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Risk Factors of Occupational Injuries Due to Loss of Control, Falls and Overexertion

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Abstract

Occupational injuries are a major concern globally due to its growing prevalence and its consequences on health. While many of the risks are related to daily routines others are as a result of individual characteristics and environmental conditions at work. Studies show that certain demographic groups and work categories appear to have higher prevalence of specific types of injury causes especially those resulting in hospital care. Most studies of risk factors for occupational injuries traditionally attempt to understand factors that distinguish persons who get injured at work from those who do not. In this study, the probability of specific occupational injury causes is modeled using injury data accrued between 2007 and 2012. In this approach, the contrast group comprises those who attained other injuries during the same time frame. All statistical analysis was performed using SPSS version 22. Results show that Injuries due to falls, loss of control and overexertion were the top three leading causes of occupational injury for the period under study. The risk for falls and overexertion were highest in the healthcare sector compared to loss of control in the manufacturing industry. Foreign born workers had increased risk for overexertion. Gender and age differences as well as other risk factors are discussed.

Knowledge of specific risk factors for individual occupational injury cause may be relevant for primary and secondary interventions.

Keywords: Occupational injuries; Causes; Hospital; falls; Loss of control; Overexertion; Foreign born; Worker; Gävleborg; Sweden.

Introduction

Occupational injuries are a major health concern globally. Recent global estimates show that over 960 000 workers are injured and 1020 die per day due to work related injuries [1]. Up to 3.2 million occupational injuries resulting in at least four days sick leave were reported within the EU in 2014 [2]. Some consequences of occupational injuries include disability [3-5] sickness absence, added financial burden such as high compensation benefits, economic cost for the employer, work disability and impaired community involvement [3-6]. The outcomes and cost of injuries often vary depending on the cause, demographic and occupational factors [7].

While many of the risks are related to daily routines (e.g. repetitive movements, work with load, etc.), others are as a result of individual characteristics and environmental conditions at work [8]. There are current calls to design prevention strategies effectively targeted to address specific risks in diverse occupations and various sociodemographic groups [9]. Knowledge of risk factors specific to different occupational and demographic groups are thus important if the foregoing is to be achieved. Although hospital records of injured workers constitute an important part of injury surveillance [10-11], most studies of risk factors for occupational injuries traditionally attempt to understand factors that distinguish persons who get injured at work from those who do not. In this approach, the contrast group comprises all those without any injury experiences within the same time frame. While this approach is important, it may however be of interest to assess factors associated with specific injury causes among all those injured within the same time frame. It could thus be interesting to understand the probability that on the event of an occupational injury resulting in hospital care in a specific demographic or occupational group, it will be a specific type of injury e.g. fall injury. In this approach, the contrast group comprises those who attained other injuries during the same time frame. Using this approach, an assessment of the probability of a specific injury, conditional on any other injury occurring in the same time frame can be conducted. In this work, the focus is on modeling the probability of specific occupational injury causes in relation to all other occupational injuries occurring in the county of Gävleborg, Sweden and seen in primary care. Each injury cause is modeled by demographic and occupational factors. Injury cause categories commonly used in the field of occupational health are used [1, 6]. A detailed description of these injury categories is provided in the methods section.

Method

Study Context

Sweden is generally considered to have lower occupational injury rates compared to most other European countries due to reasons such as improved risk assessment methods and inclusion of safety into school curriculum [12]. Recent national reports for occupational injuries however show a three percent rise in injuries resulting in sick leaves as well as changing trends in demographic and occupational risk factors [13]. Current statistics show that occupational injury magnitude vary across the twenty one counties in the country [14]. For example, while some counties record as low as 4 occupational injuries per 1000 workers, others record up to 7 to 8 injuries per 1000 workers [14]. These variations across counties are worth investigating in order to identify specific risk factors which may prove useful in designing effective and well targeted interventions. For example, the county of Gävleborg with a population of about 280, 000(population density is about 15 per kilometer square), ranks among counties with high risk of occupational injuries, i.e. up 7 workers per 1000 are injured [14, 15]. Although Gävleborg may be described as

currently in recession, the county witnessed economic growth in the past. For example, between 1993 and 1995, Gävleborg had a comparably faster growth rate in employment than national rates [16].

