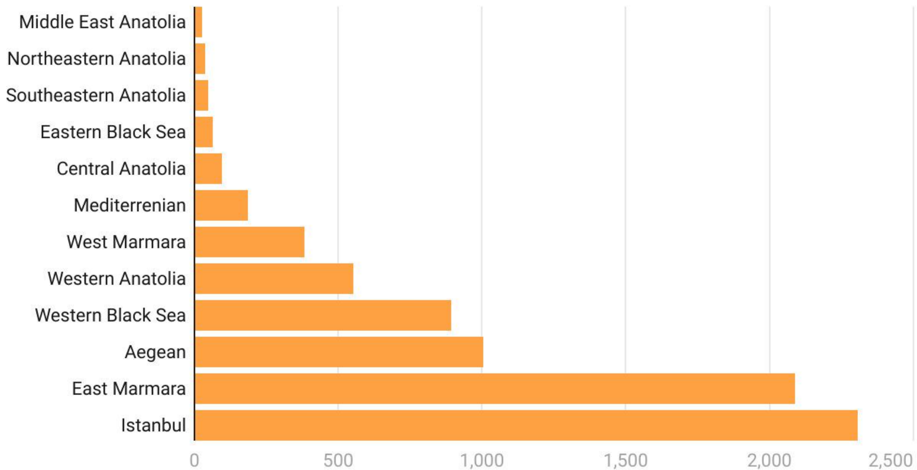


Figure 1 illustrates the regional distribution of occupational disease incidence across Türkiye, based on the TR12 regional classification defined by the TURKSTAT. The analysis utilizes employment data for individuals insured under the 4/1-a category between 2013 and 2022, compiled according to provincial records. Incidence rates of occupational diseases were calculated using official data obtained from the SSI.

As shown in the map, the Eastern Marmara region recorded the highest incidence rate of occupational diseases, with 16.62 cases per 100,000 insured individuals. This was followed by the Western Black Sea region (14.21), Western Marmara (5.29), Istanbul (5.12), Aegean (4.62), Western Anatolia (3.14), Eastern Black Sea (1.64), Central Anatolia (1.57), Northern Anatolia (1.22), Mediterranean (1.08), Southeastern Anatolia (0.49), and Eastern Anatolia (0.66), which reported the lowest incidence rate.

These findings align with expectations, as the Eastern Marmara region exhibits the highest levels of industrialization and manufacturing activity in the country, which are key factors contributing to the elevated incidence of occupational diseases observed in this area.

Figure 2. Distribution of Occupational Disease Cases Across the 12 Regions of Türkiye, 2013–2022.



As shown in Figure 2, data on individuals diagnosed with occupational diseases between 2013 and 2022 were obtained from the SSI and aggregated on a provincial basis. These data were subsequently grouped according to the twelve statistical regions of Türkiye to construct a bullet bar chart illustrating the regional distribution of reported cases.

The analysis reveals that Istanbul recorded the highest number of occupational disease cases (n = 2,309), followed by the Eastern Marmara region (n = 2,092), the Aegean region (n = 1,005), and the Western Black Sea region (n = 839). Other regions included Western Anatolia (n = 554), Western Marmara (n = 382), and the Mediterranean region (n = 187). The Central Anatolia region reported 95 cases, Eastern Black Sea 66, Southeastern Anatolia 50, Northeastern Anatolia 38, and Central Eastern Anatolia the lowest number of reported cases, with 28.

Discussion

The findings of this study indicate that occupational diseases in Türkiye have shown an overall increasing trend between 2013 and 2022, with a notable peak observed in 2019, followed by a decline during the COVID-19 pandemic period. This pattern should not be interpreted solely as a reflection of changes in actual disease burden but rather as the combined outcome of diagnostic capacity, reporting practices, and broader socioeconomic conditions. Similar trends have

been documented in previous studies, which emphasize that increases in reported occupational disease incidence often coincide with institutional reforms and improvements in surveillance systems (Ilıman, 2015; Koçali, 2023).

