

Assessment of Agriculture Hazards on Farmers' Health and Safety

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Abstract: Agricultural work considered as one of the most hazardous sectors in both developing and developed countries with high rates of accidental deaths, injuries, and work-related illnesses. The aim of this study was assess agriculture hazards on farmer's health and safety. **Design:** Descriptive design will be used to conduct this study and achieved the aim. **Setting:** the study will be conducted at Burqash Village- Imbaba- Giza Governorate, **Sample:** Convenient sampling technique used to choice (187) farmers. **Tools:** two tools were used to accomplish this study. First tool interview questionnaire which contain 6 parts demographic data, past and current medical history, knowledge, attitude, reported and observed practices and types of hazards. Tool two observational checklists to assess farmers PPE, the framework was executed in three months, it started from January 2019 till the end of June 2019. **Results:** shows more than half of study sample exposed to agriculture hazards and injuries, less than three quarters had high contributing factors, more than quarter of study sample had negative attitude, nearly half of them had average knowledge , half of study sample had satisfactory level of reported practices **Conclusion:** the main risks factors affect on farmers health and safety were educational level ,sex, marital status, and farmers exposed to many different hazards as physical, chemical ,mechanical ,biological and psychological hazards ,and satisfactory practices represent (55.1%) and unsatisfactory practices represent (44.9%). **Recommendation:** providing educational programs to increase farmer's awareness about agricultural hazards, and replicate this research finding in another setting and large scale from farmers for generalization.

Keywords: Agriculture Hazards, Farmers, Health & Safety.

1. INTRODUCTION

Agricultural is known to be one of the most important sectors worldwide, in terms of not only supplying foods but also employing a number of workers , However, the agricultural work considered as one of the most hazardous sectors in both developing and developed countries with high rates of accidental deaths, injuries, and work-related illnesses. Agriculture is a physically demanding and places farmers and farm workers at potential risks of musculoskeletal disorders (Mougeot, 2018).

Agriculture ranks among the most hazardous jobs. Farmers are at high risk for fatal and nonfatal injuries, work-related lung diseases, noise-induced hearing loss, skin diseases, and certain cancers associated with chemical use and prolonged sun exposure. Farming is one of the few work in which the families (who often share the work and live on the premises) are also at risk for injuries, illness, and death (Arabian et al., 2020).

India Association of Occupational Health estimated that 1.3 billion workers are engaged in agricultural production worldwide 2019. This represents half of the total world labor force. Almost 60% of them are in developing countries. A great majority of agricultural workers is found in Asia, which is the most densely populated regions of the world, with

more than 40% of the world's agricultural population concentrated in China and more than 20% in India (Dignard and Leibler, 2019).

According to International Labor Organization (ILO) estimates, at least 170,000 agricultural workers are killed each year worldwide. This means that workers in agriculture run twice the risk of dying on the job compared with workers in other sectors. Agricultural mortality rates have remained consistently high in the last decade compared with other sectors in which fatal accident rates have generally decreased. More than one million agricultural workers are seriously injured in workplace accidents involving agricultural machinery or poisoned by pesticides and other agrochemicals (International Labor Organization, 2014).

Significance of the study

Agriculture is estimated that about 24 million Egyptians (or more than one-quarter of the population) work in farming. Historically Egypt has always seen itself as a farming nation. Agriculture development is considered a duty of the state, as recently reaffirmed in the 2019 constitution. Employment in agriculture in Egypt was reported at 24.69% in 2019 according to the World Bank collection of development indicators, compiled from officially recognized sources. The area of agricultural land in Egypt is confined to the Nile valley and delta, with a few oases and some arable land in Sinai. The total cultivated area is 7.2 million feddans, representing only 3% of the total land area (El Shawarby, 2018).

Injuries frequently involve the use of agricultural machinery, and a common cause of fatal agricultural injuries in developed countries is tractor rollovers. Pesticides and other chemicals used in farming can also be hazardous to farmer health, and farmers exposed to pesticides may experience illness or have children with birth defects (Evans and Heiberger, 2016).

Community and Occupational health nurses play an important role in providing Knowledge of injury prevention principles and measures, Ability to recognize hazards that might create unsafe working/living environment, Knowledge of and appropriate use of community resources to complement agricultural health programs, Networking skills, Leadership skills, Knowledge of epidemiological principles, Public speaking and presentation skills, also serve as liaisons between agricultural, health, and farm workers communities. Because historically, vulnerable populations have not been influential in the research process, it is especially important to include worker representatives in efforts to promote their health and safety (Postma, 2019).

This study was conducted because there are not enough studies in Burqash Village – Imbaba – Giza Governorate - Egypt, about agriculture hazards which are important for farmer health and safety, that represent 1847 farmers related to last approved statistical

Aim of the study

The aim of this study was to:

Assess agriculture hazards on farmers' health and safety through:

- 1-Determine agricultural hazards and factors that effect on the health of farmers.
- 2- Assess farmers reported practice towards health and safety.
- 3-Assess of farmers, knowledge, and attitude regarding to agriculture hazardous, health and safety.

