Archives of Current Research International

20(6): 42-57, 2020; Article no.ACRI.60919
ISSN: 2454-7077

Farmers Knowledge, Practices and Health Problems Associated with Pesticides Use in West Tripoli, Libya

Hamza S. Abdalla Lagili[1], Hesham Ayouz[1], Serife Gunduz[1], Ndifreke Etuk Williams[2*], Olusola Bamisile[3] and Onyinyechi Jas Kamalu[4]

[1]Department of Environmental Education, Near East University, Nicosia, Turkey.
[2]Department of Environmental Science, Cyprus International University, Nicosia, Turkey.
[3]School of Mechanical and Electrical Engineering, University of Electronic Science and Technology of China, Chengdu, Schuan, P.R. China.
[4]Department of Crop and Soil Science, University of Port Harcourt, East-West Road, Choba, Port Harcourt, Nigeria.

Authors' contributions

This work was carried out in collaboration among all authors. Authors HSAL and HA designed the study and carried out questionnaire distribution and collection and literature search. Authors NEW, OB and OJK performed the statistical analysis, wrote the protocol and the first draft of the manuscript. Author SG supervised the study from start to end. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/ACRI/2020/v20i630201
Editor(s):
(1) Amal Hegazi Ahmed Elrefaei, Hot Lab and Waste Management Center, Atomic Energy Authority, Egypt.
Reviewers:
(1) Md Nazirul Islam Sarker, Neijiang Normal University, China.
(2) Purvesh Shah, K. K. Shah Jarodwala Maninagar Science College, India.
Complete Peer review History: http://www.sdiarticle4.com/review-history/60919

Original Research Article

Received 07 July 2020
Accepted 11 September 2020
Published 12 October 2020

ABSTRACT

Aims: This study focuses on farmers' knowledge, practices and health problems associated with pesticide use in west Tripoli, Libya.
Study Design: This study concentrated on the farmer being above 18 years, a permanent resident in the study area and the respondent's willingness obliged to the study protocols and complete the study.
Place and Duration of Study: The study is a cross-sectional one among 300 farmers in the West Tripoli district of the Libya which concentrated on the adult population conducted in 2017.
Methodology: The associations between pesticide-handling practices, knowledge and attitude and

**Corresponding author: Email: nwilliams@ciu.edu.tr, wilsluv11@gmail.com;*

factors potentially influencing them were explored by means of t-test, ANOVA and descriptive statistics using the statistical software SPSS 20.0. The reliability of the construct was examined using Cronbach's alpha which was not below 0.700 indicating excellent internal consistency.

Results: Farmers re-spray the crops with surplus pesticide mixture. They throw away surplus pesticide mixture on uncultivated land wash and reuse emptied pesticide containers to store water. Knowledge associated with pesticide use and practices associated with it was also not statistically significant related to attitudes towards educational level. Awareness of pesticide use and handling and therefore showed that there was no statistically significant difference between a male and female farmers' awareness of pesticide use and handling. There is no significant relationship between farmer's monthly income and knowledge regarding pesticide use and there was linear relationship practices with respect to pesticides used and symptoms experienced after exposure to pesticides. Level of education affect farmer's knowledge and practices associated with pesticide use and the ANOVA, $F = 1.489$ and $p =.000$ (> 0.05) suggests that the test was not statistically significant, on how gender affect the awareness of pesticide use and handling the result showed that there was no statistically significant difference ($t(298) = -.460$, $p = .664 > 0.05$) between male and female farmers' awareness of pesticide use and handling. Therefore, male and female gender do not affect the awareness of pesticide use and handling.

Conclusion: The results of farmers practices regarding the use of protective measures and hygiene practices with the potential for exposure to pesticides indicates that farmers use gloves, face mask, respirator and boots. Moreover, the farmers keep their working clothe at home and the spraying methods used are knapsack, hand- held can, and tractor and can be concluded that the danger of exposure increase when farmers disregard safety directives on the correct utilization of pesticides, PPE utilization and using sanitary practices.

Keywords: Perception; agricultural student; livestock; waste management; education; teaching tools.

