OCCUPATIONAL ACCIDENTS IN SERBIAN INDUSTRIES IN TRANSITION

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SUMMARY

Occupational accidents and injuries present a serious social, medical and economical problem in Serbian industries in transition. The purpose of this study is to estimate the number and average annual rate of occupational accidents and traumatic injuries in Serbian industries in transition, between 1992 and 2003, and to estimate the effects of a preventive safety program in the rubber manufacturing industry and in the production of electrical goods and equipment. This paper presents a descriptive analysis of occupational accidents and injuries which occurred in all industries over a twelve years period. In the rubber manufacturing industry and in the production of electrical goods and equipment a surveillance and prevention program has been implemented since 1997. A significant drop after 1997 in average annual accidents rate and severity ratio of injuries in these two industries has been observed, which was not the case in the other industries, and can be explained by the positive effects of the safety training program. The study documents that the safety training program showed significant effects, especially in case of workers with less than ten years of working experience.

Key words: occupational accidents, occupational injuries, safety training program, workers, transition, industry.

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INTRODUCTION

Modern way of life includes fast developing industries and traffic, which as a consequence has resulted in a rise of occupational human injury. Statistics show that occupational trauma in Serbia in the last few years is one of the leading causes of absenteeism (1). Injuries in Serbia are known to be the leading cause of death in persons 37 years old or younger (1, 2). Occupational injuries cause a huge loss of work days, and many injured workers are never able to work again (3). Every injury is a loss to the worker himself, his family, the working organization and the community in general.

The overall human, social, and financial toll of traumatic occupational injury is enormous, rivaling the burden imposed by such health threats as cancer and cardiovascular disease (4, 5, 6). The direct cost (lost wages, medical and rehabilitation payments, insurance administrative costs, property losses, production losses) plus indirect costs (cost associated with pain and suffering by workers and family members) of occupational injuries were estimated to be about US $ 30 billion annually (7). Intrajob workload, psychosocial factors, and organizational factors are potential risks for work related injuries (8). Machinery related injuries were the second leading cause of traumatic occupational fatalities (1, 2, 9).

It is characteristic of a transitional period for many workers to lose their jobs at any age or to get transferred to another new job, one in which many of them have no experience. In transitional countries such as Serbia and Montenegro, especially older workers in industries lost their jobs or were transferred to another job. As new workers on another job, older workers did lack the job experience for the new positions.

Reducing the risk of occupational accidents requires a combination of a safe work environment, comprehensive training of workers, implementation, and enforcing of a systematic safety preventive program. To understand the risk factors of occupational accidents and injuries and to develop prevention and control strategies and to estimate the effects of preventive measures, it is essential to know about and to learn from the past occupational accidents and injuries.

Aim

The purpose of this study is to estimate the number and average annual rate of occupational accidents and traumatic injuries, between 1992 and 2003, in Serbian industries in transition; and to estimate the effects of the safety preventive program in the rubber manufacturing industry and in production of electrical goods and equipment.

MATERIAL AND METHODS

The number of occupational accidents and injuries in Serbian industries followed by absence from work has been estimated in the period between 1992 and 2003. The program of the surveillance and prevention of occupational accidents and injuries has been implemented in 1997 in the rubber manufacturing industry and in the production of electrical goods and equipment. This program includes: meeting physical requirements for vision, hearing and coordination, injuries protection training, machinery operation training, engineering controls, protective equipments, regulatory controls, education, implementing and enforcing systematic management.

All new workers, workers with work experience up to ten years, workers who suffered more than two occupational accidents in one year and workers who were transferred to another job have been included in the job training program.

