

# Considerable risk of work-related injury and illnesses among seasonal and migrant farm workers in Ethiopia: A Community-based Cross-sectional Study

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## Research

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# Abstract

**Background:** Migrant and seasonal farm workers are at increased risk for occupational fatalities and injuries. However, there is limited evidence about the risk of occupational injury in those who move within the country to take up work in Ethiopia, although in recent years such employment-related geographical mobility is receiving increasing attention. Therefore, this study aimed to investigate work-related injuries, illnesses and the associated risk factors among seasonal and migrant farm workers in Ethiopia.

**Methods:** Community-based cross-sectional study design was employed from October to November 2019 among seasonal and migrant farm workers. The study was carried out in two sites of Amhara regional state, northwest Ethiopia. A cluster sampling technique was used to select 990 study participants. Bivariable and multivariable binary logistic regression analyses were performed using SPSS version 20 to identify predictors. The significance level was obtained at 95% CI and p-value  $\leq 0.05$ .

**Results:** In this study, the period prevalence of work-related injury among seasonal and migrant farm workers was 32.5% (95% CI: 29.7, 35.9). Above half (60.9%) of study participants have shown three or more heat-related illness symptoms. Extreme weakness (56.8%), skin rash (45.1%), headache (40.4%), profuse sweating (42.9%) and fatigue (45.1%) were the commonest heat-related symptoms reported by the seasonal and migrant farm workers. Moreover, the prevalence of work-related stress among seasonal and migrant farm workers was 67.6% (95% CI: 64.6, 70.7). Being unemployed before migration (AOR = 2.22, 95% CI: 1.26, 3.91), working for > 8 h/day (AOR = 1.62, 95% CI: 1.16, 2.27), stress (AOR = 1.38, 95% CI: 1.02, 1.88) and thermal discomfort (AOR = 1.48, 95% CI: 1.09, 1.98) were the significant risk factors for work-related injury.

**Conclusion:** In this study, heat-related illness, work-related injury and stress among seasonal and migrant farm workers in northwest Ethiopia remain a major public health problem. Employment history, average working hours and stress were among the risk factors associated with a work-related injury. Hence, provision of ongoing safety training, personal protective equipments, improving working hours and stress management could be given attention to minimize the problem.

## Background

Migration has been known for centuries all over the world, where people have moved to other areas for different purposes including work [1, 2]. According to the International Labour Organization's estimates, there are 150 million immigrant workers throughout the world [3]. However, many migrant workers are employed as unskilled workers and, often more willing to work harder, work for less pay, for longer hours and perform unattractive tasks, often referred to as 3D-jobs; 'Dirty, Dangerous and Demanding'. Many of the jobs are in the category of precarious work; often temporary, part-time, with changing employers and a high degree of uncertainty in the job [1, 4-8]. Most importantly, these precarious workers may take greater risks on the job, and do not complain about unsafe working conditions for the threat or fear of wage or

job loss. These conditions put migrant workers at increased risk for occupational fatalities and injuries, although some results are conflicting [1, 9-14].

Migrant and seasonal farm workers also face many occupational hazards as a result of heavy lifting and carrying; excessive heat exposure, unsecured machinery, prolonged, whole-body vibration (e.g., tractor driving); and rapid repetitive motions [9, 14-17]. Though migrant and seasonal farm workers are vital to the nation's economy, they are marginalized and underserved populations with many unmet socioeconomic and health care needs [9].

It is estimated that almost half of the deaths associated with 1.2 million annual occupational accidents worldwide occur in the agricultural sector [17]. Moreover, 6629 injuries occurred between 2000 and 2005 among migrant workers in Italy [11]. Nearly one-fifth of the migrant and seasonal agriculture workers in Turkey experienced a health problem and more than half of them (55.7%) suffered from muscle pain in 2017 [17].

Furthermore, a higher risk of mental health problems [9, 13], acute and chronic pesticide poisoning [9, 18] and heat-related illness [5, 7, 19-22] were reported among migrant and seasonal farm workers. However, underreporting of medical conditions is significant due to limited access to health services, and fear of lost wages or jobs [23]. The occupational health and safety (OHS) of these migrant workers remains a fraught and neglected issue [24].