1. INTRODUCTION

The increment in the populace and rising interest in food utilization has prompted an expansion in pesticide utilize all inclusive. Despite the fact that pesticides are assumed a positive part in securing crops against losses, because of the damaging idea of the distinctive types of pest, they harm human and contrarily influence the environment. In perspective of their forthcoming consequences for people, nations have developed tenets to encourage the safe utilization and control, import and sending out of these chemicals [1]. Between 1973 -1990, the global consumption of pesticide use averaged 3,850 metric tons annually but had shot to a high 37,712 metric tons worldwide in 2000 [2]. For instance in Ghana, in the past years between 1995 and 2000, an average of 814 tons of pesticides was transported in the nation consistently. This expanded from 7763 metric tons in 2002 to 27,886 metric tons in 2006 [3]. Pesticide use in developing nations is expanding, however, its utilization in the developing nations is steady or declining (Sarker et al., 2020). Henceforth, however, developing nations utilize 80% of the world's aggregate agrochemicals, they encounter around 1% of the total pesticide-related passing around the world. The rate of pesticide poisoning has expanded because of purposeful, unintentional and word related introduction to pesticide [4]. Pesticides were misused on farms, with not very many i.e. <2% of the farm laborers knowing the names of the pesticide they were utilizing on farms; farmers do not have the idea about the measure of pesticides to be applied on their yields.3 Around the globe, specialists have discovered that the learning of pesticide wellbeing measures is identified with gender, geography, literacy levels and, on account of female farmers, the presence kids (Sarker et al., 2016) [5].

Farmers do not have any significant safety measures, needed information on safe taking care of and use of pesticides [3]. There is an additionally deficient training on health measures and chemical application. The Ministry of Agriculture trains Agricultural Extension Officers in accordance with this to train farmers. Farmers utilize Organophosphates (OP) which are inconvenient to human and environmental health. They are prevalently presented to pesticides orally (food/water), dermally and nasally [3]. In an investigation to survey the word related occupational exposure of farmers to pesticides in Akumadan, farmers did not utilize PPEs and needed information on re-entry time after spraying of pesticides. Ninety-seven percent (97%) of the members who were exposed to pesticides experienced weakness and successive cerebral pain [6] Ntow et al., 2006). Great Knowledge of farmers on pesticide utilization and practices, for example, transfer, storage and transportation will fundamentally lessen the routes in which pesticides influence human health and the environment.[7] Ntow et al6 revealed that farmers showed self-reported side effects, while great handling with practices among farmers were low in Akumadan. Farmer's education is hence a key in the expansion in knowledge about safety practices.[2] Large amounts of knowledge and perception of hazard are insufficient to impact workers and operators self-protective behavior (Prodhan et al., 2017). This should be well-thoroughly considered when arranging training projects to increase or enhance safety (Islam et al., 2018). Other financial and sociocultural pressures may likewise be attended to as stated by Remoundou.[8] Ncube et al.[9] and Schlosser[10] confirmed the lack in utilization of PPE, unsafe techniques for pesticide administration and pesticide effect among farmers. Signs noted basically allude to the classification of direct poisoning by pesticides.[11] These outcomes appear to affirm the consequences of different overviews completed in the Caribbean[12] and in Central America[13] and in this way attracting attention to the local case of health dangers because of the act of dealing with pesticides (Islam et al., 2020).

Training and availability of steady practical support through visits are hugely vital to handle dangers of pesticide poisoning. Most pesticides are harmful to non-target species including humans and animals and can bring about negative health impacts which might be short term or long term.[8] Work related exposure may happen intensely because of mixing, loading, application or contact with spray crops. The danger of exposure gets higher when farmers overlook safety guidelines on the correct utilization of pesticides, PPE utilization and adapting sanitary practices.[14] The number of years of farming/background, training received or experienced, and level of education could affect one's level of knowledge of the impacts of pesticide in humans and on the environment. Thus the level of knowledge could likewise influence identified with pesticide utilize. In the other way round, the quantity of farming experience, training got or experienced, and level of education can influence practices [15].

Gatto et al[16] found out that outcomes from human examinations recommend that exposure to neurotoxic pesticides can initiate harm to the central auditory system. When pesticides are being sprayed it causes skin disturbances, poisoning and eye aggravations.[17] It has been recognized that the chemical pesticide residues are the key contributor to the destruction threats facing many endangered species.[18].

