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A General Evaluation of the Concept of Occupational Safety In Food and Beverage Sector

Yiyecek İçecek Sektöründe İş Güvenliği Kavramına Yönelik Genel Bir Değerlendirme

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A General Evaluation of The Concept of Occupational Safety in Food and Beverage Sector

ABSTRACT

Nutrition ranks among the most fundamental human needs. People eat not only to sustain their vital functions but also for many other reasons, such as to enjoy themselves, socialise, relax, fulfil themselves, etc. The food and beverage sector, which is part of the service industry, aims primarily to meet nutritional needs and, more specifically, other individual needs. The food and beverage sector is a rapidly developing sector in recent years, with both the number of employees and beneficiaries increasing day by day. In the food and beverage sector, which is one of the most fundamental steps in the service sector, kitchen management in state institutions in particular is outsourced to contractor companies, and subcontracted workers are employed in these positions. The service that begins in the kitchen continues with the service and then ends again in the kitchen. Personnel involved in this process face various safety and health risks in the workplace. Wet, hard and slippery floors; cutting tools; powerful machines; cleaning and hygiene products; cooking pots; flames, hot ovens and hoods; deep freezers; gas leaks and service errors are among the many factors that pose significant safety issues for workers. This study reviews occupational health and safety in the food and beverage services sector and synthesises relevant evidence to outline the main hazards and work-related health outcomes affecting workers.

Keywords- Occupational Health and Safety, Food and Beverage Sector, Unsafe Conditions, Unsafe Behaviour, Workplace Hazards and Risks

Highlights

- This research is based on the hypothesis that personnel working in the food and beverage services sector are at high risk in terms of occupational health and safety and that these risks need to be systematically assessed.
- The food and beverage sector is a rapidly growing area within the service sector. Occupational safety practices are particularly inadequate in kitchen services carried out by subcontractors in public institutions.
- There are numerous workplace hazards, such as wet and slippery floors, cutting tools, hot ovens, gas leaks, cleaning chemicals, and machines.
- Literature reviews show that occupational safety in the sector is inadequate.

Yiyecek İçecek Sektöründe İş Güvenliği Kavramına Yönelik Genel Bir Değerlendirme

ÖZ

Beslenme, insanın en temel ihtiyaçları arasında yer almaktadır. İnsanlar sadece hayati fonksiyonlarını sürdürmek için değil, aynı zamanda eğlenmek, sosyalleşmek, rahatlamak, kendini gerçekleştirmek gibi birçok başka nedenlerle de yemek yerler. Hizmet sektörünün bir parçası olan yiyecek ve içecek sektörü, öncelikle beslenme ihtiyaçlarını ve daha spesifik olarak diğer bireysel ihtiyaçları karşılamayı amaçlamaktadır. Yiyecek ve içecek sektörü, son yıllarda hem çalışan sayısı hem de yararlanıcı sayısı her geçen gün artan, hızla gelişen bir sektördür. Hizmet sektörünün en temel adımlarından biri olan gıda ve içecek sektöründe, özellikle devlet kurumlarında mutfak yönetimi yüklenici firmalara ihale edilir ve bu pozisyonlarda taşeron işçiler istihdam edilir. Mutfakta başlayan hizmet, servis ile devam eder ve yine mutfakta sona erer. Bu sürece dahil olan personel, işyerinde çeşitli güvenlik ve sağlık riskleriyle karşı karşıyadır. Islak, sert ve kaygan zeminler; kesici aletler; güçlü makineler; temizlik ve hijyen ürünleri; tencereler; alevler, sıcak fırınlar ve davlumbazlar; derin dondurucular; gaz kaçakları ve servis hataları, çalışanlar için önemli güvenlik sorunları oluşturan birçok faktör arasındadır. Bu çalışma, yiyecek

ve içecek hizmetleri sektöründeki iş sağlığı ve güvenliğini gözden geçirerek, çalışanları etkileyen başlıca tehlikeleri ve işle ilgili sağlık sonuçlarını özetlemek için ilgili kanıtları sentezlemektedir.

Anahtar Kelimeler- İş Sağlığı ve Güvenliği, Yiyecek İçecek Sektörü, Güvensiz Durum, Güvensiz Davranış, İş Yeri Tehlikeleri ve Riskleri

Öne Çıkanlar

- Bu araştırma, yiyecek içecek hizmetleri sektöründe çalışan personelin iş sağlığı ve güvenliği açısından yüksek risk altında olduğu ve bu risklerin sistematik biçimde değerlendirilmesi gerektiği hipotezine dayanmaktadır.
- Yiyecek içecek sektörü, hizmet sektöründe hızla büyüyen bir alandır. Özellikle kamu kurumlarında taşeron firmalar aracılığıyla yürütülen mutfak hizmetlerinde iş güvenliği uygulamaları yetersizdir.
- Çalışma ortamında ıslak ve kaygan zeminler, kesici aletler, sıcak fırınlar, gaz kaçakları, temizlik kimyasalları ve makineler gibi çok sayıda fiziksel ve kimyasal risk faktörü vardır.
- Literatür taramalarında, sektörde iş güvenliğinin yetersiz olduğunu göstermektedir.