Factors that can impact the health and safety of migrant and seasonal farm workers include low income, extreme temperatures, exposure to old and unsafe machinery, high workloads, long working hours, exposure to biting insects and animals, and allergies [17, 25, 26].

However, very little is known in Ethiopia about the risk of occupational injury in those who move within the country to take up work, often far from home, although in recent years such employment-related geographical mobility is receiving increasing attention.

Therefore, this study aimed to investigate work-related injuries, illnesses and the associated factors among seasonal and migrant farm workers in northwest Ethiopia.

## Methods

### Study design, setting and study participants

Community-based cross-sectional study design was employed from October to November 2019 among seasonal and migrant farm workers. The study was carried out in two sites of Amhara regional state, Northwest Ethiopia, and bordered by Sudan, where migrant and seasonal farm workers profoundly exist. The first site was West Armachiho, which is found 930 km from Addis Ababa, the capital city of Ethiopia. The average temperature is 38<sup>0</sup>C and humidity of the district is 78%, and the day time temperature is very high from March to May reaching up to 43<sup>0</sup>C. The second study setting was the Metema district. Metema

is found Northwest of Ethiopia, which is located in the West Gondar zone at 897 km from Addis Ababa. West Armacho and Metema districts are fertile agricultural areas with a large scale of farming of cash crops like sesame, maize, cotton, and sorghum. In consequence, these seasonal agriculture works attract a hundred thousand of migrants and seasonal farm workers from highlands of Amhara and neighboring regions to these areas to work particularly in the weeding (May to August) and harvesting (September to November) seasons.

### **Sample size determination and sampling procedure**

The sample size was determined by using a single population proportion formula, assuming a 4 % margin of error and a 95% confidence interval. Also, a pilot study was conducted among 50 seasonal and migrant farm workers in the Quara district to estimate the expected proportions of work-related injury and found to be 25%. Since the two-stage cluster sampling technique was used, the design effect of 2 and 10% of possible non-response rate during the data collection period were considered. Finally, a total of 990 study participants were included in the study. Study subjects were selected using a cluster sampling technique.

### **Data collection tool, procedures and data quality control**

The data was collected through interviewer-administered structured questioner adopted from different literatures. The questionnaire was originally prepared in the English version and it was translated to Amharic (local language) to make the questions easily understandable by the study participants and back to English by another translator to check the consistency of the message from the question. The translation was then reviewed by professional experts. A structured questionnaire was developed from different literatures to assess work-related injuries and illnesses. The questionnaire also includes socio-demographic, behavioral characteristics of workers and work environment issues. The questionnaire was pre-tested (n=50) to check the validity and consistency of the Amharic translated version of the questionnaire.

The training was given for data collectors and supervisors for two days on procedures, techniques, and ways of collecting the data. Moreover, the filled questioners were checked for completeness and consistency daily by the supervisors. Throughout the data collection, data collectors were supervised at each site, regular meetings were held between the data collectors and the principal investigator. Ten percent of data was double entered to check errors during data entry.

### **Operational definitions**

A work-related injury is defined as any functional disorder sustained by a worker as a result of any cause extraneous to the injured worker or any effort he/she makes during or in connection with the performance of his/her work during the 12 months preceding the interview.

Work-related stress also measured by the Perceived Stress Scale (PSS) questionnaire and those study participants who score  $\geq 27$  to 10 Likert scale items were considered as having stress. Composite level

scores were computed by summation of the items within the composite scales and dividing by the number of items. Negatively worded items were reversed when computing percent positive response [27].

Heat-related illness (HRI) is defined for the purpose of this study as experiencing three or more HRI symptoms in the preceding week to data collection was considered as having HRI [28].

