

A TWO-YEAR STUDY ON NON-FATAL WORK-RELATED INJURIES AMONG WORKERS IN DIFFERENT OCCUPATIONS

By

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Abstract

Introduction: The working environment of millions of people is unsafe. Work-related injuries (WRIs) are associated with bad sequels at individual, community, and organizational levels at the same time they are preventable and modifiable occupational health issues. **Aim of work:** To assess the demographic characteristics and pattern of reported non-fatal occupational injuries in Assiut Governorate and to identify some correlates of these types of injuries. **Materials and methods:** A record-based retrospective descriptive study was conducted and included all workers (226) with non-fatal occupational injuries who were registered to the Health Insurance Organization (HIO) - the Branch of Assiut Governorate during the years 2018 and 2019. For every injured worker, data were collected regarding: age, gender, residence, occupation of the worker, site of work, the injured part of body, nature of injuries, event leading to injury and its outcome. **Results:** Mean age of the study workers was 39.57± 9.57 years. The largest number of non-fatal occupational injuries in our study was reported from construction sectors (50.4%). As regards the injury type, fractures constituted 44.7% of the total injuries followed by contusions and bruises (23.9%). Workers' falling (51.8%), struck by blunt objects (16.4%) and accidents (15.9%) were the most commonly reported causes of injuries. Feet and hands were the most frequently body sites injured (30.5% and 25.2%). Workers' falling and feet affections were statistically significantly higher among healthcare workers (80% and 53.3%) while struck by blunt objects and hands injuries were statistically significantly higher among manual professionals (25.9% and 35.2%). The occurrence of disabilities among the non-fatal occupational injuries was 8.4%. Regarding the pattern of non-fatal injuries according to sex, incisions (26.1%) and fractures (47.8%) significantly occurred among males, while sprains/strains and

joint affections (33.3%) occurred among females. **Conclusion:** The largest number of non-fatal occupational injuries in our study was reported from construction sectors. There was difference in pattern of injuries and disabilities occurrence according to sex, work sector and occupation. Therefore, it is important to implement successful occupational health programs to prevent occurrence of occupational injuries especially at high risk work sectors and promote safer work practices for workers in these sectors.

Keywords: Non-fatal work-related injuries, Construction workers, Disabilities, Assiut Governorate and Occupational injuries.

Introduction

Worldwide, the working environment of millions of people is unsafe (Nenonen et al., 2014 and Mekkodathil et al., 2016). The World Health Organization (WHO) estimated that 20-50% of the workers are exposed to various hazards at their work and this percent is likely to be higher in the developing countries (WHO, 2014). Work-related injuries (WRIs) result from physical, biological, chemical, ergonomic or psychosocial hazards in the workplace (Varacallo and Knoblauch, 2019). WRIs are higher among those whose jobs requiring physical effort, lifting heavy loads, and stooping/kneeling/crouching (Kim et al., 2017). WRIs are considered as a public health problem especially in developing countries (Hämäläinen, 2009). There are different common factors responsible for the occurrence of WRIs such as working at an early age, job experience, smoking status, low monthly salary, absence of health

and safety training, extended work hours, sleeping problems, job stress, not using personal protective equipment (PPE), and workers' job dissatisfaction (Gebremeskel and Yimer, 2019). Occupational injuries are associated with bad sequels at individual, community, and organizational levels. WRIs represent the most important causes of work absence, disability, early retirement, and even mortality (Bakhtiyari, et al., 2012 and U.S. Bureau of Labor Statistics, 2019). According to International Labor Organization (ILO) estimates, every year the overall mortality from fatal occupational accidents was about 350,000, worldwide. In addition, around 313 million workers around the world are involved in non-fatal WRIs which cause serious injuries and absences from work (ILO, 2015). In the Middle East, the majority of fall-related injuries are associated with the construction and petrochemical industries (Tuma et al., 2013). Prevalence of occupational injuries

among construction workers in Egypt was (46.2%), (WHO/ILO, 2001). Most epidemiological information regarding WRIs are derived from developed and industrialized countries. There are limited studies on the prevalence and the characteristics of non-fatal WRIs in Egypt especially in Assiut Governorate. Previous studies emphasized on the pattern of occupational injuries on some sectors of work.

