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Investigating Some Individual Factors Effect on the Consequence Severity of Occupational Accidents

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ABSTRACT

Most industrial accidents are due to unsafe behaviors in the workplace. Therefore, the present study was aimed to investigate the role of individual factors on the consequence of accidents. This descriptive-analytical study was carried out based on data obtained from 1048 accidents registered in the Labor Inspection Office of one of the industrial provinces of Iran. In this study, individual factors were extracted from accident reporting forms and analyzed by SPSS software version 18**.** In the current study, the results showed that the least number of accidents was related to employee who had a bachelor degree or above. Of 95% reported fatalities were male and 73% of them were married. The results of statistical test showed that there is a significant relationship between outcome type and marital status ($p < 0.001$). It was also found that the employees under 30 years old had the highest number of minor injuries and death. Fisher test showed a significant relationship between age and outcome ($p < 0.001$). All minor, major injuries and death cases occurred among workers with less than 5 years of work experience. Also the workers with 25-30 years of work experience had the lowest percentage of accidents. The results of Chi-square test showed no significant relationship between outcome type and work experience ($p < 0.001$). Individual factors such as gender, citizenship, age group, marital status, educational level, work experience and related work experience have an important role in the frequency and severity of accidents in industries.

Keywords: *Individual Factors, Occupational Accidents, Consequence*

INTRODUCTION

Occupational accidents are one of the most important causes of damages in an organization that can cause directly and indirectly financial and human damages in a productive organization [1]. These accidents have an economic and social impact on people's lives and shorten their years of life [2]. Accident control is one of the managers' main challenges of dealing with daily [1]. Despite the importance of health issues and the expansion of occupational safety and health programs, the risks and harms of the industrialization process and new technologies are still growing and various studies have shown that thousands of workers are exposed to different severity of occupational accidents [3]. According to the EU statistics, the numbers of work-related accidents were 3315,101 cases in 2017; in addition, occupational accident statistics in France accounted for 749670 cases and non-fatal accidents in

Germany accounted for 862983 cases [4]. Although there are different types of occupational accidents the main reasons are inappropriate conditions and practices at work [5]. Different studies have shown that accurate recording of occupational accidents based on the ILO recommendations and statistical analysis is one of the most important tools for implementing preventive strategies [6]. In addition, the issue of accident rates and their causes is also important to accurately record accidents. Occupational accident rates vary widely compared to the countries regarding differences in social status, religion, gender, age distribution of the working population, and type of industry [7].

The outcomes of various studies showed that the human factor such as human error or unsafe behaviors is known as the 80 to 90% main causes of occupational; therefore, analysis of individual factors (gender, age, experience, occupation, etc.) of workers involved in accidents is necessary to prevent occupational accidents [8]. In a study conducted by Smith and DJ showed a significant relationship among age, sex, marital status, level of education variables, and the variables of job design, type of job, industry, work experience, annual income, shift work, second job status [9]. The researches on the causes of accidents showed that the working conditions are the main cause of occupational injuries which can be referred to as the work environment, activities, work organization, and lack of training that leads to a lack of technical and professional knowledge [10-11]. However individual factors are known as the risk factors that many people are concerned about them including young age [12-13], body mass index [14-15] lack of experience [16], smoking [17], alcohol [18], and sleep disorders [19-22].

Camino et al. investigated some of the factors influencing the incidence of accidents such as age, work time duration, company size, accident cause, accident, accident time, and geographical area [23]. In order to prevent accidents, it is necessary to study accident statistics and near-accidents such as official labor department's reports. Unsafe behaviors and individual behaviors such as gender, citizenship, age group, marital status, level of education, general work experience and related work experience are effective factors in occupational occurrence. Therefore, the purpose of this study was to investigate the role of individual factors on the outcome of accidents according to the reports.

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MATERIALS AND METHODS:

This descriptive-analytical study was conducted based on the information obtained from the labor inspection office of one of the industrial estates of the country in 2017. In case of any accident, there should be prepared for an accident report form for all industries and documented in the provincial labor inspection office.