### **Data management and analysis**

The data was checked, edited, coded and entered into Epi-Data 3.1 and exported to SPSS version 20.0 for further analysis. Descriptive statistics such as frequency, mean, percentage and standard deviations were calculated to describe the characteristics of the study population in relation to different variables. A chi-square test was performed to see the association of different factors with work-related injuries. A binary logistic regression model was fitted to identify factors associated with a work-related injury. The Work-related injury was regressed against the demographic, socio-economic, behavioral and work environment factors. Before fitting the binary logistic regression model, first, the goodness of model fit test was checked by Hosmer and Lemeshow test and the value suggests the model is a good fit (p-value = 0.52). Also, multi-collinearity was also checked using variance inflation factor (VIF) and the value was  $VIF < 5$  for each. Hence, there is no evidence of multi-collinearity.

Variable with p-value  $< 0.20$  at bivariable binary logistic regression analysis was exported to the multivariable binary logistic regression analysis. Enter method was used in multivariable analysis for the selection of variables. The significance level was obtained at 95% CI and p-value  $\leq 0.05$ . The adjusted odds ratio was used to determine the strength of association.

## **Results**

Of the total of 990, 950 of them were fully participated, which gives a response rate of 96 %.

### **Socio-demographic characteristics and working condition of the study participants**

Almost all 943 (99.3%) of the study participants were male. The mean ( $\pm$  SD) age of the respondents was  $26 \pm 7.8$  years and the age of the respondents ranged from 13 to 67. Among the study participants, 103 (10.8%) of the respondents were unemployed before their departure from their home town. The majority 832 (87.6%) of the study participants came from a rural areas. Above two-third 649 (68.3%) of the respondents were single in their marital status.

Of the participants, 178 (18.7%) of them have come to the farm site for the first time. The majority 697 (73.4%) of the study participants were working for  $\geq 8$  hours per day (Table 1).

### **Prevalence of self-reported work-related injuries and illnesses**

The finding of this study revealed that the one year period prevalence of self-reported work-related injury among seasonal and migrant farm workers was 32.5 % (95% CI: 29.7, 35.9). A total of 111 (11.7%) of

respondents had experienced work-related injuries in the past two weeks before data collection period. However, none of injured employees were get compensation for the work-related injuries sustained. Of the total 309 injured respondents, 100 (32.4%) of them hospitalized for more than 24 hours. The majority 205 (66.3%) of the injured respondents reported they have injured during harvesting period (Table 2).

### **Part of the body affected**

Among the total of injured respondents, 207 (66.9%) of them reported hand as the main part of the body affected. Moreover, of the injured respondents, 133 (43%) reported lower leg and 132 (42.7%) head as part of the body affected (Figure 1).

### **Types of injury**

Regarding the types of injury, 132 (42.7%) were head injuries and 109 (35.3%) were cut. In addition, 64 (20.7%) and 61 (19.7%) were fractures and eye injuries respectively (Table 3).

Among the seasonal and migrant farm workers who had contact with chemicals, 16 (23.4%) of them experienced chemical poisoning.

### **Heat exposure and heat-related illnesses**

Among the total respondents, the majority, 813 (85.6%) of the study participants perceived that there is a heat stress risk. This study revealed that the prevalence of self-reported heat-related illness was 60.9 % (95% CI: 57.8, 64.3). Extreme weakness 540 (56.8%), skin rash 428 (45.1%), headache 384 (40.4%), profuse sweating 408 (42.9%) and fatigue 425 (45.1%) were the commonest heat-related symptoms reported by the seasonal and migrant farm workers (Table 4).

### **Work-related stress prevalence**

According to this study, the prevalence of work-related stress among seasonal and migrant farm workers was 67.6 % (95% CI: 64.6, 70.7) (Figure 2).

### **Factors associated with work-related injuries**

The multivariable binary logistic regression showed that types of occupation before migration, average hours worked per day, stress and thermal discomfort were had a statistically significant association with work-related injuries ( $p$ -value  $\leq 0.05$ ) (Table 5).