I. INTRODUCTION

The concept of occupational health and safety (OHS) has gained increasing importance in Türkiye in recent years. Policies aimed at preventing workplace accidents and occupational diseases in the sector are being developed and implemented. Even the smallest mistake in this area can lead to serious consequences. The food and beverage sector in Türkiye encompass a wide variety of establishments, including cafeterias, bakeries, bars, restaurants, hotels, public institution kitchens (schools, hospitals, military units, police stations, prisons, universities, etc.), canteens, and catering and event companies that provide food services to factories and businesses. Along with this diversity, looking at the statistics regarding the growing employment opportunities in the food and beverage sector each year, according to TUİK [1] July data, when the distribution of salaried employees by sector is examined, the number of salaried employees in the accommodation and food and beverage service activity sector is 1465017 people. According to data from the Social Security Institution statistics for 2024 [2], a total of 41393 workplace accidents occurred in the food and beverage services sector, resulting in the loss of 51 workers' lives. The breakdown of these accidents is as follows:

- Restaurants and mobile food services: 27987 accidents
- Catering businesses and other food services: 12198 accidents
- Beverage serving services: 1208 accidents

In addition to these figures, it is stated that 20 employees in the sector contracted occupational diseases. The food and beverage service sectors rank as the 11th most hazardous sector in terms of the total temporary incapacity rate, at 3.26%. Furthermore, to evaluate whether occupational accident patterns in the sector have continued despite the implementation of the Occupational Health and Safety Law No. 6331, SGK statistics covering the period from 2013 onwards were also reviewed in this study to identify long-term trends and changes in accident-related outcomes.

The food and beverage services sector involves a broad operational workflow and employs workers across diverse job functions, including purchasing, logistics, production, distribution, service delivery, and administrative processes. This multi-component structure may require fast-paced and intensive work routines, which increases the importance of maintaining continuous occupational health and safety training and effective workplace orientation practices. International labour market assessments indicate that hospitality-related industries are generally labour-intensive and may include a considerable share of temporary or seasonal employment, particularly in segments where labour demand fluctuates over time [3]. In addition, ILOStat sectoral datasets suggest that employment structures in service-based industries may be associated with varying levels of informal employment across countries, indicating that formal working arrangements and job security can differ between sub-sectors [4, 5]. Following the enactment of the Occupational Health and Safety Law No. 6331 in Türkiye, mandatory occupational safety training and certification processes have gained momentum in the sector [6]. From a scientific perspective, occupational risk in hospitality settings has been conceptualised not only as accident frequency but also as exposure-based hazard clustering involving physical, chemical, ergonomic, and psychosocial determinants [7, 8, 9]. Contemporary occupational health frameworks emphasise hazard interaction models, where environmental heat exposure, workload intensity, organisational structure, and behavioural safety compliance collectively shape injury probability rather than operating independently. International hospitality research has

identified kitchens as high-density risk environments characterised by simultaneous exposure to thermal, mechanical, chemical, and psychosocial stressors [8, 10]. Therefore, sector-specific risk assessment should be grounded in multidimensional occupational health theory rather than solely regulatory classifications.

II. METHODOLOGY

Research design: This descriptive and thematic study examined occupational health and safety risks, occupational diseases and psychosocial effects in the accommodation and food and beverage sector. The study evaluated national and international statistical reports, legislative texts and peer-reviewed scientific publications together.

Literature Search Strategy: The literature search covered the period from January 2006 to September 2025. The following databases and institutional sources were used: PubMed, Scopus, Web of Science, Google Scholar, International Labour Organisation (including the ILOSTAT database), Turkish Statistical Institute, Social Security Institution, Health and Safety Executive, World Health Organization, Occupational Safety and Health Administration.

Key terms used: 'Occupational health and safety', 'hospitality sector', 'food service workers', 'kitchen workers', 'occupational injuries', 'musculoskeletal disorders', 'work-related stress', 'tourism employment', 'digitalisation and OHS', 'ILO statistics' and 'SGK statistics', 'food & beverage sector' as well as their Turkish equivalents.

Eligibility criteria: Studies and reports were included if they (i) addressed occupational health and safety hazards, injuries, occupational diseases, or psychosocial outcomes among food service/hospitality workers or food and beverage sector; (ii) were published in English or Turkish; and (iii) fell within the January 2006–September 2025 time window. Records were excluded if they focused on unrelated sectors, were opinion pieces without empirical or institutional data, were duplicates, or had non-retrievable full texts. Screening and selection: Records were screened by title and abstract; full texts were reviewed when relevance to food service/hospitality OHS hazards or outcomes was unclear. Hazard categorisation and synthesis: Hazard categories were developed through narrative synthesis by grouping recurrent injury mechanisms and exposure types consistently reported across multiple sources; categories were retained when supported by at least two independent sources and were then discussed with source-specific citations in the relevant subsections.

III. THEMATIC REVIEW AND DISCUSSION OF THE LITERATURE

To determine the extent of occupational accidents and diseases across all sectors, the ILO (International Labour Organisation) conducts numerous studies and classifies both occupational accidents and diseases according to their frequency of occurrence. According to Law No. 5510 on Social Insurance and General Health Insurance, an occupational accident is defined as: an event that occurs while the insured person is at work or due to a task carried out by the employer, causing physical or mental harm. An occupational disease is a disease that affects the health of an employee permanently or temporarily due to repeated exposure or the conditions under which the work is carried out [11]. In 2010, the ILO revised occupational diseases and classified them as follows [12].

Occupational diseases arising from exposure to agents resulting from work activities

A. Occupational diseases caused by exposure to risk factors arising from work activities

A1. Diseases caused by chemical agents

A2. Diseases caused by physical agents

A3. Diseases caused by biological agents (infectious or parasitic diseases)

B. Occupational diseases by target organ/system

B1. Respiratory diseases

B2. Skin diseases

B3. Musculoskeletal disorders

B4. Mental and behavioural disorders

C. Occupational cancer

D. Other diseases

In Türkiye, the formal identification and classification of occupational diseases are defined within the framework of social insurance legislation, particularly through the annexes of the Social Insurance Health Procedures Regulation published in the Official Gazette [13]. This regulatory framework provides the legal and

administrative basis for the recognition and compensation of occupational diseases at the national level. In the present study, work-related health outcomes are analysed with reference to internationally recognised conceptual classifications and sector-specific exposure patterns relevant to food and beverage services, to ensure analytical comparability and sectoral relevance.