Participants

Employers are required by law to report cases of occupational injuries to the Swedish National Working Environment Agency. To identify relevant cases for this study, two linked datasets were used. All cases of occupational injuries between 2007 and 2012 in the county of Gävleborg were identified in Swedish National Working Environment Agency database and matched against hospital records database kept by the Swedish social security board. All cases were identified on an aggregate level, i.e. no form of personal information traceable to any individual worker was used. A total of 3155 cases were identified in the outpatient records.

Measures

Dependent variables: Eight injury causes commonly used in reporting occupational injuries [17] were examined, they are as follows: Falls, loss of control of machines, tools etc., body movement without overexertion (e.g. stepping on sharp objects, running, walking, running into or being hit against something), overexertion(injuries due to lifting, carrying load and other physically strenuous movements including slips). Less frequent causes such as electrical problems/fires, leakage/overflow and collapse/fall of objects were also assessed.

Independent variables: Demographic factors include sex, age, marital status, employment status and country of birth (i.e. Sweden or outside Sweden) and industrial sector. The following seven broad categories were created for the purpose of this study, namely manufacturing, construction, education, transport and Healthcare. Non specified sectors were classified separately while all other sectors were classified as "others" due to relatively few cases.

Data analysis: Descriptive statistics were run to describe participants by demographic and occupational characteristics. Where necessary, the dependent and independent variables were transformed to reduce categories in order to increase statistical power and enhance meaningful statistical interpretation. However, all transformations remain logical. The association between the dependent variables (i.e. injury causes) and demographic/occupational variables were assessed using chi-square test, and statistically significant variables from these analyses qualified for logistic regression. The magnitude and directions of associations were expressed in the adjusted odds ratios in the logistic regressions. Statistical significance value of $p<0.05$ were assumed for the logistic regressions. All data were analyzed in SPSS version 21.

Ethical consideration: Ethical approval for the study was granted by the regional institutional review board under the condition that anonymity be ensured for the individuals included in the study. The datasets used in this study are owned and maintained by government institutions with own ethical practices to ensure the protection of personal information. For example, the process of linking the data files in order to identify relevant cases was collaboration between The National Board of Health and Welfare and the Swedish National Working Environment Agency without the involvement of the author. The final dataset containing information on aggregate basis and no personal information was later delivered to the author as a CD file.

Results

Demographic characteristics of injury patients seen in primary care 2007-2012

As shown in Table 1, the majority of patients seen in primary care for injuries was male, of Swedish background, single, employed within the manufacturing sector and was on fulltime employment. There was an even distribution in age among the injury patients (Table 1).

Causes of injuries seen in primary care 2007-2012

Three out of the eight injuries causes were consistently the main causes of injury seen in primary care between 2007 and 2012. They include injuries due to loss of control, fall of persons and overexertion and together accounted for over 80% of injury burden (Table 2a). Other Injury causes are presented in Table 2b. As shown in the tables, female workers were more prone to fall X^2 (1) = 140.9; $p<0.001$) and movement with no overexertion X^2 (1) = 10.2; $p<0.01$) injuries than male peers. Males however, were more prone to loss of control, X^2 (1) = 104.6; $p<0.001$), electricity, fire and explosion X^2 (1) = 9.2; $p<0.01$) and collapse X^2 (1) = 52.8; $p<0.001$) injuries than female peers. Fall injuries increased with increasing age X^2 (4) = 53.8; $p<0.001$), while loss of control injuries reduced with increasing age X^2 (4) = 64.8; $p<0.001$). Workers outside Sweden had more injuries due overexertion X^2 (1) = 6.8; $p<0.01$) than their Swedish born peers. Fall injuries was higher among married/cohabiting workers than single/divorced/widowed peers X^2 (1) = 37.7; $p<0.001$). Single/divorced/widowed workers had more loss of control injuries than married/cohabiting peers X^2 (1) = 19.4; $p<0.001$). Permanent employees were more prone to fall injuries X^2 (2) = 13.3; $p<0.001$) than part-time and other employees. Compared to permanent workers, part-time and other employees were at higher risk of loss of control injuries X^2 (1) = 11.1; $p<0.01$). Viewed by employment sector, fall injuries were most common in education, healthcare and transport sectors X^2 (6) = 173.3; $p<0.001$), loss of control injuries most common in manufacturing and construction

	n	%
Gender		
Female	999	31,7
Male	2156	68,3
Age groups		
30 and below	705	22,3
31-40	577	18,3
41-50	782	24,8
51-60	827	26,2
61 and above	264	8,4
Country of birth		
Sweden	2341	74,2
Outside Sweden	814	25,8
Marital status		
Single/window/widower	1890	59,9
Married/cohabiting	1265	40,1
Industrial Sector		
No branch	28	0,9
Manufacturing	1137	36,0
Construction	338	10,7
Health/social assistance	416	13,2
Education	205	6,5
Transport	238	7,5
others	793	25,1
Employment		
Permanent job	2565	81,3
Part time job	412	13,1
other	178	5,6

Table 1: Demographic characteristics of occupational injury patients 2007-2012.