This study showed that unemployed seasonal and migrant farm workers had a higher risk of experiencing work-related injuries. Seasonal and migrant farm workers who were unemployed at their home town before migration had 2.2 times higher odds of experiencing work-related injuries when compared to respondents who were students at their home town before their departure (AOR = 2.2, 95% CI: 1.3, 3.9). Working >8 hours per day was associated with a high likelihood of experiencing work-related injuries. Workers who work for more than 8 working hours per day were had more likely of sustaining

work-related injuries than those seasonal and migrant workers who work for less than 8 hours (AOR = 1.6, 95% CI: 1.2, 2.3). Work-related stress was associated with a high likelihood of the prevalence of work-related injuries. Respondents who had developed work-related stress had 1.4 times higher odds of experiencing work-related injuries than their counterparts (AOR = 1.4, 95% CI: 1.02, 1.9).

According to this study, thermal discomfort was a risk factor for experiencing work-related injuries. Respondents who were perceived as there is heat stress risk had 1.5 times higher likely odds of experiencing work-related injuries when compared to those who were not perceived thermal discomfort (AOR = 1.5, 95% CI: 1.1, 1.9).

## Discussion

In this study, the period prevalence of work-related injury among seasonal and migrant farm workers was high. A high proportion of study participants have shown heat-related illness symptoms. Extreme weakness, headache, profuse sweating, and fatigue were the commonest heat-related symptoms reported by the seasonal and migrant farm workers. Moreover, the prevalence of work-related stress among seasonal and migrant farm workers was very high. Being unemployed before migration, working for > 8 h/day, stress and thermal discomfort were the significant predictors for the work-related injury.

The finding of this study revealed that the lifetime prevalence of self-reported work-related injury among seasonal and migrant workers in Ethiopia was 32.5% (95% CI: 29.7, 35.9). Among the total of injured respondents, two-third 207 (66.9%) of them reported hand as the main part of the body affected. Moreover, 133 (43%) and 132 (42.7%) of injured respondents reported lower leg and head as part of the body affected respectively. Regarding the types of injury, 132 (42.7%) were head injury and 109 (35.3%) were cut. In addition, 122 (39.5%), 64 (20.7%) and 61 (19.7%) were abrasion, fracture and eye injury respectively. This finding suggests that seasonal and migrant farm workers are at high risk of work-related illnesses and injuries. This might be attributed to adverse occupational exposure to hazardous conditions and unsafe working environments [13, 29]. This result is supported by a study conducted across countries that stated that lack of provision of safety training and protective equipment, the use of unsafe farm machinery and poor health care access poses a significant risk for work-related injuries and fatalities [7, 17, 30–32]. Moreover, seasonal and migrant farm workers may take a greater risk on the job including work for less pay, working for longer hours and do not complain about unsafe working conditions fearing loss of jobs. These conditions put seasonal and migrant workers at increased risk of work-related injuries and fatalities [1, 7, 29].

Furthermore, this study result was higher than the study reported the prevalence of work-related injury among seasonal and migrant workers 3.3% in Turkey [17], 27% in binational health survey (USA, California) [33] and 23% in Hangzhou China [34]. The possible reason might be a substantial number of migrants in this study work without adequate training and using protective equipment. Furthermore, they work in more hazardous, worse conditions and exploitive environments, where they might be at considerable risk of work-related injury than those countries. However, this finding was lower than the

study that reported 73% among migrant farm workers [35], 38.3% among migrant workers in China districts [36] and 47% among international migrants [29]. This might be due to the higher use of heavy agricultural machinery and major language/cultural barriers among migrants in those study areas compared to this study. Besides, poor access to health care, a high rate of adverse occupational exposures and working condition might attribute to the higher prevalence of work-related injury [7]. The other possible reason might be migrant workers work in unsafe working conditions without complaining fearing loss of jobs or being deported.

This study also showed that the majority of seasonal and migrant farm workers suffered heat-related illnesses (HRI). This finding is also supported by a study conducted across countries. Which stated that uninterrupted strenuous job in a hot environment with a very few rest periods and lack of potable water contributes to a high incidence of heatstroke, heat exhaustion and heat cramps among farm workers [5, 9, 20, 21, 37, 38]. Another study also reported that farm workers are four times more likely to experience HRI than other industries workers as a result of high ambient temperatures [9]. Moreover, according to a systematic review conducted agriculture has a mortality rate from HRI that is 20 times that of all other occupations [29]. Lack of training, regular breaks, shade, and medical attention were reported as a risk factors for the high prevalence of HRI among seasonal and migrant workers [28].