Research questions:

- 1-What are agricultural hazards and factors that impact on the health of farmers?
- 2-What are the farmer's knowledge, attitude and practices related to agriculture hazards, health and safety?

2. SUBJECTS AND METHODS

Subject and methods for this study were portrayed under four main designs as the following:

- Technical items.
- Operational items.

- Administrative items.
- Statistical items.

1- Technical items.

The technical design includes research design, setting, sample and tools for data collection.

Research design:

Descriptive research design was used in this study.

Setting:

The study will be conducted at Burqash Village – Imbaba – Giza Governorate.

Sample:

A convenient sample included all women and men in Burqash village except those refuse to participate – 187 farmers shared in study and agree to participate, that represent about of 10% from total number farmers in village that constitute (1847) related to last approved statistical.

Tools of data collection:

Data was collected through using the following two tools:

Tool (1) a structural interviewing questionnaire:

Part 1: demographic characteristics of the farmers: which include: age, sex education, occupation, marital status, residence, income).

Part 2: Past and current medical history, such as (chronic diseases, diseases- related work and injuries-related work, taken medication).

Part 3: Assess knowledge regarding hazards for agriculture which divided to:

(A) General knowledge

Which divided to:-

Part (1) regarding health and hazards As Meaning of agriculture health and safety.

Part (2) regarding health consequence of agriculture hazards as the birds doesn't transmit diseases to human, bilharzias transmitted by drinking water canal, storage of grain and feed by gases may lead to suffocation, Meaning of agriculture hazards and Causes.

(B) Knowledge related to contributing factors such as (economic, age, sex, education, working hours, experience levels, using protective device, emotional factors).

Scoring system for knowledge.

- 10 open end questions **(about health and hazards).**
 - Wrong and no answer = zero point.
 - Incomplete answer = one point.
 - Complete and correct answer = two point.
 - Total score = 20 point.
- 14 closed ended questions **(about health consequence)**
 - Yes answer = one point.
 - No answer = zero point.

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- Total score = 14 point.
- 19 closed ended questions for (**contributing factors**)
- Never answer = zero point.
- Sometimes answer = one point.
- Always answer = two point.
- Total score =38 point.

The total knowledge scores ranged from (0-72).

- Good knowledge (< 75%).
- Average knowledge (from 50% - 75%).
- Poor knowledge (> 50%).

Part 4: concerned with attitude regarding agriculture farmer health and safety.

Assess attitude regarding health and safety using Likert's rating scale statement designed and modified by investigator, as (Do not see the need for regular medical check-up as long as I am in good health, Be careful not to expose the sun directly and use the head cover, Should read the instructions carefully before spraying pesticides .

Scoring system for attitude.

- 29 close ended questions for attitude.
- Never answer = zero point.
- Sometimes answer = one point.
- Always answer = two point.
- Total score = 58 point.

The total attitude score ranged from (0-58).

- Positive attitude (< 50%).
- Negative attitude (> 50%).

Part 5: concerned with reported practices regarding agricultural hazards.

Assess practices as required by farmers regarding health and safety by frequency determination statements. Such as (use of household utensils in the preparation of insecticides , Use of canal water in washing and bathing , use empty pesticide containers after washing them thoroughly , make sure there are no children's or animals nearby before sparing pesticides.)

Scoring system for reported practices.

- 22 close ended questions for general reported practice.
- Done practice = one point.
- Not done practice = zero point.
- Total score = 22 point.

The total reported practice scores range from (0-22).

- Satisfactory reported practice (< 50%).
- Unsatisfactory reported practice (> 50 %).

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Part 6: Agriculture hazards: -

Assessing agriculture safety and health hazards among farmers.

- **Physical hazards:** such as (lifting heavier than 50 K, bending, and high noise).
- **Chemical hazards:** such as inhalation of chemicals such as benzene or diesel in the form of vapors, ingestion of gases and dust by mistake, contact with skin chemicals leading to sensitivity).
- **Psychological hazards:** such as (the farmer works under constant nerve pressure, work in pay patrols and in relation to the surrounding environment and others, there is social support for the family of the peasant).
- **Biological hazards:** such as (the farmer exposure to dust - laden air which leads to inhalation and lead to asthma, eat vegetables and fruits from the field immediately before washing, drinking water running loaded with bacteria and parasites)
- **Mechanical hazards** (mechanical hazards and accidents and work injury): such as (the use of tractors, loading and transport machines, cleaning machines).

Scoring system for hazard assessed.

- 56 closed end questions for exposed hazards.
- Yes or frequent exposed = one point.
- No or never exposed = zero point.
- Total score = 56 points.