	Fall of Person				Loss of control				Body movement no exertion				Body movement with overexertion			
	N	n	%	P-value	N	n	%	P-value	N	n	%	P-value	N	n	%	P-value
Gender																
Female	997	434	43,5	0.000	997	269	27,0	0.000	997	30	3,0	0.171	997	172	17,3	0.001
Male	2152	491	22,8		2152	994	46,2		2152	86	4,0		2152	279	13,0	
Age groups																
30 and below	705	119	16,9	0.000	705	357	50,6	0.000	705	34	4,8	0.105	705	93	13,2	0.074
31-40	575	135	23,5		575	245	42,6		575	18	3,1		575	91	15,8	
41-50	781	220	28,2		781	308	39,4		781	35	4,5		781	130	16,6	
51-60	826	320	38,7		826	282	34,1		826	22	27		826	108	13,1	
61plus	262	131	50,0		262	71	27,1		262	7	2,7		262	29	11,1	
Marital status																
Single/window/widower	1889	478	25,3	0.000	1889	817	43,3	0.000	1889	77	4,1	0.152	1889	277	14,7	0.503
Married /Cohabiting	1260	447	35,5		1260	446	35,4		1260	39	3,1		1260	174	13,8	
Employment																
Permanent job	2559	788	30,8	0.001	2559	991	38,7	0.004	2559	94	3,7	0.953	2559	374	14,6	0.389
Part time job	412	97	23,5		412	193	46,8		412	16	3,9		412	50	12,1	
Other	178	40	22,5		178	79	44,4		178	6	3,4		178	27	15,2	
Industrial Sector																
Unspecified	28	8	28,6	0.000	28	12	42,9	0.000	28	1	3,6	0.445	28	2	7,1	0.000
Manufacturing	1136	211	18,6		1136	631	55,5		1136	48	4,2		1136	139	12,2	
Construction	337	77	22,8		337	137	40,7		337	11	3,3		337	55	16,3	
Health & Social assistance	415	194	46,7		415	61	14,7		415	16	3,9		415	102	24,6	
Education	204	97	47,5		204	49	24,0		204	3	1,5		204	28	13,7	
Transport	238	90	37,8		238	77	32,4		238	12	5,0		238	28	11,8	
Others	791	248	31,4		791	296	37,4		791	25	3,2		791	97	12,3	
Country of birth																
Sweden	2335	696	29,8	0.366	2335	938	40,2	0.902	2335	85	3,6	0.826	2335	309	13,2	0.003
Outside Sweden	814	229	28,1		814	325	39,9		814	31	3,8		814	142	17,4	

Table 2a : Distribution of occupational injury causes 2007-2012 by demographic and occupational factors.

	Electrical problems, explosion, fire			Leak, outflow, overflow			Collapse, fall, breakage of material		
	N	n	%	N	n	%	N	n	%
Gender									
Female	997	2	0,2	997	10	1,0	997	16	1,6
Male	2152	29	1,3*	2152	40	1,9	2152	172	8,3**
Age groups									
30 and below	705	12	1,7	705	13	1,8	705	48	6,8
31-40	575	5	0,9	575	13	2,3	575	46	8,0
41-50	781	8	1,0	781	7	0,9	781	38	4,9
51-60	826	2	0,2	826	15	1,8	826	50	6,1
61plus	262	4	1,5	262	2	0,8	262	13	5,0
Marital status									
Single/window/widower	1889	22	1,2	1889	30	1,6	1889	118	6,2
Married/Cohabiting	1260	9	0,7	1260	20	1,6	1260	77	6,1
Employment									
Permanent job	2559	21	0,8	2559	43	1,7	2559	148	5,8
Part time job	412	7	1,7	412	6	1,5	412	32	7,8
Other	178	3	1,7	178	1	0,6	178	15	8,4
Industrial Sector									
Unspecified	8	0	0,0	28	0	0,0	28	4	14,3
Manufacturing	1136	6	0,5	1136	31	2,7	1136	62	5,5
Construction	337	9	2,7	337	2	0,6	337	41	12,2
Health & Social assistance	415	2	0,5	415	1	0,2	415	6	1,4
Education	204	1	0,5	204	4	2,0	204	4	2,0
Transport	238	0	0,0	238	2	0,8	238	14	5,9
Others	791	13	1,6	791	10	1,3	791	64	8,1
Country of birth									
Sweden	2335	24	1,0	2335	35	1,5	2335	160	6,9
Outside Sweden	814	7	0,9	814	15	1,8	814	35	4,3