Furthermore, in this study more than two-thirds of the study participants have experienced work-related stress. This result is supported by a study that reported migrant workers may experience high levels of stress that is attributed to a fast-paced work environment, precarious or insecure jobs and loss of protective socio-cultural factors such as social support, family ties, language and group identity [39–42].

This study showed that the employment status of migrants before departure from their home town was a significant predictor of the work-related injury. Seasonal and migrant farm workers who were unemployed at their home town before migrating had higher odds of experiencing work-related injuries when compared to respondents who were students at their home town before their departure. This result is also supported by a study done in Shanghai, which states that occupational injury was associated with less job experience [43]. This might be explained by the concept of job-relevant knowledge gained over time. The more experienced workers had more constructive perspectives regarding safety practices than their inexperienced counterparts. Other possible reasons might be as they work longer years they become familiar and aware of hazards related to specific jobs [44].

In this study, working for more than 8 hours per day was associated with a high likelihood of experiencing work-related injuries. This study is in line with the study that reported long daily hours of work, which give rise to fatigue, increased the risk of work-related injuries [17, 24, 34, 45]. The possible reason for this might be long working hours may lead to fatigue, physical and mental stress which can possibly cause weariness, sleepiness, irritability, reduced alertness and impair judgment/decision making that increase the risk of physical injuries and susceptibility to accidents [46]. Moreover, extended working hours may also involve prolonged exposure to potential health hazards.

According to this study, work-related stress was associated with high likelihood of sustaining work-related injuries. Respondents who had developed work-related stress had 1.38 times higher odds of experiencing work-related injuries than their counterparts. This finding was in line with the study that reported the demand for quick work often results in an increased risk of injury from psychological stress [47, 48]. The possible reason might be those stressed workers might be distracted, less focused, inattentive and in consequence lead to accidents and injuries. On the contrary, less stressed workers can manage the job demand and control imbalance in a better way and this could lessen the likelihood of experiencing a work-related injury.

Furthermore, heat stress was significantly associated with sustaining work-related injury. Respondents who perceived as there is heat stress risk had 1.48 times higher likelihood of experiencing work-related injuries when compared to those who were not perceived thermal discomfort. This result is supported by a study that reported work-place heat exposure can increase the risk of occupational injury [45, 49]. This might be due to the fact that elevation of core body temperature and dehydration have had negative behavioral effects in addition to physical impacts like fatigue, irritability, impaired judgment and vigilant decrement which could lead to an increased risk of accidents and injuries.

## **Limitations**

Though this study was able to provide important data on work-related injury and illnesses among seasonal and migrant farm workers, several limitations are noted. While we were able to investigate associations between work-related injury and important variables, causation could not be established, nor were audits of workstations and activities undertaken. Furthermore, the lack of accompanying physical examination to strengthen/verify the self-reported symptom was the limitation of this study. Also, the possibility of recall bias could not be ruled out since more serious and recent injuries or troubles remembered better than a less serious and older one. But we have tried to minimize the effect by honestly explaining the objective and significances of the study to the study participants and by using structured questionnaire for assessing work-related injury and illnesses. Despite these limitations, we feel the study provides a reasonably accurate assessment of work-related injury and associated risk factors among seasonal and migrant farm workers.

## **Conclusion**

In conclusion, this study showed that heat-related illness, work-related injury, and stresses among seasonal and migrant farm workers in northwest Ethiopia remains a major public health problem.

Employment history, average working hours, stress and thermal discomfort were significantly associated factors to work-related injury. Hence, implementing tailored occupational health and safety measures would be supremely important. Provision of ongoing safety training, personal protective equipment, improving working hours and stress management could be given attention to minimize the problem.

# Abbreviations

AOR: Adjusted Odds Ratio; HRI: Heat Related illness; CI: Confidence Interval; COR: Crude Odds Ratio; OHS: Occupational Health and Safety SPSS: Statistical Package for Social Science;

# Declarations

## Ethics approval and consent to participate

Ethical clearance was obtained from Ethical Review Board of University of Gondar. Permission letter was also obtained from each district administrator and farm owner/employers. Those seasonal and migrant workers, who were selected to participate, were informed about the purpose of the study, the importance of their participation and withdraw at any time. Informed written consent was obtained prior to data collection.