The total hazards scores ranged from 0 -56 they were evaluated as follow:

- No risk or hazard (0% - < 1%).
- Mild hazard (1% - < 10 %).
- Moderate hazard (>10% - 50%).
- High hazard (> 50% - 100%).

Tool (2) Observational tool about using personal protective equipment (PPE).

Such as (long sleeve shirt, gloves, eye protection, hearing protection).

Scoring system for PPE.

- 7 closed and question for uses PPE.
- Yes used the equipment = one point.
- No used the equipment = zero point.
- Total scores = 7 point.

2- Operational phase.

The operational design includes: preparatory phase, testing validity, tools reliability, pilot study and field work.

The preparatory phase:

After reviewing of the related literature and theoretical knowledge of various of aspects of the study using books, articles, internet periodicals and magazines, the tool was developed by the investigator then presented to experts for review and validation.

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Content validity:

The revision of the tools for clarity, relevance, comprehensiveness, understanding and applicability was done by a panel of 5 experts from the Community Health Nursing specialty and the necessary modifications were done accordingly. The experts recommended content validity of all tools study variables.

Tools reliability:

To assess reliability, a pilot study was carried out on 10% from the study subjects and was tested by the pilot subjects at first session for calculating Cronbach's Alpha which was 0.927 for knowledge questionnaire, 0.982 for hazards questionnaire and 0.985 for attitude questionnaire and 0.985 for attitude questionnaire and practice questionnaire.

Pilot study:

A pilot study will be carried out with 10% represented (19) farmers which included in the study. The study subjects to included test applicability, clarity, feasibility, practicability of the tools and then the necessary modifications will be done according to the result of a pilot study.

Field work:

Farms, fields and houses of agricultural workers, working for their health and safety. When tools were finalized after pilot testing, the actual field started after obtaining official permissions, the researcher started to prepare a schedule for data collecting.

Interviewing farmer was carried out in the field. It took 20-25 minutes to be filled. The data collection phase took 6 months through academic year 2019-2020 from beginning of January 2019 to the end of June 2019 .farmers were interviewed 3days/week (Thursday, Friday and Saturday). Investigator interviewed three or four farmer per day from 4pm to 6pm, till needed sample complete.

3- Administrative phase.

An approved to carry out this study was obtained from Dean of Faculty of Nursing, Helwan University and send to agriculture administration of Giza governorate.

Ethical consideration

All ethical consideration will be issued; a written approval will be obtained from scientific ethical committee in Faculty of Nursing, Helwan University as well as an informed verbal and written consent will be obtained from each study subject included in this study after explanation of the purpose and the nature of the study before data collection. They will be given an opportunity to refuse to participate in the study, assured that the study is harmless and notified that they can withdraw at any stage of research. Also, they will be assumed that the participation in the study is entirely voluntary, anonymity, privacy and confidentiality will be assured through coding the data. Ethics, values, culture and beliefs will be respected.

4- Statistical phase.

Data entry and statistical analysis were done using SPSS statistical software package. Data were presented using descriptive statistic in the form of frequencies and percentages for qualitative variables, and means and standard deviations and medians for quantitative variables, the collected data were organized, tabulated and statistically analyzed using SPSS software (Statistical Package for the Social Sciences, version 16, SPSS Inc. Chicago, IL, USA). For quantitative data, the range, mean and standard deviation were calculated. For qualitative data, which describe a categorical set of data by frequency, percentage or proportion of each category, comparison between two groups and more was done using Chi-square test. For comparison between means of two groups of parametric data of independent samples, student t-test was used. For comparison between means of two related groups (pre and post program intervention) of parametric data, paired t-test was used. For comparison between more than two means of parametric data, F value of ANOVA test was calculated. Correlation between variables was evaluated using Pearson's correlation coefficient (r). Significance was adopted at $p < 0.05$ for interpretation of results of tests of significance (Dawson and Trapp, 2018).

3. RESULTS

Table (1): Reported Distribution of Socio-Demographic Characteristics of the Studied Sample (N=187).

Demographic data	The studied sample (N=187)	
	No.	%
•Age:		
25 - <35	30	16
≥35 - < 45	41	21.9
≥ 45- < 55	67	35.8
≥ 55 - < 65	46	24.6
≥ 65 –	3	1.6
Mean ± SD	48.1070 ± 9.98220	
•Gender		
Male	135	72.2
Female	52	27.8
•Level of education:		
No read and write	72	38.5
Writes and reading	17	9.1
Primary	13	7
Preparatory	24	12.8
Secondary	19	10.2
University	42	22.5
•Marital status		
Single	9	4.8
Married	178	95.2
•Children number		
Didn't have children	9	4.8
1 – 4	82	43.9
5 – 8	96	51.3
•Work in own land	187	100
•Work in agriculture only		
Yes	113	60.4
No	74	39.6

Table (1): Shows that the mean age of farmers in the current study was 48.1070 ± 9.98220 and 72.2% of them were male. 95.2% married .while 7% of them had primary education. Also 51.3% of them reported that have children from 5-8 child and all the farmers work in own land.