Table 2b: Distribution of less frequent occupational injury causes 2007-2012 by demographic and occupational factors.
*= p<0.01
**= p<0.001

sector X^2 (6) = 254.6; p<0.001), injuries due to overexertion were more in healthcare sectors X^2 (6) = 45.9; p<0.001) and construction while injuries from collapsing structures/objects were more in the construction sector X^2 (6) = 52.2; p<0.001) (Table 2a and 2b)

Relative contribution of demographic and occupational factors in explaining specific injury cause 2007-2012

Table 3a and 3b shows the relative contribution of individual factors after the simultaneous control of possible confounding factors to frequently seen and less frequently seen injury causes respectively. The likelihood of fall injuries remained higher among female workers when compared to male peers, and increased with increasing age. Likelihood of fall injuries was lower in the manufacturing and construction sector, when contrasted with the healthcare sector. Injuries due to loss of control had higher likelihood for male workers when contrasted with female peers, and reduced with increasing age. Likelihood of such injuries however, was higher in the manufacturing, construction, transport and other sector, when contrasted with the healthcare sector. The risk of injuries sustained due to overexertion was lower in the manufacturing, construction, education, transport and other sectors, when contrasted with the healthcare sector. Workers born outside Sweden exhibited a higher likelihood for injuries due to overexertion than peers born in Sweden in the multivariate analysis. For less frequent injury causes, certain risks factors remained significant in the multivariate analysis. Males for example, had higher risk for injuries due to electricity and fire whereas injuries due to leakage were higher in the manufacturing and education sector compared to the health/social assistance sector. Finally, the likelihood of injuries due to collapsing objects remained higher for males and Swedish workers when contrasted with female and foreign born peers respectively, it was also higher in the construction sector when contrasted with the health/social works sector (Table 3a and 3b)

Discussion

The present study investigated demographic and occupational factors associated with eight different causes of work related injuries seen in hospital outpatient. Results show that loss of control, fall of persons and overexertion were the three top injury causes. Risk factors such as age, gender, employment status and occupational sector were predictive of injury risk due to fall and loss of control. Industrial sector and country of birth on the other hand were predictive of injuries caused by overexertion.

The higher proportion of injuries observed here for men compared to women is in line with those of some studies [18] but contrasts sharply with others [19]. Although the role of certain risk factors like gender and age have always shown contradictory findings, a closer look at specific injury causes in this study show variations in how these factors play out. Findings are discussed below, only injury causes with significant findings are discussed.

Loss of Control

Male's proneness to injuries due to loss of control found in this study is in contrast to a similar study conducted in another county in Sweden in which no gender difference was observed for injuries due to loss of control injuries seen in primary care [18]. The authors of the aforementioned study did however find that males in technical industries having minimal supervision were more prone to loss of control of mobile objects. Commonly cited reasons to explain high risk of loss of control among males is overconfidence, over estimation of own abilities and high job