## Consent for publication

Not applicable.

## Availability of data and materials

All data generated or analyzed during this study are included in this article. The data that support the findings of this study are also available from the corresponding author upon reasonable request.

## Competing interests

Authors declare that they have no competing interest.

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## Authors' contributions

KAG, SDW, and GD: contributed to the study design, data collection, data analysis, interpretations of the results and manuscript write-up. TA, HF, MM, DF, TY: to the study design, data collection, data analysis, interpretations of the results and manuscript review. All authors read and approved the final manuscript.

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## Supplementary Files

**Supplementary file 1:** Figure 1: Parts of the body injured, West Armacho and Metema districts, northwest Ethiopia, 2019 (n= 950).

**Supplementary file 2:** Figure 2: Prevalence of work-related stress among seasonal and migrant workers in Ethiopia, 2019. (n=950).

## Tables

Table 1: Socio-demographic and Personal characteristics of the study participants, West Armacho and Metema districts, northwest Ethiopia, 2019 (n= 950).

Variables	Frequency (n)	Percent (%)
<b>Gender</b>		
Female	7	0.7
Male	943	99.3
<b>Age in years</b>		
13-17	43	4.5
18-29	689	72.2
30 - 39	151	15.9
>40	70	7.4
<b>Educational status</b>		
Unable to read and write	374	39.4
Able to read and write without formal education	73	7.7
Primary school	406	42.7
Secondary school & above	97	10.2
<b>Main job/occupation before migrating</b>		
Student	177	18.6
Farmer	670	70.5
Unemployed	103	10.8
<b>Family size</b>		
≤ 2	88	9.3
3 - 5	536	56.4
≥ 6	326	34.3
<b>Residence</b>		
Rural	832	87.6
Urban	118	12.4
<b>Religion</b>		
Orthodox	932	98.1
Muslim	15	1.6
Catholic/Protestant	3	0.3
<b>Marital status</b>		
Single	649	68.3
Married	243	25.6
Divorced/Widowed	58	6.1
<b>Salary per day in ETB</b>		
≤ 100	405	42.6
> 100	545	57.4
<b>Frequency of visits to the farm</b>		
First time	178	18.7
2 - 4 times	293	30.8
≥ 5 times	479	50.4
<b>Length of stays in week</b>		
≤ 2 weeks	197	20.7
3 - 4 weeks	343	36.1
5 - 12 weeks	171	18
>12 weeks	239	25.2
<b>Average hours worked per day</b>		
≤ 8 hours	253	26.6
> 8 hours	697	73.4
<b>Average hours worked per week</b>		
≤ 48 hours	96	10.1
> 48 hours	854	89.9

Table 2: Prevalence of work-related injury among the study participants, West Armacho and Metema districts, northwest Ethiopia, 2019 (n= 950).

Variables	Frequency	Percent
Injury in the past two weeks		
No	839	88.3
Yes	111	11.7
Injury in the past 3 months		
No	743	78.2
Yes	207	21.8
One year Injury prevalence		
No	641	67.5
Yes	309	32.5
Hospitalized for more than 24 hours due to injury		
No	209	67.6
Yes	100	32.4
Period where injury occurred		
Preparation	104	33.7
Harvesting	205	66.3
Employer pay your salary at the time of injury		
No	293	94.8
Yes	16	5.2

Table 3: Types of injury experienced by the study participants, West Armacho and Metema districts, northwest Ethiopia, 2019 (n= 950).

Types of injury	Frequency	Percent
Abrasion	122	39.5
Head injury	132	42.7
Cut	109	35.3
Fracture	64	20.7
Dislocation	64	20.7
Eye injury	61	19.7
Suffocation	53	17.2
Poisoning	48	15.5

Table 4: Frequency of heat-related illness experienced among study participants, Ethiopian, 2019. (n=950).

