



Work-Related Injuries Among Farmers in El-Nakhas Village, Al-Sharkia Governorate

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ABSTRACT

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Background: Currently, there is no existing system for the surveillance and reporting of the incidence of farming accidents and hazards in Egypt. Also, research on accidents in the context of occupational safety regulations among these farmers is still scarce. **Objective:** to investigate the precipitating factors that might be triggering occupational accidents among farmers in Egypt. **Method:** A cross-sectional study was conducted on 233 farmers in El-Nakhas village, Al-Sharkia governorate. The farmers were asked about work-related data and injury characteristics, using a semi-structured questionnaire. **Results:** All farmers were males, 95.7% were married, 72.1% were illiterate, and 57.5% were ≥ 50 years old. Only 25.8% were using personal protective equipment (PPE). A total 170 farmers (72.9%) reported being injured in the last year. Injuries in the last year were significantly higher among illiterate farmers (95.2% versus 15.4%, $p < 0.001$), those not using PPE (80.9% versus 50.0%, $p < 0.001$), and those working < 10 hours per day (88.2% versus 66.7%, $p < 0.001$) compared with those with middle-level education, using PPE, and working ≥ 10 hours per day, respectively. The most frequent types of injuries were hand cuts, mainly fingers. Hand tools were a frequent cause of injury among these farmers. **Conclusions:** Illiteracy, insufficient use of PPE, and excessive use of hand tools may increase the risk of work-related injuries among farmers. Awareness and training on the use of hand tools and PPE as well as registering farm injuries may help in reducing the prevalence of work-related injuries among farmers.

INTRODUCTION

Farming is the most dangerous among all occupations.¹ Farming itself employs 1.3 billion workers worldwide, and the basis of maintaining strong economic growth for a country is farming.² Approximately 60.0 % of farmworkers are in developing countries; this represents half of the whole workforce.³ Farming accidents have been documented all around the world. In Egypt, farming is considered a pivotal sector in the economy, accounting for 11.3% of the total national production. In addition, farmers contribute to 28% of all jobs and more than 55% of the agriculture workforce in the south of Egypt.⁵ Commonly, the risk of injuries is exacerbated by the increased use of machinery and related equipment.⁶ Occupational accidents in farming include: musculoskeletal; lacerations, ruptures, contusions, twists, strains, and penetration by foreign bodies.⁷ Death and accidents resulting from farming have been reported as a direct result of working in

harmful and hazardous environments, especially in less developed countries. This is because farming entails several duties and settings. Most of these duties happen to be outdoors, thus exposing farmers to many harmful risk factors.² The farming occupation in Egypt is predominantly informal. In Egypt, farmers are, de facto, working privately as landowners in rural areas. There is no system in Egypt for the surveillance and reporting of farming accidents and hazards. In addition, little research has focused on accidents and occupational safety regulations among farmers. Therefore, this research aimed to study the precipitating factors that might be triggering occupational accidents among farmers in Egypt.⁵ The objective of the current study was to identify the patterns of work-related injuries among farmers in Egypt. Additionally, to address the risk factors associated with work-related injuries among farmers in Egypt.

Table (1): Socio-demographic characteristics and working practice of the studied farmers (N=233)

Characteristics	No	%
Male Sex	233	100.0
Marital Status		
Married	223	95.7
Widowed	10	4.3
Education		
Illiterate	168	72.1
Middle-level education	65	27.9
Age		
<50 years old	99	42.5
≥ 50 years old	134	57.5
Landowners in Kirates		
Renting land	233	100.0
Working Experiences (in years)		
<10 years	5	2.1
≥10years	228	97.9
Working hours per day		
<10 hours	68	29.2
≥10 hours	165	70.8
PPE Used		
Yes	60	25.8
No	173	74.2
Type of PPE Used		
Boots	53	22.7
Mask	5	2.1
Gloves	2	0.86

METHOD

A cross-sectional study was conducted on 233 farmers in El-Nakhas village, Al-Sharkia governorate. Al-Sharkia governorate is one of the largest agricultural governorates in Egypt.

The study targeted farmers. Inclusion criteria included farmers ≥20 years of age from El-Nakhas village and working on agricultural land in El-Nakhas. Farmers from El-Nakhas village who work in fields outside El-Nakhas village or farmers from other villages working on farms in El-Nakhas village were excluded from this study. The later were excluded from the study because farmers who work on other people's land are more ambulatory, work seasonally for wages, and change jobs frequently.