Aim of work

To assess the demographic characteristics and patterns of reported non-fatal occupational injuries in Assiut Governorate and to identify some correlates of these types of injuries.

Materials and methods

Study design: This is a record-based retrospective descriptive study.

Place and duration of the study:

The Health Insurance Organization (HIO) - the Branch of Assiut Governorate during the years 2018 and 2019.

Study sample: The study included all workers with non-fatal occupational injuries who were registered in HIO. The total number of injured workers was 226. The site of work of the injured workers was classified into 5 sectors: construction, transportation,

healthcare facilities, administrative sector and others (flour mills, electricity stations and petroleum and detergent companies).

Study methods:

For each injured worker, data were collected from records about:

- a. Age, gender, residence and occupation of the worker
- b. Site of work
- c. Parts of body affected (site of injury): Upper limbs, lower limbs, hands, feet, face/ head injuries, chest/ abdomen injuries, eye and back injuries.
- d. The nature of injuries: Incision/cut wounds, contusions/bruises, burns, fractures, amputations and sprains/ strains and joint affections.
- e. The event leading to injury: Cutting objects, striking by blunt objects, flying objects, falling objects, workers' falling, burns, accidents and dog bites.
- e. The outcome of the injury was either complete cure or presence of disability.

Operational definitions:

Non-fatal occupational injuries were defined as injuries that arising out of or in the course of work during

the working hours and result in an employee having to take time away from work. Injuries that occurred while traveling to and from work were also included (OSHA, 2001).

Consent

Approval was obtained from the authorities of Health Insurance Organization to conduct the study.

Ethical approval

Reviewing the proposal was carried

out via the Ethics Review Committee of Assiut Faculty of Medicine.

Data management

Data of the two-year injuries records were checked, coded, entered and analyzed using SPSS (the statistical package for social sciences) version 20 software. Descriptive statistics and frequency distributions as well as appropriate significance tests were applied. P-value was considered significant if less than 0.05.

Results

Table (1): Demographic characteristics and occupational information of workers with non-fatal work-related injuries who lost work-days less and more than 30 days.

	Total No (226) (100%)	Lost work days≤30 days No. (114) (50.4%)	Lost work days> 30 days No. (112) (49.6%)	p-value
Sex:				
Male	184 (81.4%)	92(80.7%)	92(82.1%)	0.457
Female	42(18.6%)	22(19.3%)	20(17.9%)	
Age categories:				0.876
20-29	34 (15%)	18(15.8%)	16(14.3%)	
30-39	87 (38.5%)	42(36.8%)	45(40.2%)	
40-49	65 (28.8%)	35(30.7%)	30(26.8%)	
50-60	40(17.7%)	19(16.7%)	21(18.8%)	
Age/ (years) : Mean ± SD (Range)	39.57± 9.57 (21.0 -60.0)	39.45±9.521	39.69±9.667	0.851

Residence :				
Urban	99 (43.8%)	49(43%)	50(44.6%)	0.453
Rural	127 (56.2%)	65(57%)	62(55.4%)	
Occupations :				
Manual professionals	108(47.8%)	62(54.4%)	46(41.1%)	0.358
Technicians	23 (10.2%)	9(7.9%)	14(12.5%)	
Healthcare workers	30(13.3%)	15(13.2%)	15(13.4%)	
Drivers	11(4.9%)	6(5.3%)	5(4.5%)	
Administrative	31(13.7%)	12(10.5%)	19(17%)	
Non skilled workers	23(10.2%)	10(8.8%)	13(11.6%)	
Site of work:				
Construction	114(50.4%)	65(57%)	49(43.8%)	0.05
Health care facility	62(27.4%)	30(26.3%)	32(28.6%)	
Transportation	13(5.8%)	8(7.0%)	5(4.5%)	
Administrative	8(3.5%)	3(2.6%)	5(4.5%)	
Others	29(12.8%)	8(7.0%)	21(18.8%)	
Types of injury:				
1-Incision/cut	53(23.5%)	36(31.6%)	17(15.2%)	0.003**
2-Contusion/bruise	54(23.9%)	46(40.4%)	8(7.1%)	0.0001**
3-Burn	4(1.8%)	1(0.9%)	3(2.7%)	0.304
4-Fracture	101 (44.7%)	22(19.3%)	79(70.5%)	0.0001**
5-Amputation	9 (4.0%)	1(0.9%)	8(7.1%)	0.017*
6- Sprain/Strain &Joint affection	38 (16.8%)	25(21.9%)	13(11.6%)	0.028*
Causes of injury:				
1-Cutting objects	18 (8%)	10(8.8%)	8(7.1%)	0.419
2-Blunt objects	37(16.4%)	18(15.8%)	19(17.0%)	0.476
3-Flying objects	2(0.9%)	2(1.8%)	0(0.0%)	0.253