	Fall of Person		Loss of control		Body movement no exertion		Body movement under with overexertion	
	OR	CL	OR	CL	OR	CL	OR	CL
Gender								
Female	1		1		1		1	
Male	0,52	0,43-0,65	1,36	**1,11-1,66**	1,31	0,77-2,22	0,91	0,69-1,19
Age Groups								
30 and below	1		1		1		1	
31-40	1,56	1,16-2,10	0,70	0,55-0,90	0,61	0,33-1,12	1,20	0,86-1,67
41-50	1,84	1,39-2,43	0,66	0,52-0,83	0,91	0,53-1,54	1,24	0,90-1,69
51-60	2,72	2,06-3,60	0,57	0,45-0,73	0,54	0,29-1,00	0,91	0,65-1,27
61 plus	4,17	**2,95-5,91**	0,44	0,31-0,62	0,56	0,23-1,36	0,70	0,44-1,14
Marital status								
Single/window/widower	1		1		1		1	
Married/Cohabiting	0,99	0,82-1,20	1,01	0,84-1,20	0,90	0,57-1,41	0,97	0,76-1,22
Employment								
Permanent job	1		1		1		1	
Part time job	0,77	0,59-1,01	1,41	1,12-1,79	0,94	0,53-1,66,	0,77	0,55-1,07
Other	0,56	0,38-0,84	1,68	1,19-2,37	1,13	0,46-2,78	1,14	0,72-1,81
Industrial Sector								
Health/social	1		1		1		1	
Manufacturing	0,43	0,32-0,57	5,80	4,17-8,07	0,84	0,42-1,69	0,43	0,30-0,60
Construction	0,67	0,46-0,98	2,86	1,94-4,23	0,60	0,24-1,50	0,62	0,40-0,96
Unspecified branch	0,74	0,30-1,79	3,38	1,49-7,65	0,67	0,08-5,44	0,23	0,05-1,00
Education	1,37	0,94-1,98	1,41	0,90-2,21	0,31	0,08-1,16	0,49	0,30-0,80
Transport	1,14	0,78-1,65	2,21	1,46-3,36	1,06	0,44-2,53	0,43	0,26-0,72
Others	0,86	0,65-1,13	2,64	1,89-3,67	0,64	0,31-1,31	0,44	0,31-0,62
Country of birth								
Sweden	1		1		1		1	
Outside Sweden	1,01	0,83-1,23	1,04	0,87-1,25	1,01	0,66-1,57	0,75	0,59-0,94

Table 3a: Showing odds ratio adjusted for demographic factors and their relative contribution in explaining commonly seen injury causes
Note: Highlighted confidence intervals indicate significance

	Electrical problems, explosion, fire		Leakage, overflow etc.		Collapse, fall, breakage of material	
Gender						
Female	1		1		1	
Male	9,02	1,64-49,50	1,42	0,64-3,14	4,34	2,44-7,70
Age groups						
30 and below	1		1		1	
31-40	0,54	0,18-1,62	1,01	0,44-2,32	1,19	0,76-1,87
41-50	0,79	0,29-2,13	0,38	0,14-1,03	0,79	0,49-1,28
51-60	0,22	0,04-1,11	0,77	0,31-1,86	1,17	0,72-1,89
61plus	1,22	0,34-4,38	0,37	0,07-1,80	0,82	0,41-1,62
Marital status						
Single/window/widower	1		1		1	
Married/Cohabiting	0,84	0,33-2,09	1,30	0,66-2,55	1,03	0,73-1,47
Employment						
Permanent job	1		1		1	
Part time job	1,71	0,69-4,23	0,85	0,34-2,10	1,45	0,95-2,22
Other	1,50	0,39-5,70	0,27	0,03-2,24	1,58	0,87-2,88
Industrial Sector						
Health/social	1		1		1	
Manufacturing	0,24	0,03-1,52	8,59	1,07-68,54	1,48	0,59-3,72
Construction	0,97	0,15-5,98	1,72	0,14-20,96	3,07	1,18-7,96
No branch	0,00	0,00-0,00	0,00	0,00-0,00	5,86	1,46-23,46
Education	0,39	0,03-5,28	10,10	1,09-93,44	0,81	0,21-3,03
Transport	0,00	0,00-0,00	2,65	0,22-31,59	1,47	0,52-4,16
Others	0,79	0,14-4,47	4,34	0,52-36,00	2,39	0,96-5,92
Country of birth						
Sweden	1		1		1	
Outside Sweden	1,14	0,47-2,75	0,78	0,41-1,48	1,59	1,08-2,35

Table 3b: Showing odds ratio adjusted for demographic factors and their relative contribution in explaining less frequently seen injury causes
Note: Highlighted confidence intervals indicate significance

satisfaction especially in sectors requiring machine operation [20]. The increased risk of loss of control among younger workers has been ascribed to high risk taking and lack of physical and cognitive maturity [21]. Individual factors notwithstanding, some researchers argue that factors related to the job and workplace may be more responsible for higher rates of injuries among younger workers than individual factors. For example, studies show that young people are often employed with minimal training in high risk jobs requiring manual and unskilled labor [22]. Findings from this study is in contrast to that of Laberge et al. [23] who found no association between age and work injuries. Other groups at increased risk of loss of control were workers employed on temporary basis and those in the manufacturing sector.