Table (2): Frequency Distribution of the Studied Sample Injures Result from Agriculture Work (N=187).

Items	The studied sample (N=187)	
	No.	No.
• Actual Injures and hazards result from agriculture work		
Yes	109	58.3
No	78	41.7
• Type of injuries and hazards		
Wound	30	27.5
Fractures	28	25.7
Burns	12	11
Suffocation	12	11

Sunstroke	15	13.8
Poisoning by pesticides and sunstroke	12	11
• Action taking toward injures and chronic disease		
Treated	109	58.3
Not treated	78	41.7

Table (2): Delineates that 58.3% of study sample exposed to agricultural injuries and hazards while 41.7% not exposed. 27.5 % exposed to wound, 11 % exposed to burns, suffocation and poisoning. 58.3% taking treatment toward injuries and chronic diseases.

Figure (1): Frequency distribution of the Studied Sample Injures Exposed Results from Agriculture Work

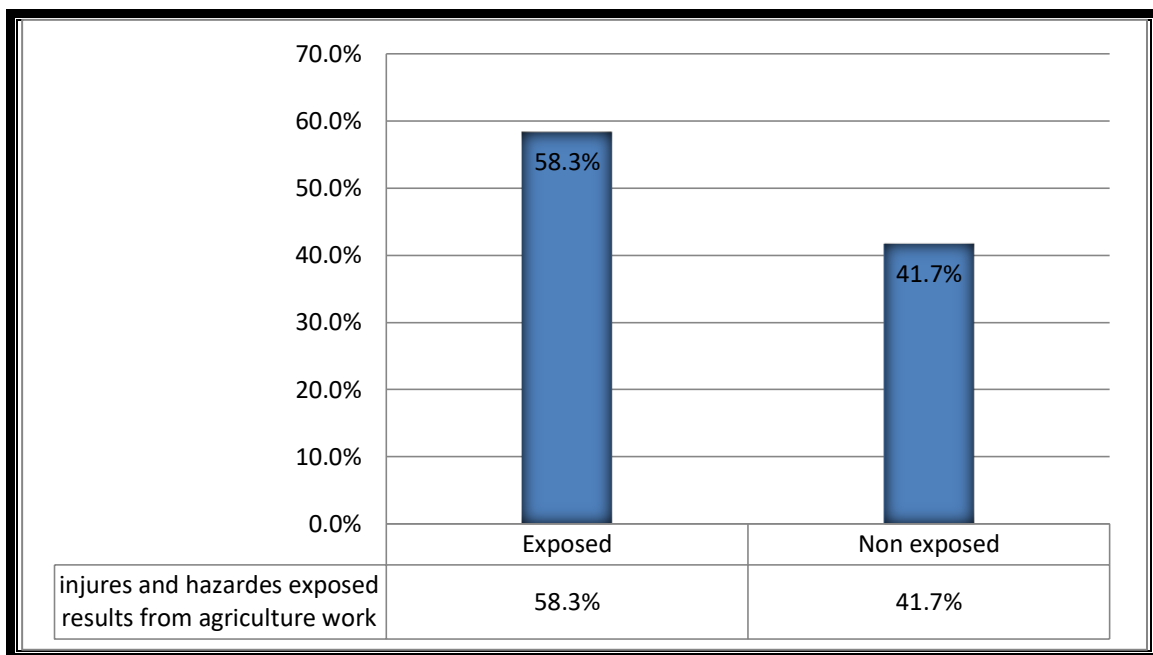


Figure (1): Shows 58.3% of study sample exposed to agricultural injuries and hazards although 41.7% not exposed.

Table (3): Total Factors Scores and Level among the Studied Sample Regarding Agricultural Health, (N=187).

Total Factors scores	The studied sample (N=187)	
	No.	%
Level of total Factors		
- Low contributing factor (0- < 50%)	50	26.7
- High contributing factor (≥ 50% - 100%)	137	73.3
Range	40	
Mean ± SD	68.0645 ±15.42828	

Table(3): Discuss that 73.3% of farmers had high contributing factors although low contributing factors represented 26.7% with mean ± SD 86.0645 ± 15.42828.

Table (4): Total knowledge Scores and Level among the Studied Sample Regarding Agricultural Health, (N=187).

Total knowledge scores	The studied sample (N=187)	
	No.	%
Level of total knowledge		
- Poor level	66	35.3

- Average level	94	50.3
- Good level	27	14.4
Range	43	
Mean ± SD	85.0053±11.439	

Table (4): Demonstrate that total knowledge score and level among studied sample regarding agricultural health that 50.3% had average level of knowledge , 35.3% had poor level of knowledge , although. 14.4% had good level of knowledge with mean 85.0053 ± 11.439.