In this study, the related data were obtained from 1048 cases of accidents registered in the provincial labor inspection office. This form is used to record work-related accidents and is completed in the first place of reference for the injured person to receive health services. This form is divided into several general categories. The respondent should first fill in the place of referral of the accident. Thereafter, the characteristics of the time and place of the accident in terms of geographical location, number of personnel, and the unit of activity of the person affected by the accident should be determined. Then the demographic characteristics of the person are determined such as age, gender, education, etc.

In the next part of the questionnaire, the date and time of the accident as well as the outcome are specified. Finally, the cause of injury and treatment provided to the person is stated. In the present study, the required information was extracted from the system and then entered into SPSS software version 18. The frequency and frequency percentage of accidents were calculated based on demographic information including gender, nationality, age group, marital status, level of education as well as general work experience and related work experience. The outcomes were examined using chi-square and Fisher tests in three different groups including minor injuries, major injuries, and deaths.

In a study conducted by Davies et al. the outcomes were divided into two groups: MINOR and MAJOR. The minor injuries result in more than 3-days normal absence from work and major injuries are accidents that result in a specifically defined [24]. Finally, linear regression test was performed to

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determine the predictive power of individual factors on the type of outcomes.

RESULTS

The results of Table 1 show that 98.2% of the victims were male and also 95.6% of them were Iranian. The main part of accident cases was between 20-30 years-old (61.1%) and 73% of them were married. In addition, in terms of education level, the lowest number of accidents was related to bachelor's degrees and above (0.5%) and the accident rate wasrelatively uniformly distributed among different subgroups of educational levels (22.5-9.27%).

The accidence rate based on work experience has been presented in Table 2. This table shows that a high number of injured people have less than 5 years of general work experience (76.5%). Also the results show that more than 60% of people have no relevant work experience.

Table 1. Frequency of accidents based on the demographic information

Variable	Grouping	Frequency	Frequency%
Gender	Male	1029	%98.2
	Female	19	1.8%
Citizenship	Iranian	1002	95.6%
	Non Iranian	46	4.4%
age category	<20 Years	81	7.7%
	20-30	640	61.1%
	31-40	171	16.3%
	41-50	146	13.9%
	51-60	10	1%
Marital status	Single	283	27%
	Married	765	73%
Level of Education	Illiterate	242	23.1%
	Elementary Reading And Writing	273	26%
	Tips	240	22.9%
	Intermediate And Diploma	288	27.5%
	Bachelor and higher	5	0.5%

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Table 2. Frequency of accidents occurred based on the work experience

Variable	Grouping	Frequency	Frequency%
General work history of the accident	<5 years	802	76.5%
	5-10	174	16.6%
	10-15	7	0.7%
	15-20	24	2.3%
	20-25	24	2.3%
	25-30	17	1.6%
Related work experience	Yes	399	38.1%
	No	649	61.9%

The relationship between accident outcome and demographic characteristics has been shown in Table 3. The results of this table show that all major injuries, minor injuries, and death cases were in the married subgroup. A total outcome of accidents is related to married people (73%) and the results of the statistical test show that there is a significant relationship between the type of outcome and marital status ($p < 0.001$). In addition, the results of Table 3 show the relationship between the outcome of the accident and the age of the victims. It can be seen that most cases of minor injuries (71.6%) and death (41.4%) occurred among workers' groups of 30 years-old. Based on the Fisher test results there is a significant relationship between age and outcome ($p < 0.001$). Another demographic characteristic studied in this study is citizenship. It can be concluded that most of the deaths, minor injuries, and major injuries occurred in the subgroup of people who were Iranian. However, the Fisher test results did not show a significant relationship between citizenship and the type of outcome ($p > 0.05$). Statistical tests performed in relation to the sex of the injured person and the outcome didn't show a significant relationship. The relationship between education level and type of outcome showed that the highest number of deaths and injuries had the lowest level of education.

No fatalities were reported at the undergraduate level, and in addition, the number of major injury and minor injury had the lowest percentage in this subgroup.

Statistical test showed a significant relationship between education level and type of outcome ($P < 0.001$).