The sample size was calculated using the prevalence of work-related injuries among farmers, which was 79.9 % at the time of the study.² Accordingly, the total sample size was 233 farmers, using OpenEpi (Version 2.3), with 80 % power of test and 95% confidence interval.⁹

Table (2): Injury characteristics reported in the last 12 months among injured farmers (N=170)

Characteristics	No	%
Place of injury		
At home	5	2.9
On the way to work	55	32.3
Working in the fields	110	64.7
Season when injured		
Summer	30	17.6
Winter	140	82.3
Time when injured		
Early morning	66	38.8
Day time	8	4.7
Evening	96	56.5
Frequency of injuries (in the last year)		
≥3 times	170	100.0
<3 times	0	0.0

The Zagazig district was chosen at random out of the other districts in the Al-Sharkia governorate. The farmers were chosen from El-Nakhas village, which was chosen randomly from this district. The 233 farmers were selected using cluster sampling, with an average land workforce of between 2 and 5 farmers, assuming it will be 5 on average.

The farmers were asked about work-related data and injury characteristics, deploying a semi-structured questionnaire.⁸ All data were collected in the fall of 2019 by the author after obtaining informed consent from each participant. All participants in this study were assured of confidentiality. Participants were interviewed face to face, and each interview took about 15 minutes. If they decline the interview, they were offered another appointment. Socio-demographic characteristics, work-related data, and injury characteristics were collected using a semi-structured questionnaire prepared by the author.

Farmers' accidents are defined as injuries or accidents that occur because of the work either at the worksite, at home, or on the way to worksites. Farmers were asked about the prevalence of accidents during the previous 12 months and were considered a period prevalence. The working duration of the farmers was categorized using 10 hours as a cut-off point for the working hours per day, and 10 years as a cut-off point for the years of working experience, in this study.

Data analysis: The analysis was performed using SPSS Statistics 23.0 (IBM, 2015).¹⁰ Data were summarized using descriptive statistics. Chi square test was used to compare categorical data. Fisher's

Table (3): The pattern of injury reported in the last 12 months among injured farmers (N=170)

Characteristics	No	%
Mode of injury		
Slipping	25	14.7
Hand tools	95	55.9
Sharp tools	30	17.6
Falls	20	11.8
Types of injuries		
Cuts	120	70.6
Punctures	18	10.6
Lacerations	15	8.8
Fractures	17	10.0
Body parts injured		
Fingers	115	67.6
Hands	26	15.3
Head	15	8.8
Eyes	5	2.9
Knees	2	1.8
Trunk	3	1.8
Legs	4	2.3

exact test was used instead when more than 20% of the cells were less than 5. Logistic regression analysis was used to detect the independent effects of socioeconomic and occupational factors on the farmers' accidents.

RESULTS

All farmers in this study were males and the majority (95.7%) of them were married. Approximately 72.1% of the farmers were illiterate and 57.5% were ≥ 50 years old. None of them owned the land they worked on. Approximately 97.9% of farmers had worked in farming for ≥ 10 years. Moreover, 25.8% of the farmers used personal protective equipment (PPE) at work. Among those who have used PPE, 2.1% used ordinary cotton masks, 22.7% used boots, and 0.86% used gloves at work (Table 1).

A total 170 farmers (72.9%) reported being injured in the last 12 months; all of them reported an incidence of injuries more than three times during the last year. The highest percentages of the injuries occurred while working in the fields (64.7%), in the evening (56.5%), and in winter (82.3%) more than in summer (Table 2).

Among these respondents, the use of a hand tool was a frequent cause of injury among farmers. They included an axe, spade, and hand saw. The most

frequent types of injury were hand cuts, and the site of injury was mainly fingers (Table 3).

The association between socio-demographic characteristics and injuries among farmers is shown in Table 4. Approximately 69.4% of the older age (≥ 50) group reported more injuries than younger groups, yet not significantly. Injuries in the last year were significantly higher among illiterate farmers (95.2% versus 15.4%, $p < 0.001$), those not using PPE (80.9% versus 50.0%, $p < 0.001$), and those working < 10 hours per day (88.2% versus 66.7%, $p < 0.001$) compared with those with middle-level education, using PPE, and working ≥ 10 hours per day, respectively. Other parameters had no statistically significant associations with farmer injuries.

