Cadernos Brasileiros de Terapia Ocupacional
Brazilian Journal of Occupational Therapy

ISSN 2526-8910

Original Article

Self-reported occupational accidents and affecting factors among the adult population

Acidentes de trabalho autorreferidos e fatores que afetam a população adulta

Mikail Özdemir[a], Dilsad Save[b]

[a]Tuberculosis Dispensary, Osmaniye Community Health Center, Turkish Ministry of Health, Osmaniye, Turkey
[b]Public Health Department, Marmara University School of Medicine, Istanbul, Turkey

How to cite: Özdemir, M., & Save, D. (2020). Self-reported occupational accidents and affecting factors among the adult population. *Cadernos Brasileiros de Terapia Ocupacional*. *28*(4), 1193-1202. https://doi.org/10.4322/2526-8910.ctoAO2065

Abstract

Introduction: As official occupational accident records are insufficient in developing countries such as Turkey, self-reported numbers are a better reflection of the real scope of occupational accidents among Turkish workers. **Objective:** This study aims to determine the factors affecting occupational accidents in Turkey. **Method:** This cross-sectional study re-evaluated data from a total of 42,360 participants, were obtained from the 'Occupational Accidents and Occupational Health Problems' module of the Household Labor Force Survey conducted by TurkStat. **Results:** The prevalence of occupational accidents in the prior 12 months was 2.1%. The probability of an occupational accident for men was 1.78 times higher than for women (95% CI: 1.38-2.30). Workers who had not completed primary education [OR=1.91 (95% CI: 1.09-3.3)] and those who were divorced [OR=2.26 (95% CI: 1.40-3.63)] were more likely to have an accident at work, when compared to university graduates and unmarried employees, respectively. **Conclusion:** Male gender, low educational level, and divorced marital status can be considered risk factors and require more attention and a control program to prevent the loss of labor due to occupational accidents in Turkey. This is the first, most comprehensive, and up-to-date study using extensive national data to examine the factors that affect occupational accidents in Turkey.

Keywords: Occupational Health, Occupational Accidents Registry, Technical Report, Turkey.

Resumo

Introdução: Como os registros oficiais de acidentes de trabalho são insuficientes em países em desenvolvimento, como a Turquia, os números autorrelatados refletem melhor o escopo real do acidente ocupacional entre os trabalhadores turcos. **Objetivo:** Este estudo tem como objetivo determinar os fatores que afetam

Received on Mar. 5, 2020; 1st Revision on May 20, 2020; Accepted on July 20, 2020.

os acidentes de trabalho na Turquia. **Método:** Estudo transversal que reavaliou dados de um total de 42.360 participantes, obtidos no módulo 'Acidentes de trabalho e problemas de saúde ocupacional' da Pesquisa da Força de Trabalho Doméstica realizada pela TurkStat. **Resultados:** A prevalência de acidentes de trabalho nos últimos 12 meses foi de 2,1%. A probabilidade de um acidente de trabalho para homens foi 1,78 vezes maior que para mulheres (IC 95%: 1,38-2,30). Os trabalhadores que não concluíram o ensino fundamental [OR = 1,91 (IC 95%: 1,09-3,3)] e os que se divorciaram [OR = 2,26 (IC 95%: 1,40-3,63)] apresentaram maior probabilidade de sofrer um acidente de trabalho, quando comparados com graduados universitários e empregados solteiros, respectivamente. **Conclusão:** O sexo masculino, o baixo nível educacional e o estado civil divorciado podem ser considerados fatores de risco e requerem mais atenção e um programa de controle para evitar a perda de trabalho devido a acidentes de trabalho na Turquia. Este é o primeiro, mais abrangente e atualizado estudo, a partir de extensos dados nacionais, para examinar os fatores que afetam os acidentes de trabalho na Turquia.

Palavras-chave: Saúde do Trabalhador, Notificação de Acidentes de Trabalho, Relatório Técnico, Turquia.

1 Introduction

Occupational safety and health in the workplace are vital components of productive and effective work. An occupational injury is defined as any personal injury, disease, or death resulting from an occupational accident. Occupational disease, a disease contracted as a result of an exposure over a period of time to risk factors arising from work activity, is defined separately. An occupational accident is an unexpected and unplanned occurrence, including acts of violence, arising out of or in connection with work and that results in one or more workers incurring a personal injury, disease or death. Globally, 2.78 million work-related accident deaths occur annually, up from 2.33 million in 2014. There were 380,500 fatal accidents in 2014, an increase of 8% compared to 2010. Furthermore, 2.4 million occupational accidents and 374 million non-fatal occupational accidents occurred in 2015 (Hämäläinen et al., 2017).