S.No	HRI symptoms experienced	Frequency (%)
1	Skin rash	428 (45.1)
2	Painful muscle cramp/spasm	203 (21.4)
3	Irritability	245 (25.8)
4	Headache	384 (40.4)
5	Profuse sweating	408 (42.9)
6	Fatigue	425 (45.1)
7	Dizziness	430 (45.3)
8	Extreme weakness	540 (56.8)
9	Blurred vision	296 (31.2)
10	Fainting /unconscious/	143 (15.1)
11	Confusion /restlessness/	451 (47.5 )

Table 5: Bivariate and Multi variable binary logistic regression analysis of factors associated with injury among seasonal and migrant workers in Ethiopia, 2019 (n= 950).

Variables	Injury (frequency)		COR (95 % CI)	AOR (95 % CI)
	No	Yes		
<b>Age in years</b>				
13-17	27	16	1.00	1.00
18-29	469	217	0.78 (0.41, 1.48)	0.66 (0.33, 1.32)
30 - 39	98	53	0.91 (0.45, 1.84)	0.85 (0.38, 1.9)
>40	47	23	0.83 (0.37, 1.83)	0.78 (0.32, 1.92)
<b>Educational status</b>				
Unable to read and write	250	124	1.00	1.00
Able to read and write without formal education	53	20	0.76 (0.44, 1.33)	0.81 (0.45, 1.46)
Primary school	267	139	1.05 (0.78, 1.41)	1.19 (0.85, 1.66)
Secondary school & above	71	26	0.74 (0.45, 1.22)	0.93 (0.52, 1.65)
<b>Main job/occupation before migrating</b>				
Student	130	47	1.00	1.00
Farmer	451	219	1.34 (0.93, 1.95)	1.42 (0.90, 2.206)
Unemployed	60	43	1.98 (1.19, 3.32)*	2.22 (1.26, 3.91)*
<b>Family size</b>				
≤ 2	62	26	1.00	1.00
3 - 5	369	167	1.08 (0.66, 1.77)	1.15 (0.68, 1.95)
≥ 6	210	116	1.32 (0.79, 2.19)	1.39 (0.81, 2.42)
<b>Residence</b>				
Rural	565	267	1.00	1.00
Urban	76	42	1.17 (0.78, 1.75)	1.04 (0.66, 1.64)
<b>Marital status</b>				
Single	435	214	1.00	1.00
Married	164	79	0.98 (0.72, 1.34)	0.93 (0.63, 1.37)
Divorced/Widowed	42	16	0.77 (0.43, 1.41)	0.69 (0.36, 1.32)
<b>Salary per day (ETB)</b>				
≤100 ETB	276	129	1.00	1.00
> 100 ETB	365	180	1.06 (0.80, 1.39)	1.05 (0.79, 1.39)
<b>Frequency of visits to the farm</b>				
First time	132	46	1.00	1.00
2 - 4 times	199	94	1.36 (0.89, 2.0)	1.27 (0.82, 1.97)
≥ 5 times	310	169	1.56 (1.07, 2.29)*	1.48 (0.98, 2.24)
<b>Length of stays in week</b>				
≤ 2	124	73	1.00	1.00
3 - 4	249	94	0.64 (0.44, 0.93)*	0.69 (0.46, 1.01)
5 - 12	109	62	0.97 (0.63, 1.48)	1.01 (0.65, 1.58)
>12	159	80	0.86 (0.58, 1.27)	0.77 (0.51, 1.16)
<b>Average hours worked per day</b>				
≤ 8 hours	183	70	1.00	1.00
>8 hours	458	239	1.36 (0.99, 1.87)	1.62 (1.16, 2.27)*
<b>Stress</b>				
No	222	86	1.00	1.00
Yes	419	223	1.37 (1.02, 1.85)*	1.38 (1.02, 1.88)*
<b>Heat stress</b>				
No	270	101	1.00	1.00
Yes	371	208	1.49 (1.13, 1.99)*	1.48 (1.09, 1.98)*

**Note:** 1:00 = reference, \* = variable P-value < 0.05, \*\* = p-value ≤ 0.001.

## Supplementary Files

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