4-Falling objects	11(4.9%)	7(6.1%)	4(3.6%)	0.279
5-Workers' falling	117(51.8%)	49(43.0%)	60(53.6%)	0.072
6-Burns	4(1.8%)	1(0.9%)	3(2.7%)	0.304
7-Accidents	36(15.9%)	11(9.6%)	25(22.3%)	0.007**
8-Dog bite	1(0.4%)	0(0.0%)	1(0.9%)	0.496
Sites of injury:				
1-Upper limb	33(14.6%)	11(9.6%)	22(19.6%)	0.026*
2-Lower limb	45(19.9%)	22(19.3%)	23(20.5%)	0.473
3-Hand	57(25.2%)	26(22.8%)	31(27.7%)	0.245
4-Feet	69(30.5%)	41(36.0%)	28(25%)	0.04*
5- Face/Head injury	26 (11.5%)	18(15.8%)	8(7.1%)	0.033*
6-Chest/ Abdomen	6(2.7%)	1(0.9%)	5(4.5%)	0.493
7- Eye	3(1.3%)	1(0.9%)	2(1.8%)	0.493
8-Back	5(2.2%)	1(0.9%)	4(3.6%)	0.179
Outcome :				
1- Cured	207(91.6%)	112(98.2%)	95(84.8%)	0.0001**
2- Disabled	19 (8.4%)	2(1.8%)	17(15.2%)	

*: Statistically significant

**: Highly statistically significant

Chi square test was used

Table (1) showed that 81.4% of the non-fatal injured workers were males with a mean age of 39.57 ± 9.57 , 38.5% of them were in age category (30- 39) years. The largest number of non-fatal work injuries reported was from construction areas (50.4%). About half of the injured workers were manual professionals (47.8%), from rural areas (56.2%) and had lost more than one month from work after the accident (49.6%). As regards the injury type, fractures constituted 44.7% of the total injuries followed by contusions and bruises (23.9%), incisions (23.5%). Workers' falling (51.8%), struck by blunt objects (16.4%) and accidents (15.9%) were the most commonly reported causes of injuries. Feet and hands were the most frequently body sites injured (30.5% and 25.2%). The occurrence of disabilities among the non-fatal occupational injuries was 8.4%. The risk of more than one month lost days from work were significantly higher in fractures (70.5%) and amputations (7.1%) as injury types; accidents (22.3%) as a cause of injury; upper limbs affections (19.6%) and among the injuries ended in disabilities (15.2%).

Table 2: Distribution of demographic characteristics and occupational information of workers with non-fatal work-related injuries according to sex.