An injury is defined as occupational if it occurs while working for compensation, on or off employer's premises, while arriving or leaving work, during a break, if on employer premises, or working as a volunteer. All injuries, which have resulted in at least one day's absence from work, formed the basis of the analyses. When the injury occurs, data are entered by management representatives of the safety department, and the plant's medical staff. The data set includes information on employee's characteristics (e.g. sex, age, education), characteristics of the workplace, description of the injury (injury type and body part injured), and outcome (lost days, days on which employees reported to work but were assigned to light or alternative duties). All injuries analyzed must meet one or more of the following conditions: medical treatment required restriction of work or motion, transfer to another job, or resulted in death. The circumstances of each incident were reviewed using variables in the database, including the narrative description of "how the injury occurred", the nature of the injury, the injured worker's job title, and recommendations to prevent future occurrences. External cause of injury in the database was based on codes from the International Classification of Diseases (10), excluding only suicide and medical misadventure. Injuries were classified in terms of the general environment in which they occur, the general mechanisms of injury (motor vehicle collisions, falls etc.), or the contributing behavioral of human factor. The annual incidence rate of accidents was calculated by taking the number of accidents and dividing it by the average number of employed workers in that year multiplied by 1000.

The severity ratio was calculated by taking the number of calendar days lost resulting from occupational injuries and dividing them by the total number of lost day cases.

Statistical analysis was performed. The present study used χ^2 values to analyze the statistical significance.

RESULTS

There were 27,192 non fatal and 170 fatal occupational accidents reported in the period 1992–2003 that occurred in Serbian industries in transition. The average annual accident rates were the highest in the mining and quarrying industry and in forestry. However over a period from 1998 to 2003 the average incidence rate of occupational accidents in the rubber manufacturing industry and in the production of electrical goods and equipment has significantly declined, which was not the case in other industries (Table 1).

In the mining, quarrying and in the land transport the number of traumatic occupational fatalities was the highest (Table 2).

In the period 1992 to 2003 there were 14,739 (54.2%) non fatal and 67 (39.4%) fatal occupational accidents that occurred at the workplace, 10,962 (40.3%) non fatal and 87 (51.1%) fatal accidents that occurred on the road while working, and 1,491 (5.5%) non fatal and 16 (9.4%) fatal accidents that occurred during journeys to and from work (Table 3).

In the period 1992 to 2003 there were 27,859 workers injured and 170 killed in occupational accidents that occurred in all fields of work in Serbia. The average age of injured workers in all industries was 56.6 ± 4.1 years. These workers hardly had any work experience (4.7 ± 2.1 years). The perished workers were in average age 37.5 ± 4.1 years, and had an average work experience of 4.4 ± 1.1 years. The average age of all exposed workers in all Serbian industries in transition was 56.7 ± 7.1 years (Table 4).

The number of accidents was the highest on Monday and Tuesday in all industries.

The greatest number of non fatal accidents in all industries occurred between 8 a.m. and 10 a.m. (12.6%) and between 4 and 6 p.m. (12.3%). The greatest number of fatal accidents occurred between 4 a.m. and 10 a.m.

Distribution of non fatal accidents by month of the year showed four peaks in the all industries: in September, October, November and December. The greatest number of fatal accidents occurred in January, October, November and December.

The severity ratio of injuries was the highest in the mining and quarrying industry and in forestry. The lowest was in the rubber manufacturing industry and in the production of electrical goods and equipment (Table 5). The severity ratio of injuries in the rubber manufacturing industry and in the production of electrical goods and equipment has significantly declined after 1997, which was not the case in the other industries, and can be explained beside others by the positive effects of the safety training program (Table 6).

The safety training program in the rubber manufacturing industry and in the production of electrical goods and equipment showed significant effects, especially in case of workers with less than ten years of working experience (Table 7).

The safety training program has significant effects on the youngest workers (Table 8).

DISCUSSION

There are many factors which can contribute to a work related injury, whether they be subjective such as age, experience, adaptation, sex, sickness, physical, psychological characteristics, habits, medication or objective such as family, organization of the workplace, characteristics of the workplace, noise, vapors, gases and dust (11).

Work related injuries are the basis for certain rights and benefits that are awarded to the injured person by the insurance agencies and the health agencies. These rights and benefits are: compensation for a lower or loss of wage, compensation for medical care and therapy, compensation for pain and suffering.

The circumstances of these injuries provide valuable information than can be used to prevent occupational accidents and injuries in the future. In these industries, the knowledge of the past occupational accidents has been implemented in the safety program. Over a period from 1998 to 2003, the average annual rate of occupational accidents, the number, and the severity ratio of injuries in the rubber manufacturing industry and production of electrical goods and equipment has significantly declined as a result of the safety preventive program. The safety training program included all new workers, all workers with job experience under ten years, workers who suffered more than two occupational accidents in one year, and workers who have been transferred to another job. Training at the company was presented to small groups of workers by their supervisors.