In low- and middle-income countries, 18% of all deaths were the result of occupational accidents. In contrast, this ratio has been reported as 5% in high-income countries. This represents an enormous social and economic burden, especially for low- and middle-income countries, where a large proportion of the population is engaged in hazardous activities such as mining, agriculture, construction, and fishing (Takala et al., 2014). Two-thirds of work-related deaths occur in Asia, followed by Africa and Europe, with 11.8% and 11.7% of the deaths, respectively (Hämäläinen et al., 2017).

Accidents may occur in any sector and during work, on the way to work, or returning home from work. These acute events can lead to death or injury, and may also cause a temporary or permanent reduction in work capacity (Costa Neto, 2000). Because of the adverse effects of occupational accidents on human health, healthcare service, and the workforce, occupational accidents are considered a high-priority in

public health (Oztek, 2009). The economic costs of occupational accidents and work-related injuries and diseases are rapidly increasing. The International Labor Organization (ILO) reports that

> [...] while it is impossible to place a value on human life, compensation figures indicate that approximately 4% of the world's gross domestic product (GDP) disappears with the cost of diseases through absences from work, sickness treatment, disability, and survivor benefits (The International Labor Organization, 1999, p. 4).

In Turkey, Household Labor Force Surveys (HLFS) have been carried out regularly since October 1988 by the Turkish Statistical Institute (TurkStat) within the framework of the definitions and concepts adopted at the ILO's 13th Conference of Labor Statistics. The sample of TurkStat is representative of the whole country. Sampling procedure may be found elsewhere (Türkiye İstatistik Kurumu, 2014).

This study aims to analyze the factors affecting occupational accidents in Turkey, which are not represented in the original TurkStat report (Türkiye İstatistik Kurumu, 2014).

2 Method

In this cross-sectional study, data derived from the 'Occupational Accidents and Occupational Health Problems' module of the HLFS executed between April 2013 and June 2013 was re-evaluated after obtaining the permission of TurkStat. The TurkStat carries out the HLFS within the framework of ILO standards. Data from the 2013 'Occupational Accidents and Occupational Health Problems' module executed in 2013, the most recent data shared to date, was used in this study. These occupational accident rates are based on self-reporting and provide a more accurate overview of the true numbers as formal occupational accident records have been found to be far below the usual rate predictions.

A questionnaire was given to the interviewers via a face-to-face interview, and the data were recorded directly to the software. All settlements in Turkey were included in the study in the sample selection step. Settlements with a population of 20,001 and more were defined as 'urban,' and those with a population of 20,000 or less were described as 'rural.' Cluster sampling was executed in two stages, including the selection using random sampling of households (as primary units) and of an adult individual in this household (as secondary units). Sample weights were calculated for the primary sampling units (PSUs), households, and all its residents. A total of 42,360 sample households across Turkey (30,600 from urban and 11,760 from rural areas) were selected for the survey. The non response rate in the whole country was 9.1%, with non response rates of 8.8% and 9.2% in rural and urban areas, respectively.

A total of 49,797 individuals aged 15 and over were interviewed in the sample households. Data of participants older than the age of 15 was retracted, although the original data also included workers who were younger than 18 years of age. More details

on sample selection and weighting were shared in the NHS results (Türkiye İstatistik Kurumu, 2014).

Variables in the HLFS study were selected as independent variables for our research including; gender, age, education level, marital status, national status, place of residence, employment status, status of the current workplace, number of people working in the workplace, social security record, working style, main activity for the primary work according to the statistical classification of economic activities in the European Community (NACE Rev. 2), and work done in the primary workplace according to the International Standard Classification of Occupations (ISCO-08), etc. The major dependent variables of this study were occupational accident status, variables related to the accident were obtained from the 'Occupational Accidents and Occupational Health Problems' module.

All accidents that occurred in the workplace or during working hours and that resulted in an injury (regardless of severity) were considered as occupational accidents, regardless of whether injury caused incapacity or whether the incident is legally considered an occupational accident. Examples include getting his/her hand caught in a machine, falling down the stairs or food poisoning in the workplace or traffic accidents on the way to a meeting, etc.