Table (5): Mean Total knowledge Score and Level among the Studied Sample regarding Agricultural Health, (N=187).

Knowledge items	Mean ± SD	Range
- General Knowledge	10.3316±2.20878	9.00
- Health consequence	7.5187±2.27738	6.00
- Contributing factors	46.9465±7.53253	26
- Total knowledge	58.0053±11.439	38

Table (5): Illustrates mean total knowledge score and level among the studied sample regarding agricultural health. Which General knowledge represent 10.3316±2.20878, Health consequence represent 7.5187 ±2.27738 , contributing factors represent 46.9465±7.53253.

Table (6): Total Attitude Scores and Level among the Studied Sample Regarding Agricultural Health, (N=187).

Total attitude scores	The studied sample (N=187)	
	No.	%
Level of total attitude		
- Positive level	139	74.3
- Negative level	48	25.7
Range	39	
Mean ± SD	63.877±15.798	

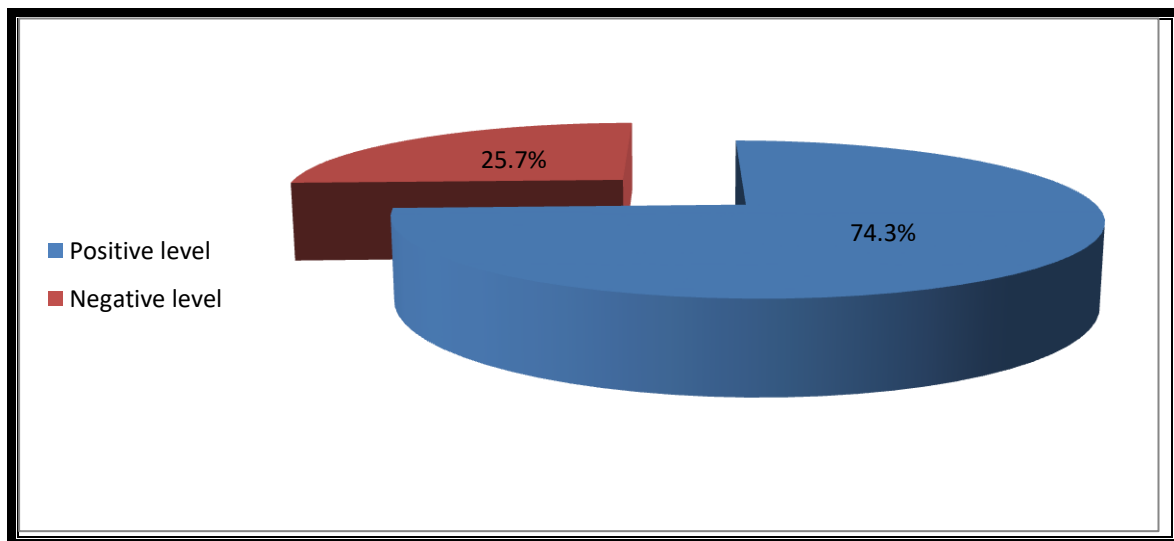


Figure (2) Total attitude scores and level among the studied sample regarding Agricultural Health

Table (6) & figure (2): Indicate that only 25.7% had negative attitude, while 74.3% of participants in the study sample had positive attitude toward agricultural hazards.

Table (7): Studied Sample Observe of Practice of Using Personal Protective Equipment (N= 187).

Using personal protective equipment	No.	%
Long sleeve shirt	82	43.9
Long pants	145	77.5
Gloves	94	50.3
Head covering	42	22.5
Work boots	53	28.3
Eye protection	21	11.2
Hearing protection	21	11.2

Table (7): Delineate personal protective equipment that 77.5 used long pants although 11.2% of the studied sample used coverall, eye protection and hearing protection.

Table (8): Total Reported Practice Score and Level among the Studied Sample regarding Agricultural Health, (N=187).

Reported Practice score levels	The studied sample regarding agricultural health (N=187)	
	No.	%
• Reported Practice level:		
➤ Satisfactory (<50%)	103	55.1
➤ Unsatisfactory (>50%)	84	44.9
Range	17	
Mean ± SD	14.304±5.493	

Table (8): Demonstrate total practice score and level among the studied sample regarding agricultural health that 55.1% had satisfactory level while 44.9% had unsatisfactory level with mean 14.304 ±5.493.

Table (9): Mean total Score of Risk and Hazards Exposure among the Studied Sample Regarding Agricultural Health, (N=187).

Hazards and risk exposure	Mean ± SD
- Physical	13.7166±3.956
- Chemical	7.3957±1.43444
- Biological	3.7818±1.70534
- Mechanical	3.6364±2.36151
- Psychological	2.5455±1.21009

Table (9): Demonstrates the mean total score of risk and types of hazards exposure that physical hazards represent total mean 13.7166 ± 3.956 although psychological hazards represent total mean 2.5455 ± 1.21009.