The most common location of accidents was the workplace. Transport to and from the factory accounted also for many of the accidents. Therefore, transport is a part of the sphere of activities

Table 1. *Number and average annual rate (per 1000 workers) of non fatal traumatic accidents by fields of activity and year, Serbia, 1992–2003*

		1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Agriculture	N	189	185	187	273	278	274	279	277	276	274	271	247
	R	13.9	13.7	13.9	22.1	22.5	22.2	22.5	22.4	22.6	22.5	22.5	20.4
Forestry	N	225	226	229	272	341	358	377	373	376	377	366	356
	R	18.9	18.9	19.2	22.7	28.3	29.4	30.9	30.6	30.8	30.8	29.8	28.9
Mining and quarrying	N	617	601	614	598	531	501	499	456	393	315	294	276
	R	39.6	38.9	39.6	39.0	37.2	35.9	36.0	36.6	35.2	33.4	32.8	32.7
Manufacture of food products	N	194	195	199	201	205	215	223	230	235	245	267	273
	R	13.5	13.5	13.7	13.6	13.9	14.5	14.9	15.4	15.7	16.1	17.1	17.4
Manufacture of tobacco products	N	13	15	16	16	21	22	21	28	27	24	22	21
	R	11.3	10.9	11.0	10.1	10.2	10.2	9.3	9.2	9.1	8.8	8.3	7.8
Manufacture of wood products	N	50	55	58	57	52	53	51	52	48	49	49	47
	R	14.1	14.0	14.3	14.3	13.5	14.2	13.9	14.1	13.5	13.9	14.1	14.0
Rubber manufacturing industry	N	32	31	31	30	30	31	20	19	18	16	14	13
	R	12.3	11.9	12.0	11.8	11.8	12.1	7.9	7.5	7.2	6.4	5.6	5.3
Manufacture of chemical products	N	54	54	53	53	51	50	50	50	47	45	42	40
	R	12.9	13.1	12.8	12.9	12.9	12.9	12.9	13.2	12.9	12.6	12.8	12.7
Production of electrical goods and equipment	N	92	92	91	91	90	54	48	45	38	35	33	32
	R	12.9	12.8	12.9	12.9	12.9	7.8	6.9	6.6	5.8	5.6	5.4	5.3
Wholesale and retail trade	N	113	112	114	116	107	109	107	99	100	101	97	96
	R	9.8	9.8	9.9	9.9	9.8	10.0	9.8	9.6	9.6	9.9	9.8	9.7
Land transport	N	170	168	175	165	163	167	157	157	148	147	135	136
	R	13.5	13.4	13.9	13.1	13.2	13.5	13.1	13.2	12.9	12.9	13.2	13.2
Financial intermediation	N	24	23	24	23	22	22	18	17	16	15	15	15
	R	6.9	6.1	6.0	6.1	5.9	6.0	5.6	5.6	5.3	5.1	5.1	5.3
Education	N	91	90	96	93	95	89	87	87	84	86	85	85
	R	7.2	7.2	7.1	7.3	7.3	7.2	7.1	7.0	6.9	7.1	7.1	7.1
Health and social work	N	268	274	279	274	283	290	277	275	277	275	272	273
	R	9.6	9.8	9.9	9.7	9.8	10.0	9.5	9.4	9.3	9.2	9.1	9.1
Services	N	148	141	145	145	147	141	145	146	133	131	126	121
	R	11.0	10.6	10.8	10.7	10.9	10.6	11.0	11.1	10.7	10.8	10.5	10.6

N = number of accidents, R = accident rate

Table 2. *Number and rate (per 100,000 workers) of traumatic occupational fatalities by fields of activity and year, Serbia, 1992–2003*