One of the most striking findings of this study is the strong positive association between occupational disease incidence and the HDI. At first glance, this relationship may appear counterintuitive, as higher levels of human development are typically associated with better working conditions and lower health risks. However, this finding aligns with the theoretical framework adopted in this study, which emphasizes the role of diagnostic capacity, institutional effectiveness, and access to occupational health services in shaping registered occupational disease statistics. In more developed regions, higher HDI values are often accompanied by stronger occupational health infrastructures, increased awareness among workers and physicians, and more effective reporting mechanisms, leading to higher recorded incidence rates rather than necessarily higher true disease prevalence (Gümüş & Gülsün, 2017; Rosenstock et al., 2006).

Conversely, the strong negative correlation observed between occupational disease incidence and GDP per capita suggests that periods of economic contraction may exacerbate occupational health risks or reduce preventive investments by employers. Economic downturns are frequently associated with cost-cutting strategies, increased work intensity, and reduced compliance with occupational health and safety regulations, all of which may contribute to heightened exposure to occupational hazards. At the same time, declining income levels may limit employers' and workers' capacity to access preventive services, thereby increasing the likelihood of occupational diseases (Songur & Songur, 2018; Takala et al., 2024).

The positive association between inflation and occupational disease incidence further supports this interpretation. High inflation environments tend to place additional financial pressure on firms, particularly small and medium-sized enterprises, which constitute the majority of workplaces in Türkiye. Under such conditions, occupational health and safety measures are often perceived as cost burdens rather than long-term investments, potentially increasing exposure to occupational risks. Similar observations have been reported in studies examining the relationship between macroeconomic instability and occupational health outcomes in developing and middle-income countries (Songur & Songur, 2018; Yılmaz, 2010).

Regional disparities identified in this study also warrant careful consideration. The higher incidence rates observed in industrialized regions such as Eastern Marmara, Istanbul, and the Western Black Sea should be interpreted within the context of both higher exposure to industrial hazards and more

developed diagnostic and reporting systems. In contrast, the lower incidence rates reported in less industrialized regions likely reflect underdiagnosis and underreporting rather than a genuinely lower occupational disease burden. This finding underscores the importance of interpreting occupational disease statistics as indicators of registered cases rather than absolute measures of true disease prevalence, a limitation widely acknowledged in the occupational health literature (Ilıman, 2015; Karadeniz, 2012).

In this study, occupational diseases in Türkiye were examined through an analysis of the existing literature and secondary data obtained from the Turkish SSI, and Eurostat (Eurostat, 2025). A correlation analysis was conducted to explore how the incidence of occupational diseases has evolved over time in relation to various development indicators. Consistent with the findings of Koçali (2023), this research focused exclusively on employees insured under the 4/1-a category in the SSI database, while excluding other insurance groups. This approach was adopted because both the Labor Law and the Social Security and General Health Insurance Law specifically address workers under 4/1-a category status. Accordingly, individuals insured under the 4/1-b (self-employed) and 4/1-c (public servants) categories were excluded from the analysis [6].

This interpretation is consistent with the findings reported by Karadeniz (2012), who similarly emphasized the role of institutional capacity in shaping registered occupational disease statistics. However, in the present study, Table 1 demonstrates a positive correlation between HDI and the incidence rate of occupational diseases in Türkiye.

Yılmaz (2010) noted that the total cost of workplace accidents and occupational diseases in industrialized countries ranges from 1% to 5% of their GDP, emphasizing that such costs impose a significant economic burden, particularly on developing nations. Supporting this perspective, Songur and Songur (2018) analyzed 2015 data to assess the significance of workplace accidents and occupational diseases, as well as the responsibilities of social partners. Their findings revealed that most workplaces in Türkiye are small- and medium-sized enterprises, which often perceive occupational health and safety measures as financial burdens. In line with these observations, Table 1 in the current study indicates a positive correlation between the incidence rate of occupational diseases and inflation, suggesting that the sharp increase in inflation in Türkiye may have contributed to the rise in occupational disease cases.

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[6]Please visit the official website 4857 Labor Law No https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=4857&MevzuatTur=1&MevzuatTertip=5 .