The objectives of this study was to assess knowledge, work practices and self-reported symptoms associated with pesticide use among vegetable farmers, to determine the prevalence of respiratory and non-respiratory symptoms associated with pesticide use, to evaluate farmers' knowledge on the effect of pesticides on human health and the environment, to evaluate work practices regarding the use of protective measures and hygiene practices with the potential for exposure to pesticides, to determine the association between farmers' knowledge/work practices and respiratory symptoms and non-respiratory symptoms. In the study the following research questions were answered.

RQ1: What is the farmer's knowledge, practice and health problems associated with pesticide use?
RQ2: Does level of education affect farmer's knowledge and practices associated with pesticide use?
RQ3: Does gender affect the awareness of pesticide use and handling?
RQ4: What is the work practices regarding the use of protective measures and hygiene practices with the potential for exposure to pesticides?
RQ5: Is there a relationship between farmer's monthly income and farmer's knowledge/work practices regarding pesticide use?
RQ6: What is the relationship between practices with respect to pesticides used and symptoms experienced after exposure to pesticides?

2. MATERIALS AND METHODS

This study mainly aim at getting the farmers knowledge, practices and health problems associated with pesticides use in West Tripoli, Libya. This study is based on field research carried out in West Tripoli, Libya in 2017. The method applied in this study to make it more reliable is quantitative method by use of a questionnaire adopted from Devi [19] and Akorfa

[20], articles, textbooks, and studies on the subject and internet source.

2.1 Participants and Sampling

The study is a cross-sectional one among 300 farmers in the West Tripoli district of the Libya which concentrated on the adult population. The criteria for eligibility in this study included (i) The farmer being above 18 years (ii) a permanent resident in the study area and (iii) the respondent's willingness obliged to the study protocols and complete the study. Every farmer was given an organized questionnaire obtained. The questionnaire focused on gender, age, education, cultivating background in years, way of life, and knowledge on the impacts of pesticide on human health, the utilization of boots, dust mask, goggles, caps, and face shield. Farmers were additionally asked whether they mix pesticides with uncovered hands, number circumstances they change their gloves into new sets, regardless of whether they eat or drink water while applying pesticides. Fig. 1 indicate the results of the age of farmer's that participated in the study Less than 20 (31.0%), 21-30 (14.0%), 31-40 (18.3%), 41-50 (22.0%), 51-60 (11.7%) and 3.0% were above the age of 60, for the gender 52.3% of the famers were male while 47.7% were female indicating that gender was fairly distributed (Fig. 2). Furthermore, 27.0 % attended high school, 43.3% college while 24.0 % has tertiary education 5.7% do not have any formal education (Fig. 3). As for monthly income, 32.0 % has income less than 500 USD per month, 12 (4.0%), 13 (4.3%) and 179 (59.7%) of the farmers received monthly income of less than 500USD, between 501 – 1000USD, 1001 – 2000USD and above 2001USD respectively (Fig. 4).

2.2 Data Gathering Tools

In this study the data collection tools used are Personal Information, Environmental Perceptions, Knowledge and Behavior Scale Test and Information test.

2.3 Scoring Scale Classification of the Substance

The perception, attitude and practices of farmers in Libya that participated in this study regarding pesticide and its protective measures were revealed and interpreted based on the survey questions.