		1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Agriculture	N	1	1	1	2	1	1	2	2	1	1	1	1
	R	7.4	7.4	7.5	16.2	8.1	8.1	16.1	16.2	8.2	8.2	8.3	8.3
Forestry	N	1	1	1	1	2	2	2	2	2	2	2	1
	R	8.4	8.4	8.4	8.4	16.6	16.4	16.4	16.4	16.4	16.3	16.3	8.1
Mining and quarrying	N	4	3	4	3	2	5	4	3	4	4	3	3
	R	25.7	19.4	25.8	19.6	14.0	38.8	28.9	24.1	35.9	42.4	33.5	35.5
Manufacture of food products	N	0	0	1	1	1	1	1	1	2	1	1	1
	R	0.0	0.0	6.7	6.8	6.8	6.8	6.7	6.7	13.4	6.6	6.4	6.4
Manufacture of tobacco products	N	0	0	0	0	0	0	0	1	1	0	0	0
	R	0.0	0.0	0.0	0.0	0.0	0.0	0.0	32.8	33.9	0.0	0.0	0.0

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		1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Manufacture of wood products	N	0	0	1	1	1	1	0	0	1	0	0	0
	R	0.0	0.0	24.7	25.1	25.9	26.8	0.0	0.0	28.2	0.0	0.0	0.0
Rubber manufacturing industry	N	1	1	0	0	0	0	0	0	0	0	0	0
	R	38.5	38.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Manufacture of chemical products	N	1	1	0	1	0	1	0	0	1	0	0	0
	R	24.1	24.2	0.0	24.3	0.0	0.0	25.9	0.0	0.0	28.1	0.0	0.0
Production of electrical goods and equipment	N	1	1	1	1	1	0	0	0	0	0	0	0
	R	13.9	13.9	14.2	14.2	14.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wholesale and retail trade	N	1	0	1	1	1	1	1	0	1	0	1	0
	R	8.7	0.0	8.6	8.6	9.1	9.2	9.1	0.0	9.6	0.0	10.1	0.0
Land transport	N	2	1	2	1	2	1	1	1	2	2	1	1
	R	15.9	8.0	15.9	7.9	16.1	8.0	8.4	8.4	17.4	17.6	9.7	9.7
Financial intermediation	N	0	1	1	1	0	0	0	0	0	0	0	0
	R	0.0	26.3	25.1	26.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Education	N	1	1	1	1	0	1	0	1	0	1	1	1
	R	7.9	8.0	7.3	7.8	0.0	8.1	0.0	8.1	0.0	8.2	8.3	8.4
Health and social work	N	1	1	1	1	1	1	2	2	1	1	2	2
	R	3.6	3.6	3.5	3.5	3.5	3.4	6.9	6.8	3.3	3.3	6.7	6.7
Services	N	1	1	1	1	1	1	1	1	1	1	1	0
	R	7.4	7.5	7.5	7.4	7.5	7.5	7.6	7.6	8.0	8.2	8.4	0.0

N = number of accidents, R = accident rate

Table 3. *Number of non fatal traumatic accidents and traumatic occupational fatalities by fields of activity and location of the accidents*

		Accident at workplace		Accidents in traffic at work		Commuting accidents	
		Number	Percent	Number	Percent	Number	Percent
Agriculture	Non fatal	1,343	44.6	1,455	48.3	212	7.1
	Fatal	3	20.0	11	73.3	1	6.7
Forestry	Non fatal	2,449	63.2	1,295	33.4	132	3.4
	Fatal	11	57.9	7	36.8	1	5.3
Mining and quarrying	Non fatal	4,483	78.7	931	16.3	281	4.9
	Fatal	36	85.7	5	11.9	1	2.4
Manufacture of food products	Non fatal	1,732	64.6	781	29.1	169	6.3
	Fatal	7	63.6	3	27.3	1	9.1
Manufacture of tobacco products	Non fatal	159	64.6	74	30.1	13	5.3
	Fatal	0	0.0	2	100.0	0	0.0
Manufacture of wood products	Non fatal	438	70.5	153	24.6	30	4.8
	Fatal	2	40.0	2	40.0	1	20.0
Rubber manufacturing industry	Non fatal	93	32.6	170	59.6	22	7.7
Manufacture of chemical products	Fatal	0	0.0	2	100.0	0	0.0
	Non fatal	422	71.6	138	23.4	29	4.9
Production of electrical goods and equipment	Fatal	3	60.0	1	20.0	1	20.0
	Non fatal	162	21.9	548	73.9	31	4.2
Wholesale and retail trade	Fatal	0	0.0	4	100.0	1	20.0
	Non fatal	333	26.2	863	67.9	75	5.9
Land transport	Fatal	1	12.5	6	75.0	1	12.5
	Non fatal	51	2.7	1,791	94.9	46	2.4