Official statistics published by the Social Security Institution (SGK) provide a comprehensive overview of occupational accidents and work-related health outcomes in the food and beverage services sector. Table 1 presents the number of registered workplaces, insured employees, occupational accidents by gender, occupational disease cases, and fatal occupational accidents recorded between 2013 and 2024. The data reflect officially registered and compensated cases within the national social insurance system and allow for an assessment of long-term sectoral trends.

Table 1. Occupational accident and disease statistics in the food and beverage services sector, 2013–2024[14]

Year	Workplaces	Insured Employees	Occupational Accidents (Men)	Occupational Accidents (Women)	Occupational Diseases (Men)	Occupational Diseases (Women)	Fatal Occupational Accidents (Men)	Fatal Occupational Accidents (Women)
2013	87094	477749	4675	1759	1	0	7	1
2014	99177	564616	6233	2585	1	0	14	0
2015	105068	599124	7321	3137	0	1	18	6
2016	109416	609318	8863	3763	4	2	17	2
2017	118311	658546	11493	5331	1	5	25	3
2018	122194	668387	14689	7798	6	7	19	2
2019	128617	713057	16886	9083	6	10	20	2
2020	122507	625930	12240	5576	4	5	34	1
2021	132312	743975	19116	7904	16	16	35	3
2022	135840	795695	20686	11921	3	16	31	2
2023	138383	793225	21399	15356	11	6	42	2
2024	148484	858537	22441	18952	10	10	48	3

A longitudinal evaluation of SGK data from 2013 to 2024 indicates a substantial increase in both insured employment and reported occupational accidents in the sector. While employment nearly doubled during this period, the number of occupational accidents increased proportionally, and fatal cases demonstrated an upward trajectory after 2021. The temporary decline observed in 2020 corresponds with pandemic-related operational restrictions, suggesting external labour market influences on reporting patterns. However, the post-pandemic increase indicates that structural risk factors persist. When earlier data are compared with 2024 figures, it becomes evident that regulatory implementation alone has not resulted in proportional accident reduction, highlighting the need for improved enforcement and sector-specific prevention strategies.

A. Safety and Health Problems in The Food and Beverage Services Sector

Occupational injuries in hospitality settings have been examined in various national and international studies; however, research focusing specifically on kitchen-based task exposure and injury mechanisms remains comparatively limited [7, 8, 9].

To identify the most frequently reported occupational accident types in the food and beverage sector, a narrative literature review was conducted. Peer-reviewed studies, official institutional reports (ILO, HSE, SGK), and sector-specific safety publications were examined. Accident categories were derived by synthesizing recurrent injury types reported across multiple sources rather than from a single dataset. The synthesis focused on accident mechanisms that were consistently described across the reviewed sources, and each category was subsequently supported with explicit citations in the relevant subsections.

This does not necessarily indicate a lower prevalence of injuries but may reflect differences in reporting practices and research priorities across sectors. In many countries, young workers are frequently employed in restaurants, kitchens, and related service roles [15].

Globally, occupational accidents and diseases continue to represent a major public health concern. According to the International Labour Organization (ILO), approximately 2.93 million deaths occur annually due to work-related accidents and diseases worldwide [16]. A considerable proportion of these outcomes arise in labour-intensive sectors where occupational safety measures may be insufficient. Technological advancements, changing organisational practices and economic pressures have substantially reshaped occupational safety landscapes, contributing to the emergence and increased reporting of diverse risk profiles including musculoskeletal disorders, psychosocial hazards, and respiratory conditions in work settings — with research indicating that digitalisation and evolving work processes are linked to both traditional and novel occupational risks [17, 18]. Detailed evidence from the occupational health literature shows that the adoption of ICT and digital technologies in workplaces can both reduce some physical hazards while simultaneously introducing new psychosocial and ergonomic challenges, and that the integration of modern technologies into OHS systems affects risk patterns in substantive ways that require updated frameworks for prevention and management [17].

Figure 1 presents fatal occupational injury rates per 100000 workers in accommodation and food service activities (ISIC Rev.4 Section I) for selected countries in 2022 and 2023, based on ILOSTAT data [19]. As illustrated in Figure 1, Türkiye showed an increase from 3.55 in 2022 to 5.24 in 2023, corresponding to the highest rate observed among the countries included in the analysis. France reported comparatively elevated levels (2.73 in 2022; 2.15 in 2023), while the United States recorded rates of 2.6 and 2.0, respectively. In contrast, Germany, Spain, and the Netherlands maintained relatively lower rates, remaining below 0.5 per 100000 workers in 2023.

These cross-country differences should be interpreted with caution, as variations in reporting systems, institutional coverage, labour force composition, and national injury registration practices may affect the comparability of the rates. Nonetheless, the findings suggest that fatal occupational injury risks in food and beverage sector remain a measurable and policy-relevant issue across diverse economic contexts (Figure 1) [19]. Figure 2 summarises common occupational health problem categories highlighted in the Health and Safety Executive's (HSE) food sector occupational health guidance [20].