Occupational accidents were considered those that involved individuals with regular or irregular employment in the 12 months prior to the study in an economic activity. Individuals may be employees with a daily wage/monthly salary, an employer, a self-employed worker, or unpaid family worker that earns income or contributes to the household income. Of the 38,794 people included in the study, 21,915 were actively employed, and 16,879 had been employed at some point during the 12 months leading up to the study.

Ethical approval was obtained from the Marmara University Faculty of Medicine Clinical Research Ethics Committee (with the protocol number 09.2016.469) and TurkStat.

Statistical analyses were performed using SPSS v.15.0 software. Data were presented according to weighting coefficients. Univariate comparisons of nominal variables were performed using the Pearson's chi-square and Fisher's exact tests. To determine the risk factors of occupational accidents, the effects of independent variables were evaluated using binary logistic regression analysis. A p value of less than 0.05 was considered statistically significant.

3 Results

The study included 49,797 individuals aged between 15 and 99. Of the participants, 52% were male and 48% were female. The mean age was 42.0±17.7 years and the median age was 40 years, while 19.6% of workers were aged between 15 and 24 years. Of the workers, 1.7% were born outside of Turkey. The highest level of education in 34.5% of participants was primary school. 66.3% were married and 72.3% lived in urban areas and 27.7% in rural areas (Table 1).

Table 1. Sociodemographic characteristics of participants.

		n	(%)
Gender	Female	23913	(48.0)
	Male	25884	(52.0)
Age group (years)	15-24	9756	(19.6)
	25-34	9330	(18.7)
	35-44	9596	(19.3)
	45-54	8636	(17.3)
	55-64	6292	(12.6)
	65 and over	6187	(12.4)
National Status	Turkish	48966	(98.3)
	Foreign citizen	831	(1.7)
Educational Level	Has not completed primary education	9009	(18.1)
	Primary School (5 years)	17170	(34.5)
	Secondary School (8 years)	9608	(19.3)
	General High School	4611	(9.3)
	Technical High School	3763	(7.6)
	Faculty	5636	(11.3)
Marital status	Unmarried	12240	(24.6)
	Married	33023	(66.3)
	Divorced	1146	(2.3)
	Widowed	3388	(6.8)
Place of residence	Rural Area	13743	(27.7)
	Urban Area	35948	(72.3)
Total		**49797**	**(100.0)**

Employment status and, in the case of employment, the type of workplace/institution, number of employees, employee social security status, and employment type are given in Table 2.

Table 2. Employment status, characteristics of workplace and social security record of participants.

		n	(%)
Employment status (n= 49797)	In employment	21915	(44.0)
	Unemployed	1974	(4.0)
	Non-labor force	25908	(52.0)
Status of the workplace (n= 21915)	Private sector	18619	(85.0)
	Public	3083	(14.1)
	Others (Foundation. cooperative. etc.)	213	(1.0)
Number of employees (n= 21915)	< 10 people	12818	(58.5)
	10-24 people	1725	(7.9)
	25-49 people	2573	(11.7)
	50-249 people	3099	(14.1)
	250-499 people	734	(3.3)
	≥ 500 people	966	(4.4)
Social security record (n= 21.915)	Registered	13406	(61.2)
	Unregistered	8509	(38.8)
Working style (n= 21.915)	Full-time	18937	(86.4)
	Part-time	2978	(13.6)

The number of accidents in the workplace or during work in the last 12 months that resulted in physical injury and information regarding these accidents are given in Table 3. Among the participants, 13,144 (64.7%) were not included in the analysis as they had not worked in the last 12 months. Of the participants who worked in the last 12 months (n=25,650), 539 (2.1%) experienced an occupational accident.

Table 3. The accidents in the workplace or during the work in the last 12 months resulted in physical injury, and information regarding these accidents.

		(n)	(%)	W[1] (%)
Occupational accident with physical injury in the last 12 months (n= 25.650)		539	(2.1)	(2.1)
Occupational accident type (n= 539)	Traffic accident on the road during work	156	(28.9)	(28.8)
	Occupational accidents other than traffic accidents	383	(71.1)	(71.2)
Which occupation is related to this accident (n= 539)	Current occupation	445	(82.6)	(82.3)
	Last occupation (for non-employed person)	54	(10.0)	(9.9)
	Others	40	(7.4)	(7.8)
Return time after last work accident (except accident day) (n= 539)	Never stayed away. continued his work (or less than 1 day)	191	(38.0)	(38.1)
	1-3 days	90	(17.9)	(18.2)
	4-13 days	90	(17.9)	(18.2)
	14-29 days	38	(7.6)	(7.3)
	≥ 1 month	94	(18.7)	(18.2)

[1]Weighted percent.