Table 3. A relationship between accident outcome and demographic characteristics

Demographic characteristics		outcome					
		Minor injuries		major injuries		Death	
		Frequency	%	Frequency	%	Frequency	%
marital status	Single	282	29.2%	0	0%	1	3.4%
	Married	685	70.8%	52	100%	28	96.6%
	Chi-square	29.685					
	p-value	p <0.001					
Citizenship	Iranian	923	95.4%	52	100%	27	93.1%
	Non Iranian	44	4.6%	0	0%	2	6.9%
	Fisher. Test	3.024					
	p-value	0.167					
Sex	Male	948	98%	52	100%	29	100%
	Female	19	2%	0	0%	0	0%
	Fisher. Test	0.228					
	p-value	0.777					
Age category	Less than 30 years	692	71.6%	17	32.7%	12	41.4%
	31-40 years	145	15%	18	34.6%	8	27.6%
	More than 40 years	130	13.4%	17	32.7%	9	31%
	Fisher. Test	42.94					
	p-value	p <0.001					
Level of education	Illiterate	175	18.1%	41	78.8%	26	89.7%
	Elementary Reading And Writing	261	27%	9	17.3%	3	10.3%
	Tips	240	24.8%	0	0%	0	0%
	Intermediate And Diploma	287	29.7%	1	1.9%	0	0%
	Bachelor Up	4	0.4%	1	1.9%	0	0%
	Linear-by-Linear Association	107.9					
	p-value	p <0.001					

The results of the relationship between accident outcome and work experience and the relevant statistical test have been presented in Table 4. The table shows that there is no relationship between work experience and outcome (P = 0.32). In addition, all injuries and death cases occurred among workers with less than 5 years of work experience. The results of Fisher statistical test showed that there is no significant relationship between the type of outcome and work experience (p <0.001).

Table 4. A relationship between accident outcome and experience and work history

Experience and work history		outcome					
		Minor injuries		major injuries		Death	
		Frequency	%	Frequency	%	Frequency	%
Related work experience	yes	378	39.1	16	30.8	5	17.2%
	no	589	60.9	36	69.2	82.8	29%
	Chi-square	6.938					
	p-value	0.32					
Work Experience category	<5 years	754	78%	28	53.8%	20	69%
	5-10	151	15.6%	15	28.8%	8	27.6%
	10-15	5	0.52%	2	3.8%	0	0%
	15-20	23	2.4%	1	1.9%	0	0%
	20-25	17	1.8%	6	11.5%	1	3.4%
	25-30	17	1.8%	0	0%	0	0%
	Fischer test	30.237					
	p-value	p <0.001					

In the present study, the outcome is presented as a dependent variable that is affected by various factors such as demographic parameters and work experience as independent variables. Table 5 shows the linear regression results of the predictive power of demographic parameters and work experience on the outcome. According to the findings, more than 37% of the outcomes can be predicted by the mentioned parameters, among which the most positive impact is related to the related work experience (Beta = 0.015).

Table 5. The results of demographic parameters linear regression and work experience on the outcome.

Independent variable	Beta Coefficient	P.VALUE	R	TOTAL P.VALUE
Marital status	**0.081**	**<0.05**		
Citizenship	**0.003**	**0.912**		
Sex	**0.012**	**0.68**		
Age category	**0.09**	**<0.05**	**0.374**	**<0.05**
Level of Education	**-.303**	**<0.05**		
Work Experience category	**0.034**	**0.277**		
Related work experience	**0.151**	**<0.05**		

DISCUSSION

The aim of this study was to investigate the effect of some individual factors on the occupational accidents. According to the studies performed on 1048 accidents, it was found that the highest number of accidents was related to the age group of 20-30 years and the lowest number occurred in the age group of 51-60 years. The results of the present study were consistent with studies conducted in this field. Various studies showed that accidents are more common in younger workers than in other age group, due to the insufficient experience of young employees in work units, their less understanding of risk perception, and way of thinking or behavior of these people [25]. The study by Swaen et al. showed that injuries from occupational accidents decrease with age [26]. Also in 2014, a study by Fuente found that in good economic conditions, young employees were more harmed than older employees [27].