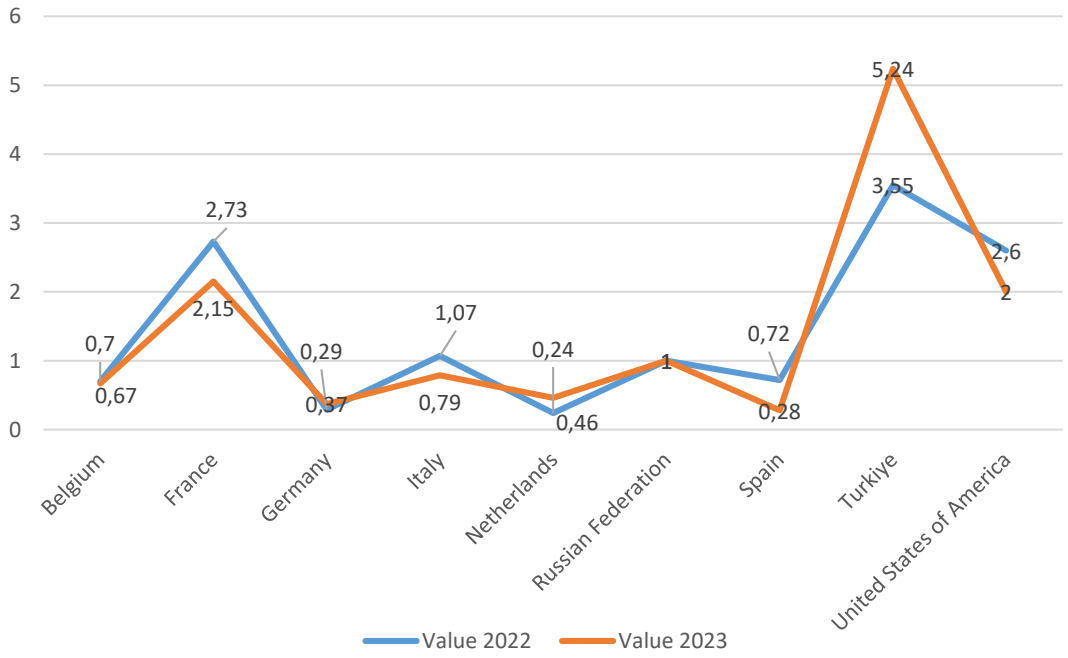

Figure 1. Fatal occupational injury rates in accommodation and food service activities (per 100.000 workers)[19]

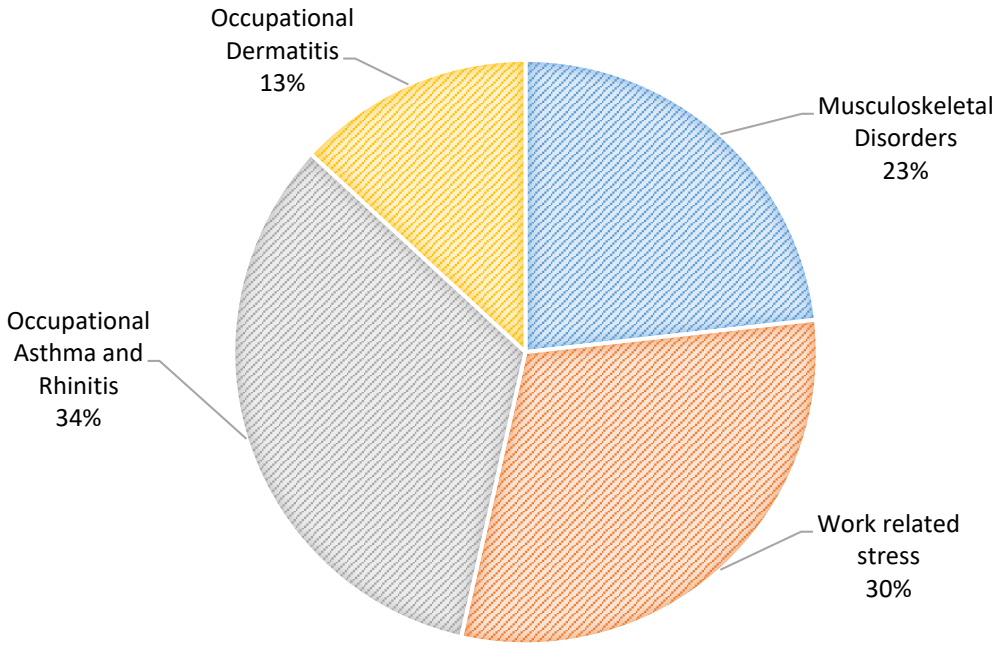

Figure 2. Common occupational diseases in the food and beverage sector [20]

When examining the sectoral distribution of workplace accidents in Türkiye, the food manufacturing industry accounts for 10% of all workplace accidents [2]. This percentage indicates that the food sector ranks among the more hazardous industries when compared to other economic sectors.

According to SGK 2024 statistics:

- A total of 41393 workplace accidents occurred in the food and beverage sector.
- In terms of fatal workplace accidents, the sector ranks among the top 10 most hazardous sectors.
- Gender distribution of employees who suffered work accidents: 22441 men, 18952 women.

Furthermore, the food manufacturing sector is among the top 10 sectors with the highest number of fatal accidents [2]. Looking at European countries in Figure 3, France had the highest number of fatal accidents in the food production sector in 2021 with 14 accidents, followed by Italy with 13 accidents [21].