Gümüş and Gülsün (2020) discussed how rapid technological advancements, while improving quality of life, also introduce new risks to both individuals and the environment. They emphasized that increased industrialization, combined with inadequate workplace safety measures, has led to a rise in workplace accidents, occupational diseases, and environmental pollution posing serious threats to human health and ecological balance. The authors further highlighted that the material and non-material losses resulting from such incidents constitute major obstacles for developing countries. Moreover, Gümüş and Gülsün (2017) identified a negative relationship between HDI and economic growth rates, suggesting that developing countries often struggle to provide high living standards for their populations. This pattern was evident in Türkiye between 1998 and 2014. The analysis of Table 1 in the present study confirms that this negative association between HDI and economic growth persisted during the period from 2013 to 2022. Specifically, Table 2 shows a strong positive correlation between occupational disease incidence and HDI ($r = 0.867$, $p < 0.01$), and a strong negative correlation between occupational disease incidence and GDP per capita ($r = –0.903$, $p < 0.01$), providing empirical support for this relationship.

Ilıman (2015) reported that diagnostic systems and workplace inspections in Türkiye were inadequate and that the number of occupational diseases showed a general downward trend between 2000 and 2012. In contrast, data presented in Table 1 of this study reveal that the incidence rate of occupational diseases generally increased between 2013 and 2022. This rise is likely linked to the enactment of the Occupational Health and Safety Law on June 29, 2012, which came into force on January 1, 2013, facilitating improved identification and reporting of occupational diseases. As observed in this study, the incidence rate increased from 2.67 in 2013 to a peak of 6.8 in 2019, followed by a decline to 4.81 in 2022. This decrease may be attributed to COVID-19-related restrictions or potential diagnostic inaccuracies in identifying occupational diseases during the pandemic. Although the enactment of Occupational Health and Safety Law No. 6331 has increased institutional awareness and reporting capacity for occupational diseases, its implementation has not been homogeneous across regions and sectors in Türkiye. Previous studies indicate that industrialized regions benefit from greater access to authorized healthcare facilities, more effective occupational health services, and stronger reporting mechanisms, whereas less industrialized regions continue to face limitations in diagnostic and registration capacity (Ilıman, 2015; Karadeniz, 2012; Koçali, 2023).

In this context, the higher incidence rates observed in regions such as Eastern Marmara, İstanbul, and the Western Black Sea may reflect not only a higher underlying disease burden but also more effective diagnostic and reporting

systems. While this does not invalidate the findings of the present study, it necessitates interpreting the results within the framework of "registered occupational diseases." The regional and sectoral variation in diagnostic and reporting practices therefore represents both a key finding of this study and a structural issue that should be addressed in occupational health policy planning.

Koçali (2023) analyzed data from the SSI to determine the provinces where workers diagnosed with occupational diseases were employed between 2011 and 2021. His findings indicated that the provinces with the highest number of reported occupational diseases included Istanbul, Zonguldak, Kocaeli, Kütahya, Ankara, İzmir, Bursa, Balıkesir, Sakarya, Manisa, and Tekirdağ. In parallel, the present study analyzed occupational disease incidence rates among employees with 4/1-a category insurance status across 12 regions of Türkiye between 2013 and 2022. Consistent with Koçali's (2023) findings, the highest incidence rates were observed in the Eastern Marmara, Western Black Sea, Western Marmara, and Istanbul regions (Figure 1). Conversely, lower incidence rates were recorded in the eastern regions, suggesting a direct correlation between occupational disease incidence and regional industrial development. This finding indicates that the prevalence of occupational diseases increases with the level of urbanization and industrialization. Furthermore, the analysis of Figure 3 demonstrates that provinces reporting occupational diseases between 2013 and 2022 are predominantly concentrated in industrialized areas, reinforcing this conclusion.

Conclusion and Recommendations

Conclusion

This study analyzed the trends in occupational diseases in Türkiye between 2013 and 2022, focusing on dependently employed workers (4A category) following the enactment of the Occupational Health and Safety Law No. 6331. The results demonstrate a significant disparity between the expected burden of occupational diseases and the officially recorded figures. Although the incidence rate rose from 2.67 per 100,000 workers in 2013 to a peak of 6.79 in 2019, these figures remain well below global ILO estimates, confirming the persistence of a serious "under-reporting" and "under-diagnosis" problem in Türkiye. The decline observed in 2022 (4.81) is attributed to the diagnostic disruptions caused by the COVID-19 pandemic rather than an actual improvement in workplace safety.