	Sex				p-value
	Male (184)		Female (42)		
	No.	%	No.	%	
Occupations :					
Manual professionals	108	58.7%	0	0%	0.0001**
Technicians	17	9.2%	6	14.3%	
Health care workers	5	2.7%	25	59.5%	
Drivers	11	6%	0	0%	
Administrative	22	12%	9	21.4%	
Others	21	11.4%	2	4.8%	
Types of injury:					
1-Incision/cut	48	26.1%	5	11.9%	0.034*
2-Contusion/bruise	42	22.8%	12	28.6%	0.274
3-Burn	4	2.2%	0	0%	0.437
4-Fracture	88	47.8%	13	31%	0.034*
5-Amputation	9	4.9%	0	0%	0.151
5-Sprain/Strain or Joint affection	24	13%	14	33.3%	0.003**
Causes of injury:					
1-Cutting objects	17	9.2%	1	2.4%	0.116
2-Blunt objects	36	19.6%	1	2.4%	0.003**
3-Flying objects	2	1.1%	0	.0%	0.662
4-Falling objects	11	6%	0	.0%	0.098
5-Workers' falling	79	42.9%	38	90.5%	0.0001**
6-Burns	4	2.2%	0	0%	0.437
7-Accidents	34	18.5%	2	4.8%	0.018*
Sites of injury:					
1-Upper limb	28	15.2%	5	11.9%	0.583
2-Lower limb	39	21.2%	6	14.3%	0.312
3-Hand	53	28.8%	4	9.5%	0.005**
4-Feet	44	23.9%	25	59.5%	0.0001**
5-Face/ Head injury	25	13.6%	1	2.4%	0.026*
Disability :	18	9.8%	1	2.4%	0.097

*: Statistically significant

**: Highly statistically significant

Chi square test was used

Table (2) showed a statistical significant higher occurrence of non-fatal injuries among male manual professionals (58.7%) and drivers (6.0%) while, they were more frequent among females health care workers (59.5%) and administrative (21.4%). As regards the injury type, incisions (26.1%) and fractures (47.8%) were significantly higher among males, while sprains/strains and joint affections (33.3%) were significantly higher among females. The most commonly reported causes of injuries among males were struck by blunt objects (19.6%) and accidents (18.5%), while workers' falling (90.5%) were the most common cause among females. Injuries to hands (28.8%) and face/head (13.6%) were the common body sites to be affected in males, while the feet (59.5%) were the most affected site among females.

Table 3: Distribution of the types, causes and body sites of non-fatal work-related injuries in relation to the site of work.

	Site of work					p-value
	Construction (114)	Healthcare facility (62)	Transportation (13)	Administrative (8)	Others (29)	
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	
Types of injury:						
1-Incision/cut	33 (28.9%)	13(21%)	1(7.7%)	0(0%)	6(20.7%)	0.165
2-Contusion/ bruise	26 (22.8%)	16(25.8%)	3 (23.1%)	2 (25.0%)	7 (24.1%)	0.995
3-Burn	1 (0.9%)	1(1.6%)	0 (0%)	0 (0%)	2 (6.9%)	0.258
4-Fracture	49 (43%)	24(38.7%)	9 (69.2%)	5 (62.5%)	14(48.3%)	0.251
5-Amputation	8 (7%)	0(0%)	0(0%)	0(0%)	1 (3.4%)	0.151
Causes of injury:						
1-Cutting objects	12(12.3 %)	1(1.6%)	0 (0%)	0 (0%)	3 (10.3%)	0.080
2-Blunt objects	26(22.8%)	3(4.8%)	1(7.7%)	0(0%)	7 (24.1%)	0.011*
3-Flying objects	1(0.9%)	0 (0%)	0(0%)	0(0%)	1(3.4%)	0.572
4-Falling objects	6(5.3%)	2 (3.2%)	0(0%)	2(25.0%)	1(3.4%)	0.085
5-Workers' falling	44(38.6%)	47(75.8%)	10(76.9%)	5(62.5%)	11(37.9%)	0.0001**
6-Burns	1(0.9%)	1(1.6%)	0(0%)	0(0%)	2(6.9%)	0.258
7-Accidents	21 (18.4%)	8(12.9%)	2(15.4%)	1(12.5%)	3(13.8%)	0.890
Sites of injury:						
1-Upper limb	15(13.2%)	11(17.7%)	1(7.7%)	1(12.5%)	5(17.2%)	0.850
2-Lower limb	22(19.3%)	13(21.0%)	2(15.4%)	2 (25%)	6(20.7%)	0.984
3-Hand	34(29.8%)	7(11.3%)	4(30.8%)	0(0%)	12(41.4%)	0.006**
4-Feet	25(21.9%)	24(38.7%)	6 (46.2%)	5(62.5%)	9(31%)	0.024*
5- Face/Head injury	20(17.5%)	5(8.1%)	0 (0%)	0 (0%)	1(3.4%)	0.04*
Disability :	12 (10.5%)	1(1.6%)	0(0%)	0(0%)	6(20.8%)	0.017*