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		Accident at workplace		Accidents in traffic at work		Commuting accidents	
		Number	Percent	Number	Percent	Number	Percent
Financial intermediation	Fatal	1	5.9	15	88.2	1	5.9
	Non fatal	12	5.1	208	88.9	14	5.9
Education	Fatal	0	0.0	2	66.7	1	33.3
	Non fatal	300	28.1	695	65.1	73	6.8
Health and social work	Fatal	0	0.0	8	88.9	1	11.1
	Non fatal	1,765	53.2	1,287	38.8	265	7.9
Services	Fatal	1	6.2	11	68.7	4	25.0
	Non fatal	997	59.7	573	34.3	99	5.9
All industries	Fatal	2	18.2	8	72.7	1	9.1
	Non fatal	14,739	54.2	10,962	40.3	1,491	5.5
	Fatal	67	39.4	87	51.1	16	9.4

Table 4. *Average age and work experience of victims by the fields of activities*

Fields		Exposed workers			Injured workers			Death		
		N	X (years)	SD	N	X (years)	SD	N	X (years)	SD
Agriculture	E	12,562	7.9	8.4	3,180	3.2	0.9	15	2.9	0.8
	A	12,562	59.4	4.9	3,180	59.9	5.8	15	49.1	3.7
Forestry	E	12,118	15.8	9.2	3,978	3.9	1.2	19	3.1	0.9
	A	12,118	58.3	7.5	3,978	59.7	8.9	19	51.2	7.4
Mining and quarrying	E	12,865	11.4	5.7	5,795	4.5	1.7	42	3.2	1.3
	A	12,865	58.3	8.5	5,795	59.8	4.8	42	33.8	3.5
Manufacture of food products	E	14,912	19.8	4.7	2,795	3.7	1.1	11	3.1	0.9
	A	14,912	59.2	5.8	2,795	59.7	6.3	11	56.8	5.8
Manufacture of tobacco products	E	2,173	15.8	5.4	253	2.7	0.5	2	1.5	0.7
	A	2,173	58.4	8.5	253	57.2	4.2	2	31.5	0.7
Manufacture of wood products	E	3,695	16.4	5.8	672	4.1	0.8	5	2.4	0.4
	A	3,695	57.8	8.9	672	57.8	5.2	5	29.8	3.2
Rubber manufacturing industry	E	2,536	25.1	5.3	293	12.9	1.5	2	11.5	4.7
	A	2,536	47.9	8.7	293	37.1	6.4	2	39.5	5.7
Manufacture of chemical products	E	3,805	21.7	6.5	598	3.9	0.1	5	2.7	0.5
	A	3,805	57.9	7.4	598	52.8	4.9	5	30.5	2.7
Production of electrical goods and equipment	E	6,727	24.2	5.9	751	14.1	0.7	5	13.2	1.8
	A	6,727	48.4	8.3	751	37.8	4.2	5	38.4	0.7
Wholesale and retail trade	E	10,792	11.2	6.3	1,289	3.9	2.2	8	2.4	1.1
	A	10,792	57.8	7.4	1,289	51.4	4.7	8	27.9	3.8
Land transport	E	11,856	12.3	5.1	1,902	4.8	1.1	17	3.1	0.9
	A	11,856	55.7	8.4	1,902	58.3	4.7	17	29.3	2.7
Financial intermediation	E	3,080	38.9	2.1	241	23.2	3.9	3	27.4	5.2
	A	3,080	59.6	4.9	241	59.7	8.3	3	57.7	3.1
Education	E	12,470	27.8	4.9	1,072	9.9	4.1	9	14.7	2.9
	A	12,470	57.2	7.8	1,072	49.8	5.4	9	31.4	3.8
Health and social work	E	29,002	25.8	4.7	3,345	3.2	0.7	16	2.1	0.8
	A	29,002	56.4	7.2	3345	51.4	5.8	16	29.8	3.9
Services	E	12,883	13.9	5.8	1,695	4.2	0.7	11	3.1	1.1
	A	12,883	53.1	8.3	1,695	59.5	4.9	11	27.8	3.7
All industries	E	151,478	17.3	5.2	27,859	4.7	2.3	170	4.4	1.1
	A	151,478	56.7	7.1	27,859	56.6	4.1	170	37.5	4.1