The statistical analysis revealed two critical dynamics regarding socioeconomic development:

• The "Better Development, Better Reporting" Paradox: A strong positive correlation was found between the Human Development Index (HDI) and recorded occupational diseases (r=0.867). This indicates that regions with higher industrialization and development (such as Eastern Marmara and Istanbul) possess better diagnostic and reporting capacities, whereas lower numbers in less developed regions likely reflect "invisible" unregistered cases rather than safer conditions.

• The Economic Vulnerability Factor: A strong negative correlation with GDP per capita (r=-0.903) and a positive correlation with inflation (r=0.794) suggest that economic instability exacerbates occupational health risks. During periods of economic downturn and high inflation, safety measures may be compromised, particularly in Small and Medium Enterprises (SMEs), leading to higher disease incidence.

Recommendations

Based on these findings, the following policy recommendations are proposed:

• Targeted Regional Surveillance: Inspection and diagnostic capacities must be urgently strengthened in regions with low HDI and low reported cases (e.g., Eastern and Southeastern Anatolia) to uncover the "invisible burden." Conversely, in high-incidence industrial hubs like Eastern Marmara, the focus should shift to advanced prevention technologies.

• Economic Support Mechanisms: Given the link between high inflation and increased occupational diseases, policymakers should introduce financial subsidies or tax incentives for OSH investments specifically for SMEs during periods of economic instability to prevent safety budget cuts.

• Closing the Diagnostic Gap: To align Türkiye's statistics with ILO expectations, the integration between the Ministry of Health and the Social Security Institution (SGK) databases should be improved. Training for physicians on recognizing work-related diseases should be expanded to reduce the under-diagnosis rate.

Holistic Policy Making: Occupational health strategies must be integrated with macroeconomic policies. Reducing income inequality and ensuring economic stability should be viewed as indirect but effective tools for improving worker health.

Limitations of the Study

A primary limitation of this study is its exclusive focus on employees registered under the 4/1-a category (dependently employed workers) of the SSI. Although

self-employed individuals (Category 4/1-b) are also covered by occupational accident and disease insurance under the Turkish social security system, they were excluded from this analysis. This exclusion was intentional to ensure data homogeneity, as the working conditions, reporting mechanisms, and legal responsibilities for dependently employed workers differ significantly from those of the self-employed. Accordingly, all data regarding the number of insured workers and occupational disease cases utilized in this study were specifically retrieved from the statistical tables designated for the 4/1-a category in official SGK reports. Consequently, the findings reflect the trends associated with dependently employed workers and may not be generalizable to the entire insured workforce in Türkiye.

Genişletilmiş Özet

Bu çalışma, Türkiye'de 2013–2022 yılları arasında meslek hastalıklarının eğilimlerini ve bu eğilimlerin temel sosyoekonomik kalkınma göstergeleriyle ilişkisini incelemektedir. Araştırma, 2012 yılında yürürlüğe giren 6331 sayılı İş Sağlığı ve Güvenliği Kanunu sonrasında geçen on yıllık süreci kapsamaktadır. Amaç, meslek hastalıklarının zaman içindeki değişimini ve bu değişimlerin toplumsal ve ekonomik koşullarla nasıl şekillendiğini ortaya koymaktır.

Çalışma, SGK, TÜİK ve Dünya Bankası gibi kurumlardan elde edilen ikincil verilere dayalı retrospektif bir araştırmadır. İncelenen değişkenler arasında meslek hastalıklarının görülme sıklığı, 4/1-a kapsamındaki sigortalı işçi sayısı, İnsani Gelişmişlik Endeksi (İGE), kişi başına düşen gayrisafi yurt içi hasıla (GSYH), enflasyon oranı, Gini katsayısı ve meslek hastalıklarına bağlı sürekli iş göremezlik vakaları yer almaktadır. Veriler, Spearman korelasyon analizi ile değerlendirilmiştir.

Bulgulara göre, meslek hastalıklarının görülme sıklığı 2013'te 100.000 çalışan başına 2,67 iken, 2019'da 6,79 ile zirveye ulaşmış, ardından 2022'de 4,80'e gerilemiştir. Bu düşüş, büyük olasılıkla COVID-19 pandemisi sırasında yaşanan bildirim eksikliklerinden kaynaklanmaktadır. Benzer şekilde, meslek hastalıklarına bağlı sürekli iş göremezlik oranı da 2013'te 0,23 iken 2019'da 3,19'a yükselmiştir; bu artış, yasanın etkisiyle tanı ve raporlamada yaşanan gelişmeleri yansıtabilir.