The logistic regression analysis indicates that the probability of injuries among illiterate farmers was 140.8 times the probability among middle school education (95% CI: 43.6-455.0). The probability of injuries among those who do not use PPE was 3.9 times the risk among those using PPE (95% CI: 3.2-35.7). The probability of injuries among those worked less than 10 hours per day was 3.7 times the probability among those worked hours more than 10 hours per day (95% CI: 1.0-5.1). On the other hand, older age had no statistically significant associations with farmer injuries (Table 5).

DISCUSSION

Death and accidents resulting from farming have been reported as a direct result of working in harmful and hazardous environments, especially in less developed countries. This is because farming entails many duties and settings. Most of these duties happen to be outdoors, which expose farmers to many harmful risk factors.² All farmers in this study were males, $> 70\%$ were illiterate and more than half were aged > 50 years. This was in line with a study in Ethiopia, where most of the farmers were males.⁸ This may be because males are more suited to farming than females. In contrast to our results, studies by Das and Singh et al. reported a younger age group of farmers in India.¹¹⁻¹² Also, this was not in line with a study in Nepal, which examined a middle-aged group of farmers accounting for 24.4% of all farmers, who were all owners of the farms they worked on.² Moreover, studies by Gautam and Prasain & Xiang et al. found that 60.0% of the workforce were females in Nepal.¹³⁻¹⁴

The percentage of farmers who worked in farming for ≥ 10 years was 97.9%. This was similar to the

Table 4: Demographic and occupational characteristics by injury status among the studied farmers (N=233)

Characteristics	Injuries in the last year				χ^2	P-value	Odds ratio	
	Yes (N = 170)		No (N = 63)				COR	95% CI
	No	%	No	%				
Marital Status								
Married	165	74.0	58	26.0	2.8	0.1	2.8	0.8-10.2
Widower (reference)	5	50.0	5	50.0				
Education								
Illiterate	160	95.2	8	4.8	151.5	<0.001	110	37.8- 337.5
Middle-level education (reference)	10	15.4	55	84.6				
Age (years)								
<50 years	77	77.8	22	22.2	2.0	0.150	1.5	0.8-2.9
≥ 50 years (reference)	93	69.4	41	30.6				
Working experiences								
<10 years	5	100.0	0	0.0	FET	0.330	--	---
≥10 years (reference)	165	72.4	63	27.6				
PPE use								
Yes (reference)	30	50.0	30	50.0	21.6	<0.001	0.2	0.1-0.5
No	140	80.9	33	19.1				
Working hours per day								
<10 hours	60	88.2	8	11.8	11.3	<0.001	3.7	1.6-9.1
≥10 hours (reference)	110	66.7	55	33.3				

FET: Fisher exact test, COR: Crude odds ratio

Nepal study, which reported lower use of PPE on farms by 30.0%.² Also, 25.8% of the farmers used PPE at work; among those who used PPE, 2.1% used ordinary cotton masks, 22.7% used boots, and 0.86% used gloves at work. This concurred with the Nepal study, which reported that more than 60% of their farmers do not use PPE at their farms, and among those who did use PPE, almost all of them used cotton masks, 4% used boots, and 1.7% used gloves on farm sites.²

More than 70% of the farmers in the current study reported having been injured more than three times in the previous year. The highest percentage of the injuries occurred while working in the fields (64.7%), in the evening (56.5%), and during the winter (82.3%) more than in summer. This corresponded with the study in Nepal, which reported similar results among farmers, those who were injured more than once were 69.0%, and those who reported "fields" as the site where the injury had occurred were 91.0%.² However, it reported different timings for the occurrence of the injuries than in our results, with daytime and more rainy seasons making up the highest percentage. On the other hand, this did not concur with the Indian study by Kalaiselvan et al., which showed a lower prevalence of agricultural injuries (30.6%) as compared to our study.¹⁵