One of the reasons is the use of younger workers in the manufacturing sector whereas and older employees are working in less active sectors with a fewer accident possibility. In a 2014 study, Chau et al. found that employees under 25 years were more likely to be injured than older employees [28].Yan Cui showed that older workers are less harmed than younger workers for the following reasons; He stated that older workers have less physical work capacity due to reduced aerobic and musculoskeletal capacity. Therefore, managers may turn the jobs of older workers into a relatively safe activity. In addition, aging leads to experience and learn more about the workplace, so that older workers

can compensate for their job problems and needs; In addition to the above, young workers are associated with ignorance, lack of experience, and risky behaviors [29]. The results showed that only about 2% of accidents were female and more than 98% of accidents were male. This finding was consistent with the study of Mehrad et al. which proved that the

number of accidents was higher for men than women [27].

Furthermore, other studies confirmed this finding [22-30); which may be due to the different job content of women in different countries due to economic, religious, industrial, and cultural status. Also, women have low-risk jobs compared to men in Iran. The results of Yang Wan Jo study confirmed that there is a significant difference between gender, age, company size, and type of construction workers' accidents with accident and mortality rates. He showed that the rate of accidents among male workers was four times higher and their mortality rate was almost seven times higher than female workers [31]. The present study showed that the highest number of accidents was among employees with less than 5 years of work experience. Also it was found that a high percentage of accidents occur in people who have no previous work experience. A study conducted by Chi et al. in Taiwan construction industry showed that 71.4% of accidents were caused by workers with less than 1 year of work experience [32].

Based on Juan Castillo-Rosa's study, half of all electrical accidents occurred among workers with less than 1 year of experience that may be due to their lack of knowledge of safe work practices [8]. Also, the level of education related to the death cases was examined and it was found that the lowest number of accidents was in the bachelor's degree and above, and on the contrary, the highest number of accidents was related to secondary education and diploma, which was consistent with Swaen et al. findings. According to Swaen et al. employees with an average level of education are 7 times more likely to be at a risk for occupational accidents than employees with a higher level of education [26]. One of the most important reasons that people with university education are usually in managerial positions where the number of accidents is less than the working group. Another reason that can be mentioned is the higher level of education and more study about the dangers and accidents related to work and the impact of this awareness on the attitude and practice of these people.

In this study, it was found that all of the above cases had a significant relationship with the outcome of the accident so that most minor injuries and deaths occurred in employees less than 30 years, which shows the age range is effective on the outcome of the accident. A study organized in Taiwan found that age and type of accident were associated with mortality and also in all age groups; fatal accidents were higher in men than in women [22]. Also, a study in the Korean construction industry showed that the variables of sex, age, and the company's size have an effect on fatal injuries [33]. One reason is the low experience of younger employees and ignorance of present hazards and past accidents; also, younger people may work in stations where there is a higher risk of accidents due to having more physical strength or more familiarity with up-to-date equipment. In relation to work experience, it was found that most injuries and deaths occurred in employees with less than 5 years' work experience because the victims did not have the necessary experience and knowledge or because they are young and do risky work, they are more exposed to accidents. According to the regression test results presented in Table 5, the most influential outcome was related to work experience.

However, it was found that 37.4% of the outcome is influenced by demographic factors and more than 60% of other factors were effective such as job factors including the type of industry and workshop activity, managerial & equipment causes. Dong et al. found that the type of industry affects the rate of outcome and the average rate of occupational accidents and injuries in the construction industry is higher than other industries [34]. In a study conducted by Omidvar et al. the implementation of safety programs has positive effects on reducing accident indices which has its role in reducing accident severity index, accident frequency index, accident severity index and [35].

CONCLUSION

The results of the current study showed that most accidents occurred in young people, married, with low education and work experience under 5 years. The results of statistical tests performed on the mentioned factors showed a significant relationship with the type of outcome. In addition, it was found that 37.4% of accidents can be predicted by demographic information where related work experience has the most affect.

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CONFLICT OF INTERESTS

The authors declare no conflict of interest in this study.

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