E = work experience, A = age

Table 5. *Severity ratio and times lost due to occupational injuries by the industry*

Field of activity	Day away from work	Severity ratio
Agriculture	357,750	112.5
Forestry	500,035	125.7
Mining and quarrying	810,141	139.6
Manufacture of food products	290,121	103.8
Manufacture of tobacco products	23,150	91.5
Manufacture of wood products	70,695	105.2
Rubber manufacturing industry	15,587	53.2
Manufacture of chemical products	58,063	98.6
Production of electrical goods and equipment	38,451	51.2
Wholesale and retail trade	113,303	87.9
Land transport	179,359	94.3
Financial intermediation	20,461	84.9
Education	92,407	86.2
Health and social work	306,067	91.5
Services	167,127	98.6
All industries	3.043,617	109.2

Table 6. *Severity ratio in the rubber manufacturing industry and in the production of electrical goods and equipment, by the years*

Years	Rubber manufacturing industry		Production of electrical goods and equipment		All industries	
	Severity ratio	Number of injured workers	Severity ratio	Number of injured workers	Severity ratio	Number of injured workers
1992	65.4	34	63.9	94	110.9	2,336
1993	64.9	33	61.6	94	109.4	2,318
1994	63.9	33	61.0	93	107.4	2,367
1995	64.1	32	60.9	93	103.0	2,462
1996	64.1	30	61.2	92	102.6	2,472
1997	64.1	31	61.2	54	104.3	2,432
1998	38.4	20	29.9	48	105.2	2,415
1999	30.6	19	27.8	45	106.9	2,365
2000	29.7	18	27.1	38	110.9	2,272
2001	29.6	16	26.9	35	115.8	2,191
2002	29.9	14	26.5	33	117.8	2,143
2003	28.6	13	25.8	32	119.9	2,086

Table 7. *Number of injured workers in the rubber manufacturing industry and in the production of electrical goods and equipment, by the work experience*

Work experience (Years)	Included in safety training program			Not included in safety training program		
	E	I	%	E	I	%
Rubber manufacturing industry						
Under 5	580	15	2.6	180	33	18.3*
6–10	240	2	0.8	212	22	10.4*
11–20	220	4	1.8	195	6	3.1
21–30	210	3	1.4	209	5	2.4
31–40	250	5	2.0	204	5	2.4
Total	1,500	29	1.9	1,000	71	7.1*
Production of electrical goods and equipment						
Under 5	1,365	45	3.3	980	62	6.3*
6–10	572	9	1.6	562	34	6.0*
11–20	608	10	1.6	730	22	3.0
21–30	603	11	1.8	711	20	2.8
31–40	432	10	2.3	287	8	2.8
Total	3,580	85	2.4	3,270	146	4.5*

*E = number of exposed workers, I = number of injured workers, *p<0.05.*
Statistical significance between workers included in safety training program and workers not included in safety training program

Table 8. *Number of injured workers in the rubber manufacturing industry and in the production of electrical goods and equipment, by the age*

Age (Years)	Included in safety training program			Not included in safety training program		
	E	I	%	E	I	%
Rubber manufacturing industry						
Under 20	421	13	3.1	279	28	10.0*
21–30	225	5	2.2	151	15	9.9*
31–40	258	6	2.3	178	5	2.8
41–50	205	6	2.9	139	5	3.6
51–60	198	5	2.5	133	4	3.0
Over 60	193	4	2.1	120	4	3.3
Total	1,500	39	2.6	1,000	61	6.1*
Production of electrical goods and equipment						
Under 20	948	28	2.9	898	67	7.5*
21–30	508	11	2.2	453	29	6.4*
31–40	554	13	2.3	501	15	2.9
41–50	551	12	2.2	499	13	2.6
51–60	521	11	2.1	474	12	2.5
Over 60	498	10	2.0	445	10	2.2
Total	3,580	85	2.4	3,270	146	4.5*

*E = Number of exposed workers, I = Number of injured workers, *p<0.05.*
Statistical significance between workers included in safety training program and workers not included in safety training program

over which occupational health and safety obligation should be seen to extend.