*: Statistically significant **: Highly statistically significant

Chi square test was used

Table (3) showed that struck by blunt objects as a cause of injury was statistically significantly higher among workers in construction fields (22.8%), while workers' falling (90.5%) was higher among workers in healthcare facilities (75.8%) and transportation (76.9%). Hands were the body sites that are being frequently injured among workers in transportation (30.8%) and construction (29.8%) fields. On the other hand, feet affections were reported among workers in administrative facilities

(62.5%), transportation (46.2%) and health care facilities (38.7%). Face/head injuries were statistically significant among workers in construction fields (17.5%) and healthcare facilities (8.1%).

Table 4: Distribution of the age categories, types, causes and sites of injuries in relation to occupations among the non-fatal work-related injured workers.

	Occupations						p-value
	Manual professionals No=108	Technicians No=23	Healthcare workers No =30	Drivers No =11	Administrative No =31	Non skilled workers No =23	
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	
Types of injury:							
1-Incision/cut	28(25.9%)	7(30.4%)	6(20.0%)	4(36.4%)	5(16.1%)	3(13.0%)	0.476
2-Contusion/ bruise	26(24.1%)	3(13.0%)	7(23.3%)	3(27.3%)	8(25.8%)	7(30.4%)	0.825
3-Burn	2(1.9%)	2(8.7%)	0(0%)	0(0%)	0(0%)	0(0%)	0.153
4-Fracture	46(42.6%)	11(47.8%)	11(36.7%)	3(27.3%)	17(54.8%)	13(56.5%)	0.415
5-Amputation	8(7.4%)	0(0%)	0(0%)	0(0%)	0(0%)	1(4.3%)	0.202
7- Sprain/Strain	13(12.0%)	2(8.7%)	9(30.0%)	3(27.3%)	6(19.4%)	5(21.7%)	0.157
Causes of injury:							
1-Cutting objects	14(13.0%)	1(4.3%)	1(3.3%)	0(0%)	1(3.2%)	1(4.3%)	0.201
2-Blunt objects	28(25.9%)	4(17.4%)	1(3.3%)	1(9.1%)	1(3.2%)	2(8.7%)	0.006**
3-Falling objects	6(5.6%)	1(4.3%)	0(0%)	2(18.2%)	2(6.5%)	0(0%)	0.205
4-Workers' falling	41(38.0%)	12(52.2%)	24(80.0%)	6(54.5%)	19(61.3%)	15(65.2%)	0.001**
Site of injury:							
1-Upper limb	13(12.0%)	5(21.7%)	2(6.7%)	2(18.2%)	8(25.8%)	3(13.0%)	0.278
2-Lower limb	20(18.5%)	7(30.4%)	6(20.0%)	2(18.2%)	4(12.9%)	6(26.1%)	0.661
3-Hand	38(35.2%)	4(17.4%)	4(13.3%)	2(18.2%)	3(9.7%)	6(26.1%)	0.024*
4-Feet	28(25.9%)	7(30.4%)	16(53.3%)	1(9.1%)	12(38.7%)	5(21.7%)	0.027*
Disability:	12(11.1%)	2(8.7%)	1(3.3%)	2(18.2%)	0(0%)	2(8.7%)	0.283

*: Statistically significant

** : Highly statistically significant

Chi square test was used

Table (4) showed that regarding the cause and site of injury, struck by blunt objects (25.9%) and hands affection (35.2%) were significantly higher among manual professionals, while workers' falling (80.0%) and feet affection (53.3%) were significantly higher among health care workers.