Table (10): Total Risk and Hazards Exposure and Level among the Studied Sample Regarding Agricultural Health, (N=187).

Items	The studied sample (N=187)	
	No.	%
Level of total risk and health hazards		
- No risk(0 %-< 1%)	0	0
- Mild risk(1 %-< 10%)	0	0
- Moderate risk(>10 %-< 50%)	20	10.7
- High risk(>50%-100%)	167	89.3
Range	25	
Mean ± SD	31.1658±6.317	

Figure (3): Total Risk and Hazard Exposure Level among the Studied Sample Regarding Agricultural Health

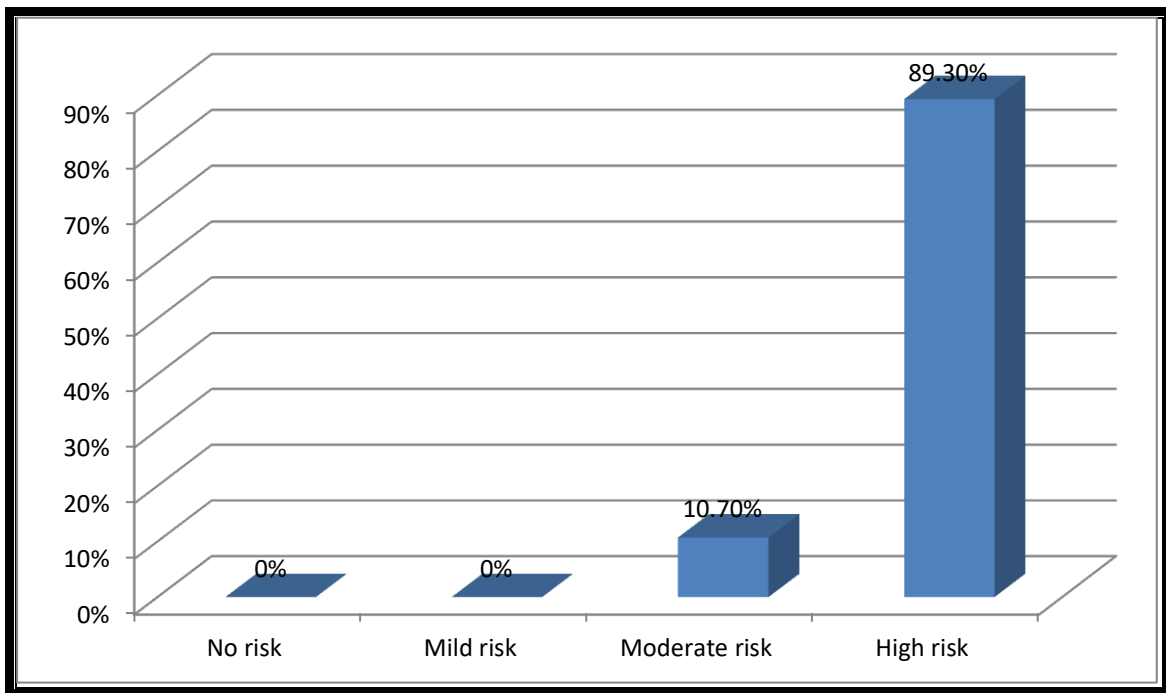


Table (10) & figure (3): Delineates the level of total risk and types of health hazards. That 89.3% of participants had high risk and health hazards while 10.7% only had moderate risk with mean 31.1658 ± 6.317 .

Table (11): Correlation between Total Scores of Knowledge, Attitude and Total Score Practice of the Studied Sample Regarding Agricultural Hazards and Safety Measures (N= 187).

Variables	Total knowledge scores	
	r	P
➤ Total Reported and observed practice of the studied sample	0.533	0.000*
➤ Total Attitude of the studied sample	0.551	0.000*
Variable	Total Reported practice of the studied sample	
➤ Total Attitude of the studied sample	0.294	0.000*

*Significant (P<0.05)

r= Pearson Correlation Coefficient

Table (11): Shows significant correlation between studied sample knowledge, attitude and reported practices p 0.000. Also show significant relation between studied sample, reported practice and total attitude.

Table (12): Correlation between Agricultural Injuries Exposure and Total Scores of Knowledge, Total Score Attitude and Total Reported practice of the Studied Sample Regarding Agricultural Hazards and Safety Measures (N= 187).

Variables	Agricultural injuries exposed	
	r	P
➤ Total knowledge scores	- 0.396	0.000*
➤ Total Reported practice of the studied sample	- 0.677	0.000*
➤ Total Attitude of the studied sample	- 0.351	0.000*

*Significant (P<0.05)

r= Pearson Correlation Coefficient

Table (12): Show highly statically significant negative relation between studied sample total score knowledge, practice, attitude and agricultural injury exposed.