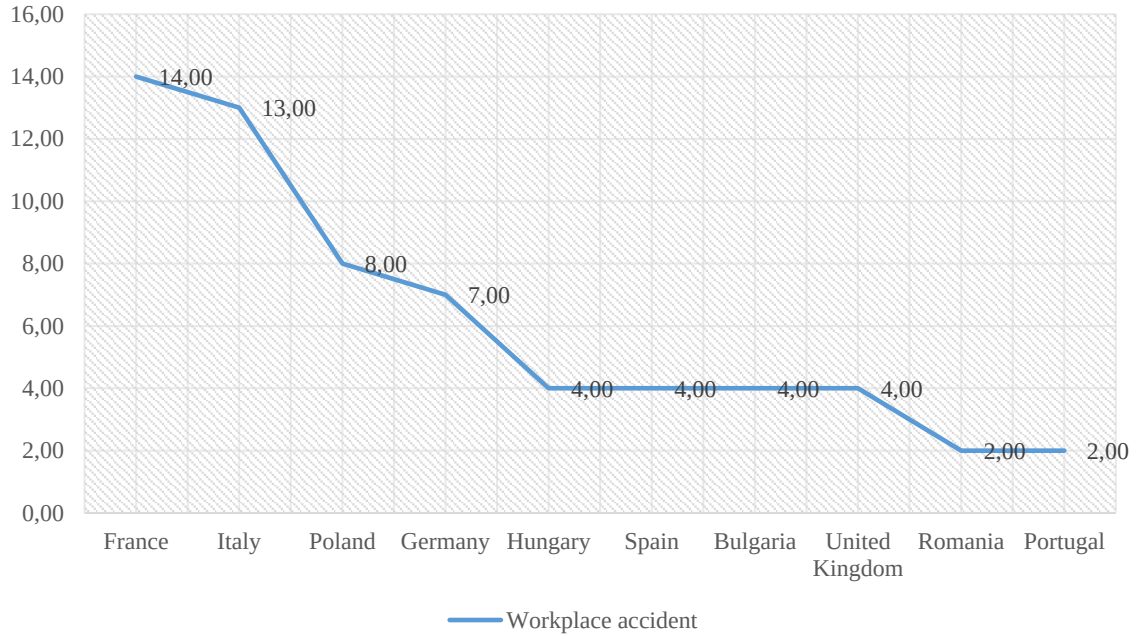

Figure 3. Fatal Work Accidents in the European Food Products Sector [21]

According to SGK statistics for 2013, there were 87094 workplaces in the food and beverage services sector in Türkiye, employing 477749 insured workers. In the same year, 4675 male and 1759 female employees, totalling 6434 insured workers, suffered work accidents, and 1 male employee contracted an occupational disease. As a result of work accidents, 7 male and 1 female employee lost their lives in the sector [22]. However, 11 years later, SGK statistics show that "according to the table showing the distribution of workplaces and the number of compulsorily insured persons covered by Article 4-1/a of Law No. 5510 by activity group, the number of workplaces in the food and beverage services sector was 148484, while the number of insured personnel working in these workplaces was 858537. In the same year, 22441 male and 18952 female employees working in food and beverage services, totalling 41393 insured employees, suffered work accidents, while 10 male and 10 female employees contracted occupational diseases. As a result of work accidents, 48 male and 3 female employees lost their lives in the sector [2].

The following subsections systematically categorise occupational risks in food and beverage sector according to exposure type and injury mechanism. Each category is discussed in relation to empirical findings, institutional safety guidance, and national statistical trends to ensure analytical coherence between hazard identification and prevention strategies.

Based on a narrative synthesis of sector-focused institutional guidance and empirical hospitality studies, the most frequently reported accident mechanisms in food and beverage workplaces include slips/trips/falls, cuts and lacerations, burns and scalds, chemical-related poisonings, electrical incidents, cold-related injuries, and psychosocial problems [8, 23-26].

1. Falls and collisions: Accidents caused by slippery floors, unsuitable work areas and carelessness.
2. Cuts and lacerations: Accidents caused using knives, cutting machines, and glass materials.
3. Burns and scalds: Accidents caused by hot liquids, frying oils, and ovens.
4. Poisonings: Accidents caused by the incorrect use of chemical cleaning products and food hygiene issues.
5. Electric shocks: Accidents caused by the incorrect use of industrial kitchen equipment or deficiencies in electrical installations.
6. Freezer burns and cold-related injuries: Tissue damage due to prolonged exposure to cold.
7. Psychological and mental health problems: Increased stress due to excessive workload, shift work and customer relations.

Despite efforts to keep pace with technological developments, which have increased from day to day, the sector cannot produce products without human labour and skill. Particularly in catering businesses, as well as in the goods reception areas, cold stores, and preparation and pre-preparation sections of large five-star hotels, it is necessary to maintain high levels of safety precautions during the stages of purchasing, storage, transportation, food production, service, and distribution, while also striving to prevent health problems during this process. As those working in the sector are racing against time, accidents at work mostly occur because of carelessness and insufficient precautions. The safety and health problems experienced in the food and beverage sector are described in detail below.

Collisions and falls: Slips, trips, and falls are consistently reported as one of the leading causes of occupational injuries in hospitality and food service environments. Empirical studies conducted among kitchen workers and hotel staff indicate that wet floors, improper storage practices, and manual material handling are primary risk factors associated with fall-related injuries [8, 23-25]. Water in areas where vegetables and fruit are washed and in dishwashing areas, as well as grease and food residues on the floor in food preparation areas, cause collisions and falls. In warehouses, carelessness when unloading goods from vehicles in unloading areas, and unbalanced handling during transport and placement on shelves also cause collisions and falls. Furthermore, injuries from being crushed under heavy loads are observed when heavy loads are carried without assistance. In food production areas, slips occur during cleaning, especially at the end of the day, because of both detergent and water. Such situations can be prevented by constructing the production area using non-slip materials, removing excess water using squeegees after washing, and ensuring personnel wear non-slip slippers and boots.

Cuts: Knife-related injuries represent one of the most frequently reported accident mechanisms in kitchen environments [8, 23, 24]. Vegetable chopping, slicing and grating machines, mincing machines, electric saws used to cut meat carcasses, manual tools such as knives, cleavers and skewers, kitchen robots, industrial shredders and deli slicers can cause cuts. Mincer machines, in particular, cause finger amputations and deep wounds. To prevent such incidents, feeding should be done with the aid of a mallet. Steel mesh gloves and aprons should be worn, especially during meat cutting and carcass cutting. Indeed, a study conducted on hotel kitchen workers emphasised that cuts and injuries caused by knives and sharp-edged equipment are among the most common workplace accidents, and that regular maintenance of such equipment and the use of appropriate protective equipment significantly reduce the risk of injury [8].