Meslek hastalıkları ile İnsani Gelişmişlik Endeksi arasında güçlü bir pozitif korelasyon ($r = 0{,}759$; $p < 0.05$), kişi başına düşen gelir ile ise anlamlı negatif bir korelasyon ($r = –0.903$, $p < 0.01$) tespit edilmiştir. İGE ile yıllar arasında da güçlü pozitif ilişki gözlenmiştir ($r = 0{,}944$). Enflasyon oranı ile meslek hastalığı sıklığı arasında da pozitif bir ilişki bulunmuştur; bu da makroekonomik istikrarsızlığın iş sağlığı risklerini artırabileceğine işaret etmektedir.

Bölgesel düzeyde değerlendirildiğinde, en yüksek meslek hastalığı sıklığı Doğu Marmara (16,62/100.000), Batı Karadeniz ve İstanbul'da görülmüştür. Bu bölgeler, sanayileşmenin yoğun olduğu alanlar olup, sanayi yoğunluğunun iş sağlığı üzerindeki etkisini yansıtmaktadır. En düşük oranlar ise sanayi faaliyetlerinin sınırlı olduğu Doğu ve Güneydoğu Anadolu bölgelerinde kaydedilmiştir; bu durum, gelişmişlik düzeyiyle doğrudan ilişkili olabilir.

Tartışma bölümünde, Türkiye'de meslek hastalıklarına ilişkin raporlama sistemlerinin ve tanı süreçlerinin eksikliklerine dikkat çekilmektedir. Daha gelişmiş bölgelerdeki daha yüksek vaka sayıları, tanı ve kayıt sistemlerinin etkinliğinden kaynaklanabilir. Ayrıca, ekonomik zorluklar ve artan enflasyonun işverenlerin iş sağlığı ve güvenliği yatırımlarını kısıtlayarak riski artırabileceği vurgulanmaktadır. 6331 sayılı kanunun uygulamaya girmesiyle birlikte artan farkındalık, raporlamadaki yükselişi kısmen açıklayabilir.

Çalışma, Karadeniz (2012), Gümüş & Gülsün (2017) ve Koçali (2023) gibi araştırmacıların bulgularıyla karşılaştırılmıştır. Karadeniz'in küresel düzeyde İGE ile iş kazaları arasında ters ilişki olduğunu belirttiği çalışmasının aksine, bu çalışmada pozitif bir ilişki görülmektedir. Bu farklılık, gelişmiş bölgelerde tanı kapasitesinin artmış olmasından kaynaklanabilir. Ayrıca, Gümüş & Gülsün'ün sanayileşme ve ekonomik kırılganlıkla artan meslek hastalıkları riskine ilişkin değerlendirmeleri bu çalışma ile uyumludur. Koçali'nin bölgesel analizleri de çalışmanın bulgularını desteklemektedir.

Sonuç olarak, Türkiye'de meslek hastalıklarının son 10 yılda artış gösterdiği ve bu artışın sadece işyeri koşullarıyla değil, aynı zamanda bölgesel ve ekonomik faktörlerle de yakından ilişkili olduğu görülmektedir. Bu nedenle, meslek hastalıklarının önlenmesine yönelik politikaların yalnızca sektörel riskleri değil, aynı zamanda bölgesel sosyoekonomik eşitsizlikleri de dikkate alacak şekilde tasarlanması gerekmektedir. Tanı sistemlerinin güçlendirilmesi, raporlama süreçlerinin iyileştirilmesi ve sanayileşmiş bölgelerde önleyici tedbirlerin artırılması, Türkiye'de meslek hastalıklarının yükünü azaltmada önemli bir rol oynayacaktır.

Contributions

Author Contributions

Study design: MK, LK, AG, EÇ; data collection: LK, AG, EÇ; data analysis: LK, AG; study supervision: LK, MK; manuscript writing: LK, AG, EÇ; critical revisions for important intellectual content: LK, MK.

Competing Interests

The authors declare that there are no conflicts of interest.

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Ethics Statement

Ethical guidelines were strictly followed throughout all stages of the research, and the study was conducted in accordance with the principles outlined by the Committee on Publication Ethics (COPE).

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