Factors associated with occupational accidents in the univariate analyses were included in the multivariate backward Wald logistic regression, in which the most appropriate model was obtained in Step 5. Variables included in the first step of multivariate analysis were age, gender, educational level, marital status, settlement status (rural vs. urban area), main workplace activity (according to NACE 09), workplace status, and weekly working hours. According to the analysis, the probability of an occupational accident in men was 1.78 times higher than that of women (95% CI: 1.38-2.30). Workers who has not completed primary education [OR=1.91 (95% CI: 1.09-3.3)], primary school graduates [OR=2.07 (95% CI: 1.31-3.26)] or secondary school graduates [OR=1.87 (95% CI: 1.15-3.03)] were more likely to have an accident at work than university graduates. Similarly, married [OR=1.33 (95% CI: 1.04-1.72)] and divorced/widowed [OR=2.26 (95% CI: 1.40-3.63)] workers had a higher probability of occupational accidents compared to unmarried employees. In consideration of the main activity of the employees, the odds ratio of an occupational accident in 'very hazardous' occupational groups such as mining was 4.81 (95% CI: 2.04-11.33) and the odds ratio in the construction sector was 2.35 (95% CI: 1.87-2.96).Both of these were higher than less hazardous occupational groups such as office work (Table 4).

Table 4. Multivariate analysis of the factors affecting occupational accidents.

		B	S. E.	Wald	p	OR	CI 95%
Gender	Male	0.578	0.131	19.524	<0.001	1.783	1.380-2.304
Educational Level	Faculty (≥13 years)			10.1	0.018		
	Has not completed primary education	0.647	0.282	5.258	0.022	1.91	1.099-3.321
	Primary education (1-8 years)	0.73	0.231	9.944	0.002	2.075	1.318-3.266
	Secondary education (9-12 years)	0.628	0.246	6.499	0.011	1.874	1.156-3.036
Marital status	Unmarried			12.196	0.002		
	Married	0.292	0.128	5.18	0.023	1.339	1.041-1.721
	Divorced/widowed	**0.816**	**0.242**	**11.35**	**0.001**	**2.261**	**1.407-3.635**
NACE 09	Less hazardous occupations			66.193	<0.001		
	Mining	1.571	0.437	12.902	<0.001	4.811	2.042-11.338
	Agriculture	0.243	0.144	2.838	0.092	1.275	0.961-1.692
	Very hazardous occupations	0.856	0.117	53.416	<0.001	2.355	1.872-2.963

B= coefficient of logistic regression. S.E.= standard error. p= p value. O.R.= odds ratio. CI= confidence interval.

4 Discussion

Our study was conducted utilizing microdata from the study 'Work Accidents and Work-Related Health Problems in Turkey' conducted by TurkStat in 2013. Considering its representative power, this study is the most comprehensive and up-to-

date study on the affecting factors of occupational accidents in Turkey. To our knowledge, this is the first study conducted using extensive national data related to occupational accidents in Turkey.

In 2013, 2.1% of workers employed during the 12 months prior to the study experienced a work accident in Turkey, a decrease from the accident rate of 3% in 2007. According to sector analysis, the work accident ratio in the mining and quarrying sector was 11.2%, followed by the electricity, gas, steam, water, and sewerage (4.9%) and construction (4.1%) sectors. The share of the occupational accidents in the mining and quarrying sector increased by 0.1%, while in contrast, the share in the construction sector decreased by 0.2% from 2007. The proportion of employees who had work accidents in the electricity, gas, steam, water, and sewerage sectors did not change. In the manufacturing industry, which had the largest share of occupational accidents, the rate of occupational accidents decreased by 1.4%from that in 2007 and became 3.7%.