Table 5: Distribution of the residual disabilities among the non-fatal work-related injured workers.

	Occurrence of disability				p-value
	Cured (207)		Disabled (19)		
	No.	%	No.	%	
Types of injury:					
1-Incision/cut	49	23.7%	4	21.1%	0.527
2-Contusion/bruise	53	25.6%	1	5.3%	0.033*
3-Burn	2	1.0%	2	10.5%	0.002**
4-Fracture	92	44.4%	9	47.4%	0.495
5-Amputation	0	0%	9	47.4%	0.001*
6- Sprain / Strain &Joint affection	36	17.4%	2	10.5%	0.348
Causes of injury:					
1-Cutting objects	13	6.3%	5	26.3%	0.010*
2-Blunt objects	33	15.9%	4	21.1%	0.379
3-Falling objects	10	4.8%	1	5.3%	0.628
4-Workers' falling	112	54.1%	5	26.3%	0.018*
5-Burns	2	1%	2	10.5%	0.036*
6- Accidents	34	16.4%	2	10.5%	0.388
Sites of injury:					
1-Upper limb	31	15.0%	2	10.5%	0.599
2-Lower limb	40	19.3%	5	26.3%	0.465
3-Hand	45	21.7%	12	63.2%	0.0001**
4-Feet	67	32.4%	2	10.5%	0.036*
5- Eye	1	0.5%	2	10.5%	0.019*

*: Statistically significant **: Highly statistically significant Chi square test was used

Table (5) showed that there was statistically significant increase of disabilities with amputations (47.4%) and burns (10.5%) as types of injuries, and injuries by cutting objects (26.3%) and burns (10.5%) as the cause of injury, while hands (63.2%) and eyes (10.5%) were the body sites that have been significantly affected with disabilities.

- About 81.5% of manual professionals in our study were working in construction fields, (70.1%) from rural areas. Also, there was statistical significant higher occurrence of disabilities (11.0%) and amputations (7.1%) among workers from rural compared to urban areas (Results are not tabulated).

Discussion

Occupational injuries may lead to adverse personal life and work-related outcomes (Kim et al., 2017). Work related injuries represent the most important causes of work absence, morbidity, disability, retirement, and even mortality among workers especially those in high risk sectors (construction, transportation and mining). In addition; these injuries need medical treatment and may result in transfer to another job (Bakhtiyari, et al., 2012 and U.S. Bureau of Labor Statistics, 2019).

The current study used data of non-fatal WRIs which was registered in HIO Assiut Governorate branch during 2018 and 2019. The study revealed that the majority of the non-fatal injured workers were males (80.7%) (Table1). This is in accordance with a study done in Dessie town, Northeast Ethiopia (2018) that found the odds of work injuries was two times higher in males compared to females and this may be explained that males usually engaged in more hard works with higher occurrence of injuries than females (Gebremeskel and Yimer, 2019).

About third of studied workers (38.5%) were in age category (30-

39) years with a mean age of 39.57 ± 9.57 (Table1). This finding was consistent with the result of a study conducted in Al Shuaiba Industrial Medical Center in Kuwait that found 40% of non-fatal occupational injured workers was in age category (31- 41) years (Al-Fajjam and Samir 2018) and with Cemalovic et al., (2016) who concluded that occupational injuries were most common among the age category from 30 to 39 years old. This may be due to those workers at older ages usually occupied supervisor positions with lower risk of hazardous exposure than younger ones.

The largest number of non-fatal occupational injuries in the current work was reported from construction sectors (50.4%) (Table 1) and about 10.5% of injuries in these sectors ended by disabilities (Table 3). About half of the injured workers were manual professionals (47.8%) (Table1). Workers in construction sectors are associated with significant risks. The majority of injuries that required longer hospital stay usually detected among construction and transportation sectors. The workers in these sectors are unaware of the dangerous hazards that they are exposed to and so that they

are not in regular adherence to personal protective equipment and didn't attend occupational health and safety trainings (Menéndez and Havea, 2011; Al-Thani et al., 2014; Mekkodathil et al., 2016). The results of the current work coincided with Gebremeskel and Yimer (2019) who found that the occupational injuries were high among construction workers (32.6%). Similarly, a study was done on workers of small-scale manufacturing factories in Yashio city, Saitama prefecture, Japan and detected that the manufacturing (44.2%) and driving (43.5%) were reporting high rates of occupational injuries (Nakata et al., 2006). Also these results were in agreement with Cemalovic et al., (2016) who found that most of occupational injuries were among craftsmen in different industrial sectors.