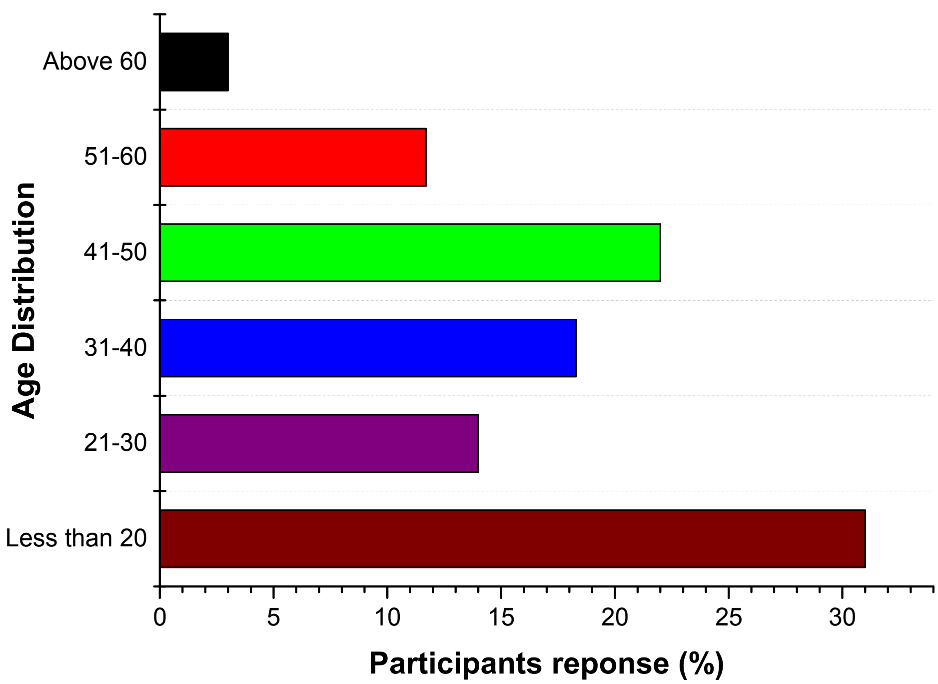

Fig. 1. Age distribution of the farmers

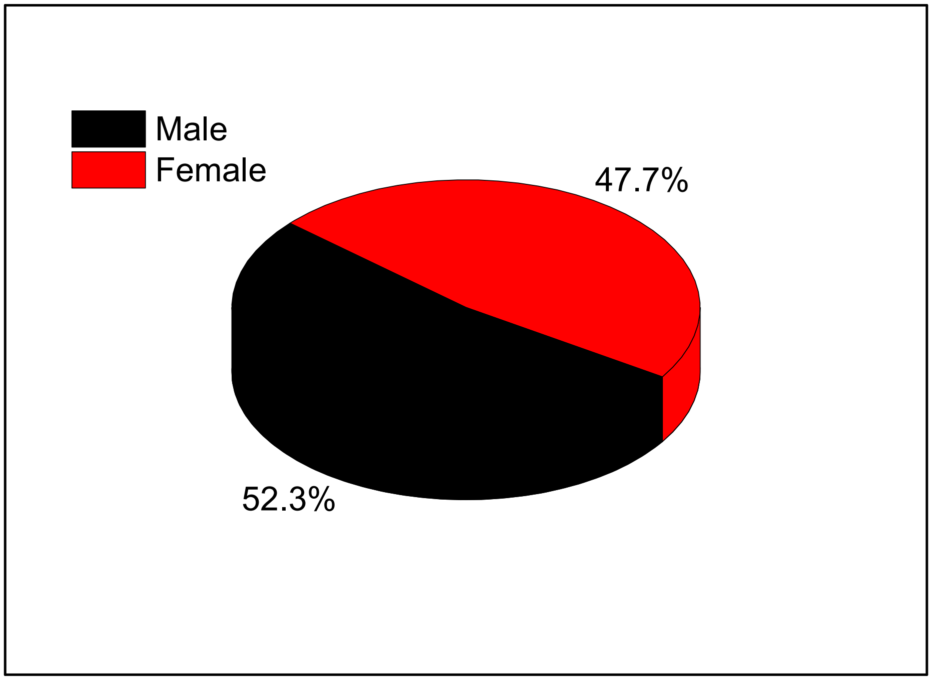

Fig. 2. Gender distribution of the farmers

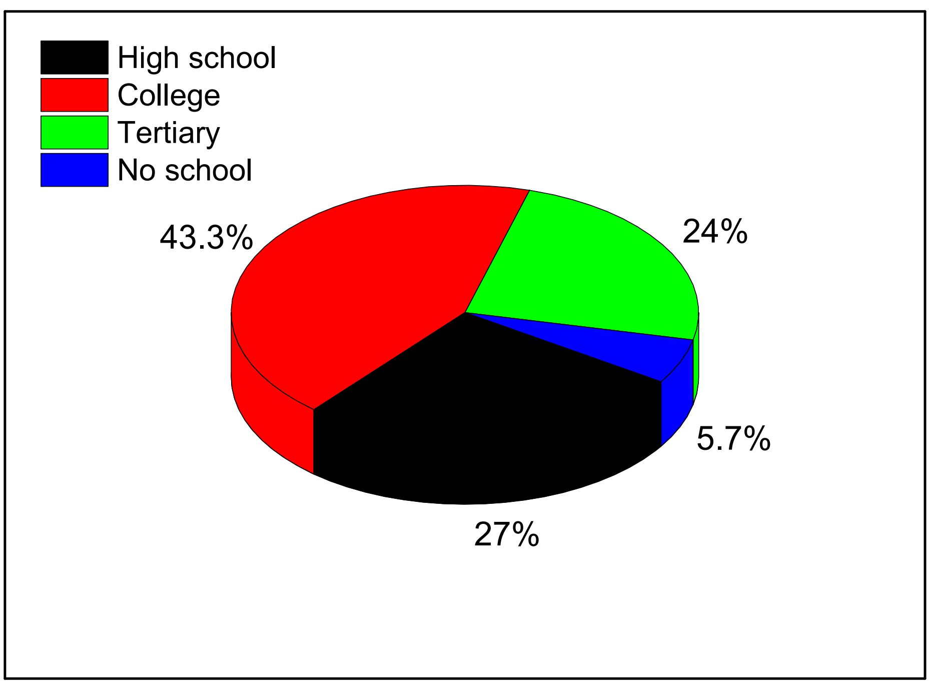

Fig. 3. Educational level

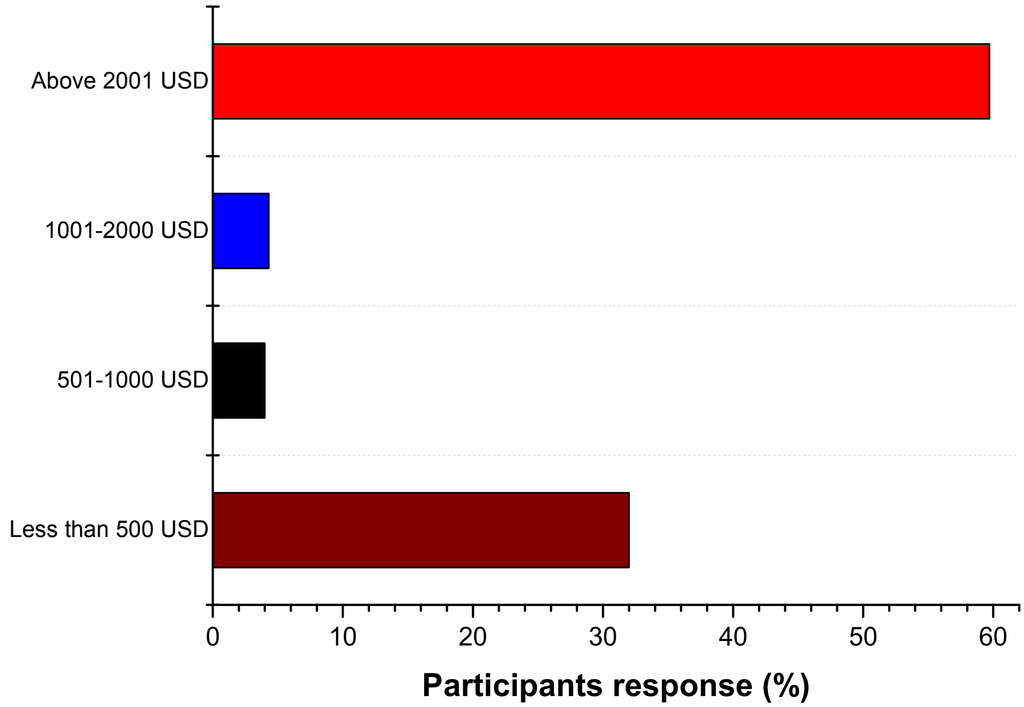

Fig. 4. Monthly income of farmers

Table 1. Reliability Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Awareness	7.7946	1.710	.798	.774
Knowledge	7.9241	1.681	.649	.851
Practice	7.7749	2.254	.706	.794

2.4 Data Analysis

The associations between pesticide-handling practices, knowledge and attitude and factors potentially influencing them were explored by means of t-test, ANOVA and descriptive statistics. Data was analyzed using the statistical software SPSS 20.0. No laboratory or medical tests were conducted.

2.5 Reliability of the Study

Table 1 displays the summary of the reliability test of the three constructs. The reliability of the construct was tested using Cronbach's alpha. The construct reliability should be more than 0.7 to fall within recommended leve [21]. The reliability of the construct of this study ranges from 0.774 to 0.851 which indicates good internal consistency.