According to studies on global occupational accidents, the number of occupational accidents per 100,000 workers was 639 in the United Kingdom, 3,753 in the United States, 7,609 in India, 7,858 in Poland, 8,442 in Kuwait, 9,392 in China, 12,843 in South Africa, 14,229 in Indonesia, and 15,063 in Brazil (Pearson, 2009). According to the abovementioned information, the majority of occupational accidents occurred in the manufacturing sector. Another study stated that the number of workers involved in occupational accidents per 100,000 workers was 3,959 in the United States, 4,852 in Canada, 2,434 in Japan and 632 in the United Kingdom (Hämäläinen et al., 2006). According to ILO data published in 2014, the incidences of occupational accidents per 100,000 employees was reported as913 in Australia, 48 in Bulgaria, 1,189 in Canada, 739 in Estonia, 3,141 in Mexico, 140 in Russia, 329 in the United Kingdom and 1,071 in the United States (ILO).

In occupational safety and occupational health definitions, occupations are categorized into three main groups: less hazardous, hazardous and very hazardous occupations. In our study, categories were based on the main workplace activities, in accordance with NACE 09. During the multivariate analyzes, agriculture, forestry, and mining sectors were excluded. This is due to the fact that the occupational injury rate and risk increase in miners were higher than in other highly hazardous sectors, according to the univariate analyses. In the multivariate analyses, the probability of a work accident in mining was 4.81 times higher than in less dangerous occupational groups such as office work and services.

In terms of demographic information, men were 1.78 times more likely to have an occupational accident than women. According to our study, the risk of occupational accidents increases as the level of education decreases; the probability of occupational accidents was 1.91 times higher in employees who did not graduate from school compared to postgraduates. Surprisingly, marital status also had an effect on occupational accidents. The probability of occupational accidents was 1.33 times higher in married and 2.26 times higher in divorced/widowed employees when compared to never-married workers. Asady et al. (2018) conducted a study in the same period in Iran and reported that the highest prevalence of occupational accidents was seen in the industrial sector during all years. In addition, severe accident outcomes were seen at older ages and in the male gender, married individuals, agriculture sector, and outside of the workplace (Asady et al., 2018). Their results are similar to those of our study.

One of the main limitations of this study was the exclusion of deaths due to work accidents. In Turkey, a considerable number of deaths occur as a result of occupational accidents. According to the Social Security Institution (SSI), the officially recorded number of deaths due to occupational accidents was 1,360 (1, 336 men and 24 women) in 2013 and a total of 1,626 (1,589 men and 37 women) deaths were reported in 2014 in Turkey (Sosyal Güvenlik Kurumu, 2013, 2014; Türk Mühendis ve Mimar Odaları Birliği, 2014). If informal deaths are taken into consideration, the number increases even more. When looking at data from the last three years in Turkey, more than 44.4% of the deaths due to occupational accidents occurred in construction-related sectors.

Britain's population, which has a population similar to Turkey's in magnitude, had 133, 142, and 144 worker deaths due to occupational accidents in statistical years of 2013/2014, 2014/2015 and 2015/2016, respectively (Taşyürek, 2017). More than half of the deaths resulting from occupational accidents and diseases occur in Asian, Southeast Asian, and Pacific countries (Karadeniz, 2012).

Another limitation of this study was the fact that occupational accidents were based on individual reports, and people may be afraid to report occupational accidents due to concerns over unemployment. Although reporting is legally mandatory, SSI statistics show that most work accidents are not officially registered. In our study, the ratio of occupational accidents was reported as 2.1 per 100 people, excluding deaths. However, this ratio was reported as 1.32 and 1.47 per 100 people in the 2013 and 2014 SSI statistics, respectively (Sosyal Güvenlik Kurumu, 2013, 2014).

5 Conclusion

Data on the occurrence of occupational accidents provided by the HLFS provides a valuable source of information which was unlikely to have been previously obtained. Since the HLFS is a population-based study, it is able to cover the entire population, including individuals working in unregistered sectors, which are not included in formal information systems (SSI, etc.). Therefore, the HFLS provides a more accurate estimate of the actual magnitude of the problem.

Occupational accidents are a significant public health problem affecting individuals, families, society, and the national economy. In order to prevent occupational accidents, it is necessary to understand and model the conditions leading to occupational accidents.

As a result, measures to be taken for risk groups (including male gender, low education level, divorcees/widows, workers in 'very hazardous' sectors such as mining, and employees who work for long hours) against physical injury may prevent the loss of lives and labor due to work accidents in Turkey.

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Author's Contributions
Mikail Özdemir and Dilsad Save authors were responsible for the conception, discussion and writing of the article. All authors approved the final version of the text.

Corresponding author
Mikail Özdemir
e-mail: mikail@dr.com