According to the present study results, more than half of the injured workers were from rural areas (56.2%) (Table 1). There is statistical significant higher engagement of rural workers in construction fields (70.1%). Also, there was statistical significant higher occurrence of disabilities (11.0%) among workers from rural areas. Amputations (7.1%) were statistically significant more frequently occurred

among those from rural areas than urban areas (Results are not tabulated).

This was in agreement with what was reported by Peek-Asa et al., 2004 that occupational injuries rates were higher among rural populations as many of dangerous occupations were found in rural areas (e.g. agriculture, mining and construction) (Peek-Asa et al., 2004). They also added that injuries among rural workers are usually multiple, severe and resulting in disabilities. Inadequate access to emergency medical services and defect of rehabilitation services in rural areas may play a role in increasing the probabilities of bad outcomes and interfere with full recovery of those injured workers (Peek-Asa et al., 2004).

As regards the injury types, fractures constituted 44.7% of the total injuries followed by contusions and bruises (23.9%) and incisions (23.5%). Workers' falling (51.8%), struck by blunt objects (16.4%) and accidents (15.9%) were the most commonly reported causes of injuries (Table 1). A similar observation was found in an Iranian study, which revealed that the fractures (71%) was the most common type of injuries, and slipping/ falling (36%) was the most important cause (Moradinazar et al., 2013). Similarly, a

study done by Al-Thani, et al., (2014) in Qatar who reported that falling (51%) followed by being struck by heavy objects (18%) and accidents (17%) were the most important events leading to injuries. Our findings were in contrary to the results of a study done by Ewis (2012) on workers in sugar industry in El-Minia, Egypt who reported that the contusions was the most common type of injuries followed by incisions and fractures. Also, not matched with Al-Fajjam and Samir (2018) who found that wound injuries was representing the highest percent among different types of injuries followed by eye trauma and foreign body.

Workers' falling was statistically significantly higher among healthcare workers (80%) than other occupations (Table 4). This corresponds to a study done in U.S to identify non-fatal injuries among health care workers from 2008 to 2010 and revealed that high percent of fall injuries occurred among health care workers especially at night shifts (Yeoh et al., 2013).

On the other hand, struck by blunt objects as a cause of injury was statistically significantly higher among workers in construction fields (22.8%) and manual professionals (25.9%) than

other occupations (Tables 3 & 4).

These results were in contrary to the findings of Al-Thani et al., (2014) who found that fall from height (51%) was the main cause of injury among workers in construction sectors. The struck by blunt objects as a cause of injury were higher in the current study among construction workers in comparison to other work sectors but when ranking the causes of injuries among construction workers only, workers' falling was representing the highest percent in comparison to other causes of injuries (Table 3).

Feet and hands were the most frequently body sites injured (30.5% and 25.2% respectively) (Table 1) among the studied group of workers. These was matched with Awadallah (2011) and Ewis (2012) who concluded that fingers and feet were the most commonly affected body sites among injured workers. On the contrary to the present study findings, Al-Fajjam and Samir (2018) found that the upper extremities (44.1%) and eyes (26.8%) were the most frequently affected body parts among the injured workers.