Fall of Persons

The high proportion of falls observed here for females than men is line with a previous Swedish study by Kemmlert et al. [24]. A possible explanation may lie in women's predisposition to bone mass degeneration [25], physical inactivity and non-optimal physical and mental health [26]. Population based intervention to reduce falls among women may have to take each individual participant's unique health status and health needs into consideration to ensure success [26]. However, the overrepresentation of women in certain sectors (discussed below) may in part explain this finding. Age-related changes including reduced cognitive ability and balance [28, 31] may explain increased risk for fall among older workers. A healthier aging population and ongoing positive changes for the elderly in the labor market (e.g. less age discrimination) may mean a commiserate increase in fall injuries among older workers. Positive developments in the labor market should therefore be equally matched by ensuring safer work places for older workers.Contrary to some national statistics [17] but in line with another finding [27], fall injuries were higher in the healthcare sector than for other sectors in the county of Gävleborg. The nature of tasks within the healthcare sector e.g. patient and load handling, haste, physical exertion and violence from patients [17, 28-30] may explain the comparably higher risk for fall than in other sectors. In addition, the domination of the sector by female gender already known to be more predisposed to fall [31], may be a contributing factor. Fall injuries generally have poor prognosis and high mortality/fatality [1], therefore current prevention efforts such as safe patient-handling and mechanical lifts, should be backed up with appropriate injury surveillance system and evaluation methods [32].

Overexertion

Injuries due to overexertion have consistently remained the second and third leading cause of injury among women and men respectively [33-34]. Occupational sector and the injured worker's country of birth were significantly associated with overexertion (i.e. injuries due to lifting, carrying load or other physically strenuous movements including slips). When contrasted with other sectors, workers in the healthcare sector were more at risk for injuries due to overexertion. Although comparative data on the risk of injuries due to overexertion or strenuous movement within different sectors is scarce, studies show high prevalence of negative health outcomes commonly associated with exertion among healthcare staff [35]. Fall as a possible outcome of overexertion has been investigated in some literature and findings suggest that the mechanism of fall in situations of overexertion may be related to abnormal gait pattern, increased heel slip distance after heel contact [36-37] and situations like trying to catch a falling patient [35]. The relationship between over exertion and fall is further proven by available evidence that effective programs to reduce injuries due to overexertion contribute significantly to reducing injuries due to fall [38].The increased risk for overexertion among foreign born

workers may be indication that there is an area of unmet need. Further investigations not just for the purpose of understanding the mechanisms behind the differences, but also for designing effective workplace health promotion to address this problem, is needed. The finding may be of particular interest in sectors where job tasks include lifting and carrying of objects or persons. This is particularly relevant considering the increase in foreign born persons and females entering the healthcare labor market.

Conclusion

Certain risk factors such as gender and age are not new but they continue to be of major concern (ILO report 2011). An aging workforce and overrepresentation of certain gender in certain sectors makes it all the more important for interventions suited to address these risk factors. Injuries due to overexertion deserves further investigation. With an aging population and increased need for healthcare in the population, the burden placed on healthcare in terms of lifting and carrying may be more than what it really seems. It is suggested that work place health promotion activities to reduce injuries should avoid less effective paradigms that are solely based on lectures, awareness campaigns and behavioral modeling [23]. They should rather be grounded in appropriate contextually adapted designs related to the specific work place. The strength of this study lies in the use of data accrued over the same time frame to simultaneously study multiple injury causes, their distribution and determinants. In addition, some studies suggest that due to underreporting, the use of merged database such as those for compensation purpose and those provided from hospital records provide useful knowledge for research and designing targeted prevention programs. One limitation is that the study discusses risk factors for injury attended to in hospitals and may therefore differ from general determinants of occupational injuries. The examination of injury distribution by demographic and individual factors may inform interventions directed at specific groups at risk. This is especially important considering that such factors may act as effect modifiers of the known associations between occupational injuries on the one hand, and social, psychological and behavioral consequences on the other [10].

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