4. DISCUSSION

Agricultural health is the study of environmental, occupational, dietary, and genetic factors on the health of farmers, farm families, pesticide applicators, and others who work with farmers and are exposed to agricultural chemicals hazards, the work in the agricultural sector has taken on a fundamental role in the last decades, due to the still too high rate of fatal injuries, workplace accidents, and dangerous occurrences reported each year (Cividino et al., 2018).

Regarding to the demographic Characteristics of the Studied Sample, the finding of the current study revealed that, more than one third of farmers were in the age group from ≥ 45 - < 55 years with mean age was 48.10 ± 9.98 . This result similar with the result of study performed by Zalat et al., (2015) in their study in Sharkia governorate Egypt about Decreasing Work-Related Pesticide Exposures among Farmers and Their Families and indicate that the mean age of the study participants was 46.3 ± 16.1 .

According to **gender and marital status**, the finding of the current study revealed that less than three quarters of farmers were male. Also mostly of them were married and half of them reported that they had children from 5-8 child. From the researcher point of view. These results might be due to males working in the agricultural profession more than females because it need physical and muscle strength. These results agreement with the study achieved by Derafshi et al., (2017) who carried out a study in Turkey to assess Pesticide knowledge, attitudes, and clothing practices of Turkish farmers”, who indicated that more than three quarters of the farmers under study were male and the majority of them were married.

Likewise, more than half of the studied farmers exposed to agricultural injuries and hazards, more than half of the studied farmers exposed to agricultural injuries and hazards, more than one quarter of them exposed to wound, fractures and tenth of them exposed to burns, suffocation and poisoning . These results similar with the result of study performed by Saracino et al., (2015) who carried out a study in Italy about Quantitative assessment of occupational safety and health and stated that more than half of the studied farmers exposed to agricultural injuries and hazards. From researcher point of view this may be due to the decline in the role of the governmental agricultural guides in educating farmers about the agricultural injuries and hazards. These results supported with the study done by Çakmur et al., (2015) who carried out a study in Kars, Turkey to evaluate the farmers’ knowledge-attitude-practice about zoonotic diseases, and stated that more than half of the farmers under the study exposed to agricultural injuries and hazards.

Related to general knowledge about health consequence regarding agricultural hazards, the finding of the current study revealed that, the mean of total level of general knowledge about health consequence of agricultural hazards was 7.5187 ± 2.277738 . Knowledge sub items as pesticides, poisoning, bilharzias transmitted, and treatment of acute pesticide, tuberculosis transmitted and importance of tetanus vaccine. This results approved with the study performed by Remoundou et al., (2017) about Pesticide risk perceptions, knowledge, and attitudes of operators, workers, and residents.

Regarding to general knowledge about contributing factors effect on farmers’ health, the finding of the current study showed that, the mean of total level of general knowledge about contributing factors effect on farmers’ health was 46.9465 ± 7.53253 . These results due the majority always unable to read the tag information contained on pesticides. Also, three fifth of them always had lack of culture plane for use education. These results agreement with the study performed by Weng & Black (2015) who carried out a study in Taiwan to assess Taiwanese farm workers’ pesticide knowledge, attitudes, behaviors and clothing practices and indicated that the majority of the studied sample reported that they read the instructions on pesticide packages prior to usage.

Likewise the finding of the current study revealed that, less than half of the studied farmers sometimes had training in the use of protective equipment, awareness of the consequences of non-compliance with occupational health and safety issues and knowledge about how to use protective equipment. This result is accordance with Mrema et al., (2017) in their study about Pesticide exposure and health problems among female horticulture workers in Tanzania who stated that Women working in horticulture in Tanzania usually have low levels of education and income and lack decision-making power even on matters relating to their own health. This contributes to pesticide exposure and other health challenges.

Additionally the finding of the current study showed that, half of studied farmers sometimes forgetting and reduces efficiency the use of protective equipment. Also, more than half always had lack of adequate time for the preparation and unpleasant appear of this equipment in use of protective equipment. These results appropriate with the study performed by **Bhandari et al., (2018)** who conducted study at Nepal to assess Factors affecting pesticide safety behavior and stated that Farmers often did not adopt the appropriate safety measures when handling pesticides sighting the constrained perceived barriers.

In the current study, slightly less than three quarters of farmers had high contributing factors. While more than one quarter had low contributing factors with mean \pm SD 86.06 ± 15.42 . These results approved with the study performed by **Sahin & Anli (2019)** in Sanliurfa/Turkey about "Investigation The Awareness of Farmers on Agricultural Health and Safety Rules" and indicated that more than two thirds of farmers had high contributing factors effect on their health evidenced by around two thirds of the farmers did not receive agricultural spraying training, did not receive first aid training and did not receive occupational health and safety training.