In addition to knife-related injuries, institutional safety guidance for catering and hospitality settings notes that broken glassware and ceramic/porcelain materials constitute a recognised source of lacerations, particularly during service preparation and dishwashing activities [23, 24, 26]. Safety publications further emphasise the importance of proper handling and disposal of broken tableware and the use of appropriate protective gloves during cleaning tasks to reduce cut-related injuries [23, 24]. Accordingly, careful handling during service and dishwashing, the use of durable protective gloves, and the immediate removal of broken materials from the work area are recommended preventive measures [23, 24, 26].

Musculoskeletal disorders: According to SGK [2] data, the total number of musculoskeletal and connective tissue disorders is 100, with 66% of these cases being male employees and 34% female employees. The most common types of MSDs are chronic crepitant synovitis of the hand and wrist (n=30), lateral epicondylitis (n=33), medial epicondylitis (n=17), and tendon sheath abscess (n=12).

The most common types of MSDs are:

- Back pain and herniated discs (due to heavy lifting and prolonged standing, such as when working with boilers, thermoboxes, vegetable and fruit crates, etc.)
- Neck and shoulder pain (due to bending over and poor posture, such as washing vegetables, chopping, serving food in a bain-marie, washing dishes, rolling out dough, working continuously under a hood, etc.)
- Carpal Tunnel Syndrome (Nerve compression resulting from repetitive hand movements)

Kitchens are a workplace with long working hours, and a correlation has been found between kitchen workers and musculoskeletal pain [9, 27]. In many stages of food preparation, chefs and other kitchen workers may adopt inappropriate positions that can lead to musculoskeletal disorders and acute back pain [28].

Özcan and Kesiktaş reported that occupational back pain is frequently seen in workers engaged in physical activities such as lifting, lowering, carrying, bending forward, and turning, also known as manual handling tasks, and particularly in those working in the service and cleaning sectors, such as hotels and restaurants. The most common occupational musculoskeletal disorders include muscle strain, back pain, herniated discs, neck stiffness, cervical disc herniation, and carpal tunnel syndrome [29]. Implementing effective ergonomics programmes in the workplace is crucial for preventing musculoskeletal disorders. In implementing these programmes, it is important that employers and employees are aware of their responsibilities and fulfil them [30]. Indeed, a study conducted

on employees in the hospitality industry revealed that conditions such as prolonged standing and heavy lifting are among the most common work-related diseases causing musculoskeletal disorders [10].

Venous insufficiency and varicose veins: Prolonged standing is widely recognised in occupational health literature as a risk factor for lower extremity venous disorders, including venous insufficiency and varicose veins. Hospitality and kitchen workers often perform tasks that require long hours of static standing in high-temperature environments, which may contribute to circulatory strain in the lower limbs [9, 27]. Empirical research conducted in accommodation establishments has similarly identified prolonged standing and physically demanding tasks as common occupational health concerns among food service employees [10]. Static postures maintained over extended periods may result in fatigue in the lower extremities and lower back, potentially increasing the risk of venous and musculoskeletal strain [9, 27]. Preventive approaches described in occupational health literature include ergonomic interventions, task rotation, periodic posture changes, and scheduled rest breaks to reduce circulatory and musculoskeletal load in standing-intensive occupations [9, 10].

Burns: Employees are at risk of burns and scalds when performing cleaning tasks such as filling or emptying automatic dishwashers, continuous feed dishwashers and glass washers, or washing dishes and pots. Additionally, employees may be exposed to burns from hot surfaces, hot food and beverages, and hot oil, grease, and steam emitted from equipment such as stoves, grills, steam cookers, and deep fryers. Deep fryers are frequently identified as a major source of severe burn injuries in food service settings [24].

In occupational health literature, burns are commonly classified according to their causative mechanism, including thermal, chemical, and electrical burns [24, 28].

1.Thermal Burns:

- Resulting from exposure to hot water, steam, or cooking oils.
- Occur in industrial kitchens when boilers tip over or hot liquids are being transported.

2. Chemical Burns:

- They are caused by the incorrect use of cleaning products, disinfectants or industrial detergents.

3□. Electrical Burns:

- Resulting from faulty equipment, inadequate insulation, or unsafe handling practices in wet kitchen environments [24].

In large-scale catering operations, bulk cooking processes involving substantial volumes of boiling liquids may present significant scalding risks during transfer, draining, or lid-opening procedures [24]. Sudden steam release from pressurised or covered containers may lead to facial and upper-body burns if appropriate precautions are not observed. Preventive measures described in institutional safety guidance include safe transfer procedures, appropriate personal protective equipment, equipment maintenance, and staff training in burn prevention and emergency response [23, 24].

Workplace Transportation Hazards: According to sectoral safety reports and institutional data sources synthesised in this review, transportation-related incidents including forklift collisions and vehicle strike constitute a significant proportion of severe workplace injuries in food production and catering environments [23, 31]. Each year, more than 200 people are struck by forklifts and other vehicles in food and beverage factories, often resulting in serious injuries. The main causes of injury are vehicle collision (excluding forklifts) (31%), forklift accident (26%), falling from a vehicle (22%), being crushed between a vehicle or wall (6%), being trapped under an overturned forklift (6%), and being crushed between two vehicles (5%). Furthermore, when forklift accidents are examined, it was found that in 28% of cases the forklift was in reverse gear (compared to 21% of cases involving other vehicles) [31]. Preventive strategies include clearly designated pedestrian and vehicle routes within storage and loading areas, mandatory forklift operator certification, reversing alarm systems, speed limitation policies, and installation of convex safety mirrors in blind-spot zones. Physical separation barriers between pedestrian walkways and vehicle traffic areas are recommended to minimise collision risk in hospitality and catering facilities [23, 31].