Hand affection (35.2%) was significantly higher among manual professionals (Table 4). About 81.5%

of manual professionals in the present study were working in construction fields (results are not tabulated). Hands were the most used body parts in work by manual professionals so they are at higher risk to injuries than other body parts. The results of the current study were in accordance with a study done by Mersha et al., 2017 among small scale industries workers in Arba Minch town; in Addis Ababa, Ethiopia, and detected that the hands were the most frequently affected body parts and the most common cause for occurrence of these injuries was hand tools. Feet affections were significantly higher among health care workers (53.3%) (Table 4). This is similar to the results obtained by Yeoh et al., (2013) who reported that lower extremities especially feet and toes were the most affected body parts among injured health care workers due to higher occurrence of fall injuries recorded among them that resulted in sprains and strains.

The present work revealed that the occurrence of disabilities among the non-fatal occupational injuries was 8.4% (Table 1). There was statistical significant increase of disabilities due to amputations (47.4%) as type of injuries, and injuries by cutting objects (26.3%)

as a cause of injury, while hands (63.2%) and eyes (10.5%) were the body sites that have been significantly affected with disabilities (Table 5). These results were slightly lower than the rates detected by Awadallah (2011) who detected that disabilities were observed in 13.3% of his study population and reported that the disabilities were significantly higher with amputations and with injuries of the fingers compared to other body parts. Also the results of the current work were in accordance with a study done among workers in the steel plant of Usiminas, Brazil which found that 86% of injuries resulted in permanent disabilities which was amputations (Schoemaker et al., 2000).

About half (49.6%) of non-fatal occupational injuries had resulted in more than one month lost from work after the accident. On analyzing the injuries that resulted in more than one month work loss, it was found that the risk was higher with fractures (70.5%) and amputations (7.1%) as injury types; accidents (22.3%) as a cause of injury; upper limbs affections as affected body parts (19.6%) and with the injuries that ended in disabilities (15.2%) (Table 1). According to the Bureau of Labor Statistics, U.S. Department of Labor

(2018), median days lost from work were highest for fractures (31 days), and amputations (22 days). Regarding the affected body parts, injuries to upper extremities resulted in the longest absence from work (a median of 18 days for shoulder affection and a median of 17 days for wrist affection).

Regarding the pattern of non-fatal injuries according to sex, the present study showed that there was statistically significant higher occurrence of non-fatal injuries among manual professionals (58.7%) and drivers (6.0%) among males while, the non-fatal injuries were more frequent among health care workers (59.5%) and administrative (21.4%) females. As regards the injury type, incisions (26.1%) and fractures (47.8%) significantly occurred among males, while sprains/strains and joint affections (33.3%) occurred among females. The most commonly reported causes of injuries among males were struck by blunt objects (19.6%) and accidents (18.5%), while workers' falling (90.5%) were the highest cause among females. Injuries to hands (28.8%) and face/head (13.6%) were the major regions of body sites to be affected in males, while the feet (59.5%) were the most affected among females (Table 2). This could be

attributed to work nature of males who usually perform high-risk occupations (e.g., construction, manufacturing) than females (health care, education and or in service occupations) and so they have different pattern of injuries (Tessier-Sherman et al., 2014). U.S. Department of Labor 1998, declared that sprains and strains represent 45% of work related injuries among females. The findings of the present work were similar to the results of a study conducted by Saleh et al., (2001) on their study on epidemiology of occupational injuries and illnesses in a university population and found that women had higher rates for workers' falling as a cause of injury than men and they had significantly higher rates of sprains/strains (69.3%) as a type of injury compared to males (37.4%).

Conclusion: Workers in different occupations especially those working at high risk jobs are exposed to different types of work-related injuries that affect their health in different ways. The largest number of non-fatal occupational injuries in our study was reported from construction sectors. Fractures were the most frequently reported injury types, workers' falling was the most common cause of injuries and feet and hands were

the most frequently reported body sites injured. There was statistical significant increase occurrence of disabilities with amputations, injuries by cutting objects and injuries of the hands.

Recommendations: Intervention programs should be implemented especially at high risk work sectors to reduce the health effects of hazards in these sectors. An electronic medical registration system of WRIs at different work sectors should be established to follow-up the occurrence and outcome of these injuries is also recommended. This will help in analyzing the causes of occurrence and in taking action to prevent further reoccurrence.

Conflicts of interest

No conflict of interest is declared by all authors.

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