Concerning the total knowledge toward agricultural health, the finding of the current study revealed that, nearly half of farmers had average level of total knowledge. And, more than one third of them had poor level of knowledge. Although, more than tenth of them had good level of knowledge with mean 85 ± 11.43 . from the researcher point view This lack of knowledge would be exaggerated by their low educational level as in the current study level where more than one third of the farmers were illiterate. This finding shed the light about the importance of proper educational programs. These results similar with **Baksh et al., (2015)** who carried out study in Trinidad to determine the Farmers' knowledge, attitudes and perceptions of occupational health and safety hazards and stated that Farmers appeared to have good to average level of knowledge. also these results agreement with the study done by **Sharafi et al. (2018)** who carried out study in Kermanshah, Iran about "Knowledge, attitude and practices of farmers about pesticide use, risks, and wastes" and stated that and found that the farmers mainly had incorrect knowledge about pesticides and their risks, and used incorrect and high-risk methods for handling and application of pesticides and relevant wastes.

Concerning the total farmers' attitudes regarding health and safety, the finding of the current study revealed that, nearly three quarters of studied farmers had positive attitude toward agricultural hazards. While one quarter of them had negative attitude. From the researcher's point of view "These results might be due to more than half of farmers had average level of total knowledge scores regarding health and safety, These results similar with the result of study performed by **Thongpalad et al., (2019)** who conducted study to assess Knowledge, attitude and practices of farmers about pesticide use, risks, and wastes and stated that more than two thirds of studied farmers had positive attitude toward pesticide use, risks, and wastes.

Related to using personal protective equipment, the finding of the current study revealed that, more than three quarters of studied farmers using long pants. Although about tenth of them using eye protection and hearing protection. These results were appropriate with the study performed by **Yuantari et al., (2015)** who conducted study at Indonesia to assess Knowledge, attitude, and practice of Indonesian farmers regarding the use of personal protective equipment against pesticide exposure and stated that more than two fifth of farmers using long pants. Also this result agreement with the study achieved by **Sharafi et al. (2018)** who stated that one quarter of the studied sample using coverall, eye protection and hearing protection.

Concerning to total reported practice score and levels regarding Agricultural Health, the finding of the current study revealed that, more than half of studied farmers had satisfactory practice score while less than half of them had unsatisfactory practice score, with mean 14.304 ± 5.493 . From the researcher point view these results mean that the farmers' knowledge had an effect on their practices, as when the farmers have satisfactory knowledge level regarding agricultural health; this will affect their practices regarding using personal protective equipment. These results similar with the result of study performed by **Rezaei et al., (2018)** conducted study at Iran about "Understanding farmers' safety behavior towards pesticide exposure and other occupational risks" and stated that more than half of studied farmers had satisfactory practice score towards pesticide exposure.

Related to the correlation between total scores of knowledge, total score attitude and total score reported practice of the studied sample regarding agricultural hazards and safety measures, the finding of the current study showed that, there were significant correlation between studied sample knowledge, attitude and reported practices. This could be explained

as, positive attitude were higher among farmers who had good knowledge and satisfactory level of practice. These results supported with the study achieved by **Bagheri et al., (2019)** who conducted study at Iran to assess Farmers' knowledge, attitudes, and perceptions of pesticide use in apple farms and found that there were highly statistical significance correlation between studied sample knowledge, attitude and reported practices.

Associated to the correlation between agricultural injuries exposure and total scores of knowledge, total score attitude and total score reported practice of the studied sample regarding agricultural hazards and safety measures, the finding of the current study presented that, there were highly statically significant negative relation between studied sample total score knowledge, practice, attitude and agricultural injury exposure. This could be explained as, whenever the farmers had good knowledge, positive attitude and satisfactory practice, the agricultural injury exposure level decreased. These results supported with the study achieved by **Yuantari et al., (2015)** who establish that there were highly statically significant negative relation between studied sample total score knowledge, practice, attitude and agricultural injury exposure.

5. CONCLUSION

On the light of results of the current study and answers of the research questions, it could be concluded that ; more than half of the studied farmers exposed to agricultural injuries and hazards, more than one quarter of them exposed to wound, fractures and tenth of them exposed to burns, suffocation and poisoning, more than half of farmers had average level of total knowledge.

While, more than one third of them had poor level of knowledge, slightly less than three quarters of farmers had high contributing factors, three quarters of studied farmers had positive attitude while practices represent 55.1% satisfactory and unsatisfactory represent 44.9 %. Finally there were highly statically significant negative relation between studied sample total score knowledge, practice, attitude and agricultural injury exposure.

6. RECOMMENDATIONS

On the light of the current study findings the following recommendations are suggested:

- Providing continues level like workshops help in improving knowledge, attitude about agricultural hazards, and improve practice towards health and safety.
- Educational program for farmers about the effect of agricultural on health and safety.
- Replicate this research finding in another setting and large scale from farmers for generalization.

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