Hazards associated with deep freezers: The food industry has also been affected by rapid developments in the food and beverage sector, and many raw materials used in the industry have begun to be supplied frozen to increase production speed. Raw materials used in the sector, ranging from frozen onions, peas, corn, strawberries, pastries to meat, are stored in refrigerators at -20/-30$^{\circ C}$.

Deep freezers pose a serious risk in terms of hypothermia and cold burns. According to research, personnel working in cold environments below -18°C for more than 15 minutes are at risk of serious tissue damage. Based on institutional safety guidance and occupational health recommendations addressing cold-environment exposure risks, the following preventive measures are commonly recommended [32].

- A two-person working system should be implemented (one inside, one outside).
- Freezer doors should be designed to open from the inside.
- Protective gloves and clothing must be mandatory.
- Emergency stop buttons and alarm systems must be present.

In businesses using deep freezer systems located in rooms, doors should open from the inside, and emergency warning systems and systems that detect the presence of people inside must be in place. The presence of these systems prevents people from becoming locked inside cold room systems.

Skin diseases: Occupational dermatological risks discussed in this section were identified through synthesis of hospitality-focused occupational health literature and institutional safety documents addressing wet work and chemical exposure in food service environments [23, 34]. Prolonged contact with water, cleaning agents, acidic washing solutions used for fruits and vegetables, and direct handling of meat, fish, and spices may increase the risk of irritant and allergic contact dermatitis. Cross-contamination and inadequate hygiene practices may further contribute to the transmission of infectious skin conditions in kitchen environments. Institutional guidance also highlights the importance of appropriate glove selection and regular skin protection measures to reduce dermatological risks in hospitality workplaces [23]. Risk reduction strategies include limiting wet-work duration, appropriate glove selection, and regular skin protection training in accordance with occupational dermatology guidelines [23].

Hearing loss: Noise sources in the sector include the sounds produced by hoods, cutting and shredding tools, dishwashers, etc. In discos and bars, constant exposure to high noise levels causes hearing loss in employees. As in all other sectors, the most appropriate protection against noise in the food industry is achieved by preventing noise at its source. Therefore, attempting to protect against noise using personal protective equipment should be considered a last resort, and instead, the aim should be to reduce noise by tackling it at its source. When purchasing new equipment, the noise level it will generate in the working environment and the total noise level it will create in conjunction with other equipment operating in the same environment should be considered. Existing equipment with high noise levels should be moved as far away from workers as possible and isolated with soundproofing around it. Noise exposure control strategies should include periodic noise mapping, equipment isolation, and engineering controls before reliance on personal protective equipment [33].

Poisonings: Improper dilution or mixing of cleaning agents may result in the release of hazardous gases, while inadequate ventilation and gas system failures may increase the risk of inhalational exposure. Foodborne illnesses are primarily associated with inadequate hygiene practices, improper storage, and cross-contamination processes in kitchen environments. These risk patterns have been consistently reported in sector-focused occupational safety publications and regulatory guidance documents [23]. Preventive measures include strict chemical segregation protocols, ventilation control systems, gas leak detection devices, and mandatory Safety Data Sheet training for cleaning agents [23, 24].

Infections: Along with serious infectious diseases such as tuberculosis and hepatitis C, caution is also required regarding influenza, colds, or infectious skin diseases (fungal diseases). Furthermore, to prevent zoonoses from spreading to employees and customers through cross-contamination, suppliers must be carefully selected during the purchasing process, and control documents for meat, poultry, fish, and dairy products must be requested from the supplier to ensure that only safe products are used in production. The practice of carrier examinations, which were previously required for those starting work in the food and beverage sector and were carried out every three months, was abolished by Decree Law No. 663 dated 11.10.2011. From this date onwards, a health report is only required at the start of employment. According to the "Hygiene Training Regulation" published in the Official Gazette dated 05/07/2013 and numbered 28698 [34], all workplaces engaged in food production, such as hotels and motels, must ensure that their owners and employees undergo hygiene training, and the training received by employees must be documented. The best way to prevent infections in the sector is to be aware of the sources of transmission and take precautions accordingly. Although many infectious diseases are prevented from spreading to employees and customers through the reports obtained upon employment in the sector, employees must be particularly vigilant regarding certain infections that may arise during the process. Microorganisms causing to the diseases can be removed from tools and equipment through disinfection procedures applied in the sector, while individuals who are sources of infection can only be removed from the environment by granting them leave for treatment. The greatest responsibility of the employer is to grant individuals with infections leave for treatment until they recover and not to compromise on this issue.

Psychological problems: Psychosocial risk patterns discussed in this section were derived from systematic reviews and empirical hospitality research synthesised within the methodological framework of this study [35–38]. Empirical studies in hospitality settings have identified workload pressure, shift-based scheduling, and emotional labour requirements as significant predictors of anxiety and depressive symptoms among employees

[35, 36]. A recent systematic review focusing on food industry workers reported that approximately 52.3% of participants exhibited symptoms of anxiety, while 34.4% reported depressive symptoms [36].

Workplace bullying, low job satisfaction, and work–family conflict have also been associated with adverse mental health outcomes in tourism and hospitality contexts [37, 38].

Institutional data from the Health and Safety Executive further indicate that work-related stress represents a substantial proportion of occupational health concerns across sectors, highlighting the relevance of psychosocial risk management in labour-intensive industries such as food service [31].