The hand tools were the frequent cause of injury among farmers in the current study. They included an axe, spade, and hand saw. Cuts were the most frequent types of injury, and fingers was the most reported site of injury, and this can be explained as farmers use their hands more frequently in cutting plants of different types, harvesting, and using the water from the canals for irrigation. In addition, the low use of gloves among Egyptian farmers in our study explains why hands and fingers were the most common site of injury. Furthermore, the studies by Das and Xiang et al. have identified hand tools as the most frequently used and were responsible for farming accidents in India and China, respectively.¹¹⁻¹⁴ These countries used similar farming machinery, and they are low-income countries. Also, more manual work that led to hand injuries was reported in a study of Ethiopian farmers, which detected those cuts and lacerations were the most frequent injuries among the farmers.⁸ However, our results was not in line with a study by Kalaiselvan et al., which reported a lower prevalence of accidents among farmers.¹⁵ Additionally, it was not compatible with results from a study by Mucci et al., which reported that the most frequent injuries on farms were contusions and dislocation.¹⁶

Table (5): Logistic regression analysis of the effect of the socioeconomic and occupational factors on the incidence of the farmers' injuries

Predictors	B	SE	P-value	AOR	LCI	UCI
Age (years)						
<50 years	-0.54	0.6	0.4	0.6	0.17	1.9
≥ 50 years (reference)						
Education						
Illiterate	4.9	0.6	<0.001	140.8	43.6	455.0
Middle school education (reference)						
PPE used						
No	1.4	0.6	0.020	3.9	1.2	13.06
Yes (reference)						
Working hours per day						
<10 hours	1.3	0.4	<0.001	3.7	1.7	8.4
≥10 hours (reference)						

AOR: Adjusted odds ratio, LCI: Lower confidence interval, UCI: Upper confidence interval

Illiterate farmers and those who were not using PPE in our study reported more injuries in the last year than those with middle-level education and those using PPE. Moreover, the logistic regression analysis confirmed the same observation. This was consistent with the study in Nepal that showed that the accident rates were statistically higher among the illiterate and those who were not using the PPE.² Additionally, our finding was in line with a study by Yiha and Kumie, which identified that illiterate farm workers and those who did not use PPE were predictive factors for occupational farming injuries.⁸ Also, this concurred with the study by Ravi and Joseph, which reported that more occupational injuries can be prevented by footwear as a part of PPE use by farm workers.¹⁷

Farmers in the current study who worked <10 hours per day showed a statistically significant higher rate of accidents. This may be explained by the fact they were less experienced and tend to work shorter time in the field. Additionally, the shorter time in the field may be associated with inexperience with field hazards and more risk of getting injuries. This was not consistent with some studies that found that farmers who worked less than or equal to 48 hours per week in Ethiopia and Nepal had fewer accidents during farming.^{2,8} Additionally, the study by Yiha and Kumie reported that farmers who used to work more than 48 hours per week were at more risk of occupational injuries.⁸

Injuries among farmers were slightly higher among older age (≥ 50) group but the finding was not significant. This may be explained by the fact that they work more than other age groups; thus, they become much more competent and professional when in direct contact with the job hazards. This

was contrary to a study on Ethiopian farmers which reported a significant association between injuries and old age.⁸ Also, the Nepal study found that the older the farmer, the less careful they were dealing with the risk factors during farming.² Additionally, this was not in line with the study by Gauchard et al., which reported that workers more than 40 years old are more liable to workplace injuries.¹⁸ Also, this did not concur with the study by Yiha and Kumie, which reported that the association of accidents on farms with age showed that younger workers between 17 and 29 were less likely to be injured than farmers who were 30 years old and above.⁸

Limitations of this study: We were not able to reach all farmers at the same time, because of their different working schedules. Therefore, future studies may get access to different farmers' gatherings, such as religious meetings, celebrations such as weddings, and even funerals. The cross-sectional design is not suitable to prove causation and self-reported injuries are susceptible to bias. However, we believe that these limitations do not affect the study finding.

CONCLUSIONS

More than 70% of the farmers reported farm injuries in the last year. Injuries in the last year were significantly higher among illiterate farmers, those not using PPE, and those working <10 hours per day. The most frequent types of injuries were hand cuts, mainly fingers. Hand tools were a frequent cause of injury among these farmers. Awareness and training on the use of hand tools and PPE as well as registering farm injuries may help in reducing the prevalence of work-related injuries among farmers.

Ethical Approval

The study obtained all required approvals from the Institutional Review Board or research ethics committee of Faculty of medicine, Zagazig University. The study followed the ethical standards of the committee responsible for human experimentation and were approved by the Institutional Review Board at Zagazig University.

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