Most accidents occurred on Monday and Tuesday. These results are similar to the results of other authors (12).

The time of day that the accidents occurred revealed peaks between 6 a. m. –10 a. m. and between 4 p. m.–6 p. m. However, the peak injury times for mining are similar to the peak injury times from a study of work injuries at an industrial worksite (13) and peak incident times in the other industries (14). These peaks in incident frequency for a particular time of day may simply reflect a higher number of persons working at those times rather than changing incidence during the day. The peaks in incident times could also be the result of different operations being performed at different times of the day or might be due to changes in worker behavior. Without information concerning the number of workers employed at particular times of day or information regarding the exact operations performed at different periods throughout the day, it is difficult to comment on the effects of time of day on the incidence of accidents and injuries (15).

The highest number of workers had one or more occupational accidents and injuries in the first five years of employment. These results are similar with the results of other authors (16). Lack of work experience can be the contributing factor in the development of occupational injuries. The literature data indicate that relevant training and timely accurate education are needed to prevent occupational injuries (17). From the efforts to prevent occupational injuries among new workers will benefit employers, regulatory agencies, the community at large and young workers themselves. Employers can develop safety training programs that address young workers potential lack of experience and skills in recognizing and responding to hazards. Schools to work programs have traditionally been focused on high skill jobs rather than the types of workplaces where youths are more likely to gain employment. The requirements for becoming a skilled worker include meeting physical requirements for vision, hearing and coordination, participating in industrial vehicle training, and passing a test of knowledge and ability for the job. As part of every employee's safety training, each employee should be made aware of the hazards associated with that job. Safe working practices and rules should be clearly explained to workers and enforced when appropriate. Supervisors need to know and understand the safety rules they are responsible for enforcing. Talking about safety is a part of the ongoing safety.

One of the key findings in this study indicates occupational fatalities involving workers younger than 40 years. These results are similar to authors who found that the risk of occupational fatalities was inversely related to worker's age (18, 19, 20). Young workers may be at increased risk for injuries in the workplace because they are often new to a job, inexperienced, commonly unaware of their legal rights as workers. Compared with older workers, young workers tend to move in and out of the workforce and are usually employed in part time, low paid jobs (21). Youth employment also tends to be seasonal, peaking during the summer months (22, 23). The seasonal and sporadic nature of youth employment, along with frequent job changes, make it difficult for young workers to obtain the sustained mentoring and experience needed to perform their job safety. It has been well established that age is associated with employee's work well being and specifically with job satisfaction (24). In the transition period in Serbia the majority of older workers in studied industries is loosing their jobs or has been transferred to another job. As new workers, the older workers are inexperienced for that job, which leads to occupational injuries. The results of this study showed that average age of injured workers was 56.6 ± 4.1 years. These workers have had job experience less than five years (4.7 ± 2.3 years). The key findings of this study indicate that the transitional period in Serbia influences the job forces in such a way that leads to a jump in occupational accidents and injuries. It is believed that the reason behind this is that older workers are forced to take up jobs that they have no prior experience with.

CONCLUSION

Examination of occupational accidents and injuries can elucidate the causes of both and provide valuable information than can be used to prevent accidents and injuries in the future.

Traumatic occupational accidents and injuries pose a significant problem in Serbian industry, going through the transition period. Injury rates are highest among the oldest workers with less job experience working the new job. Inexperience and lack of training may be risk factors for occupational accidents.

Implementation of safety training programs leads to a significant drop in occupational accidents and traumatic injuries. The safety training program is the most effective measure among younger workers and among workers with less job experience. Transport accounted for many of the accidents, and it is part of the sphere of activities over which occupational safety programs should extend.

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