Unsafe Behaviours: Due to the pressure and demands of meeting deadlines, the most common unsafe behaviours observed among sector workers include rushing, moving quickly, not using personal protective equipment (PPE), or using PPE improperly [25, 39]. Additionally, attempting to catch a falling knife, joking around with knives, or using knives as can openers are examples of unsafe behaviours [32]. Behaviour-based safety monitoring systems and near-miss reporting mechanisms are recommended to identify and reduce unsafe acts in hospitality settings [25, 39].

Excessive Heat and Heat Stress: Exposure to agricultural chemicals combined with excessive heat can adversely affect workers' health. Furthermore, it has been noted that as workers sweat, the rate of chemical absorption through the skin may increase. Heat stress in the workplace refers to the excessive heat load a worker may be exposed to. The causes include environmental conditions (air temperature and humidity), heat-emitting sources in industrial settings, and machinery [32].

Workplace Air Pollution: Poor air quality in restaurant kitchens can cause respiratory diseases in workers. Ventilation systems should be developed to prevent long-term health problems. For example, the use of charcoal during shish kebab preparation causes fine particulate matter (PM2.5) emissions and exposes workers to high levels of air pollution. Grill chefs, working long hours in poorly ventilated environments throughout the day, face serious health risks such as respiratory diseases, cardiovascular diseases, and even cancer [41].

Extreme Weather Events and Crisis Management: Extreme weather events such as heatwaves and storms can disrupt the food supply chain and affect the safety of food industry workers. Businesses should develop contingency plans to protect their workers [32].

B. Measures to Prevent Workplace Accidents

Although legislative progress has been achieved following the enactment of Law No. 6331, SGK statistics presented in Table 1 indicate that occupational accident and fatality figures in the food and beverage sector have continued to increase in parallel with employment growth [2, 3]. This trend suggests that implementation gaps, subcontractor oversight challenges, and limitations in injury reporting systems may persist despite formal regulatory measures. It is particularly important to raise workers' awareness of occupational safety and strengthen protective measures in labour-intensive sectors such as the food and beverage industry.

In this context, taking the measures outlined below will protect the physical and psychological health of sector employees and increase work productivity:

1.Strengthening Training and Awareness Programmes: Training programmes should be structured as task-based hazard education covering knife safety, burn prevention, chemical handling procedures, ergonomic lifting techniques, and cold-storage safety protocols in accordance with sectoral safety guidance [23, 24].

Technology-supported methods such as virtual reality-based safety simulations and digital reporting platforms have been shown to enhance hazard recognition and safe behaviour in kitchen environments [41].

2.Environmental and Thermal Risk Control: Environmental risk control measures in industrial kitchens should prioritise heat stress prevention, indoor air quality management, and ventilation efficiency. Prolonged exposure to high temperatures and steam accumulation may increase both physiological strain and accident risk [15]. Therefore, mechanical ventilation systems, local exhaust hoods, temperature monitoring devices, and structured rest schedules should be implemented. Periodic indoor air quality assessments and steam extraction controls are recommended to reduce respiratory and heat-related risks in enclosed kitchen environments [32, 40].

3.Taking Technical Measures to Prevent Workplace Accidents: Technical preventive measures may include automatic gas shut-off systems, deep fryer splash guards, non-slip industrial flooring, temperature alarm systems in cold storage units, and digital accident reporting platforms to enhance real-time hazard monitoring [23, 24, 32].

4.Psychological Health and Improvement of Working Conditions: Psychological health programmes should be implemented. Psychological counselling services should be provided in businesses so that employees can receive support for mental health issues such as depression, stress and anxiety [35]. Shift schedules should be

planned in a balanced manner. Working hours should be planned fairly and regularly to prevent employees from experiencing work accidents due to excessive fatigue. Anti-bullying policies should be established. Control mechanisms should be put in place and reporting systems should be implemented to prevent psychological pressure among employees in the workplace [36].

5.Strengthening Legal and Institutional Measures: Strengthening inspection mechanisms, improving subcontractor accountability, and enhancing digital injury reporting systems are necessary to address the increasing accident trends observed in SGK data (Table 1) [2]. Improved sector-specific reporting transparency would facilitate more accurate risk assessment and prevention planning. Detailed statistics should be published by the Social Security Institution (SGK) and the Ministry of Labour, and sectoral risk reports should be prepared annually. Inspections should be increased and sanctions strengthened. Inspections should be intensified for unregistered workers in terms of occupational safety, and criminal sanctions should be imposed on businesses in cases of occupational safety violations [22].

IV. CONCLUSION

This study evaluated occupational safety in food and beverage sector through the combined analysis of longitudinal national statistics (2013–2024 SGK data) and international occupational health literature. The findings demonstrate that, despite regulatory advancements following the enactment of Law No. 6331, occupational accident patterns in the sector have persisted in parallel with employment growth. Burns, slips and falls, musculoskeletal strain, chemical exposure, and psychosocial stress remain recurrent risk clusters within kitchen-intensive work environments. By moving beyond purely legislative definitions and adopting an exposure-based analytical framework, the study systematically categorised sector-specific hazards according to injury mechanisms and work process characteristics. The integration of institutional safety guidance with empirical hospitality research enabled the development of a structured prevention perspective that links identified risks to targeted control strategies. The longitudinal evaluation of SGK statistics highlights that regulatory presence alone is insufficient to ensure proportional reductions in accident incidence. Rather, effective prevention in this labour-intensive sector requires consistent enforcement, task-oriented training models, technological monitoring systems, and strengthened subcontractor oversight mechanisms.

Overall, this study contributes to the literature by providing a sector-focused occupational risk classification grounded in both national statistical evidence and international theoretical frameworks. Such an integrated approach offers a more empirically robust foundation for prevention planning and policy development in food and beverage services, where operational intensity and human-dependent processes continue to shape occupational risk dynamics.

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