3. RESULTS AND DISCUSSION

This section shows the statistical analysis of the study on farmers' knowledge, practices and health problems associated with pesticides use in West Tripoli, Libya with its interpretation according to the respondents result from the questionnaire administered to answer all the research questions regarding this study.

RQ1: What is the farmer's knowledge, practice and health problems associated with pesticide use?

As shown in Table 2 the majority of the farmers agreed with item the question that pesticide affects the health of humans which 63.4% agreed, 26.4% disagreed, pesticides affect the environment 64.7% agreed, 25.3% disagreed, pesticide has effect on fish and rivers 68.7%

agreed, 21.3% disagreed and pesticide can remain in soil for a long time 81.0% of the farmers agreed, 12.3% disagreed. Therefore, the farmers have knowledge associated with the use of pesticide to health problems. Furthermore, as indicated in Table 3 the majority of the farmers agreed with that farmers re-spray the crops with surplus pesticide mixture by 69.0% while 16.0% disagreed and 69.3% agreed that farmers throw away surplus pesticide mixture on uncultivated land while 18.3% disagreed, meanwhile 74.0% agree that farmers wash and reuse emptied pesticide containers to store water while 14.7% disagreed, and 81.7% agreed that farmers return emptied pesticide containers to dealers, 11.3% disagreed, 82.3% agreed that farmers reuse emptied pesticide containers to store pesticides while 9.0% disagreed. Also, high number of the farmers with 72.7% agreed that farmers bury or burn emptied pesticide containers while 18.7% disagreed and 76.0% agreed that farmers throw away emptied pesticide containers to rubbish dump while 16.7% disagreed, 75.7% agreed that farmers hire trained sprayer to spray the farm while 14.7% disagreed indicating that they spray the farm with pesticide themselves. In addition, 83.0% agreed that farmers in West Libya wear protective clothes before spraying while 11.0% disagreed, then 75.3% agreed that farmers feel comfortable wearing the protective clothing while 16.3% disagreed and the farmers further indicated that 79.3% agreed that farmers in the region drink water while spraying but 11.7% disagreed, on the other hand, 75.0% agreed that farmers wash their protective clothing with personal clothes while 15.7% disagreed and 76.0% agreed that all farmers bath with soap and water after pesticide application while 13.7% did not agree to that. Therefore, farmers' good practice with respect to pesticide use is high.

RQ2: Does level of education affect farmer's knowledge and practices associated with pesticide use?

Table 4 and 5 shows the standard regression model summary and provides the Analysis of Variance (ANOVA) test of statistical significance of regression model. From the ANOVA (Table 6), F = 1.489 and p =.000 (> 0.05) suggests that the test was not statistically significant. Therefore, linear combination of education factors significantly relate to the perceived practice, and knowledge. The standard regression model summary indicates the value of the regression coefficient (R =.100). This indicates how well all independent factors combined related with the independent factor (practice and knowledge). Moreover, the Adjusted R2 = 0.003 shows that all the factors combine contributed only 0.03% of the variances in the dependent factor educational level. As seen in Table 4, Factor 1 (knowledge associated with pesticide use) was not statistically significant (B = -0.118, t = -1.724; p = 0.000 >0.05) and Factor 2 (practices associated with pesticide use) was also not statistically significant (B = 0.059, t = 0.862; p = 0.000 > 0.05) relate attitude towards educational level. Therefore, the level of education does not affect the farmer's knowledge and practices associated with pesticide use?

RQ3: Does gender affect the awareness of pesticide use and handling?

Table 7 shows the descriptive statistics of gender effect on awareness of pesticide use and handling. The mean values, 3.97 (SD = 0.787) show that male farmers' awareness was little above the mean value 3.93 (SD = 0.759) of females' farmers. In general, the mean values for both genders was above 2.5, indicating that both gender are aware of pesticide use and handling. The Levene's independent sample t-test was used to investigate whether male and female gender affects the awareness of pesticide use and handling at p = 0.05. The results are displayed in Table 11. The t-test results in Table 8, showed that there was no statistically significant difference (t (298) = -.460, p = .664 > 0.05) between male and female farmers' awareness of pesticide use and handling. Therefore, male and female gender do not affect the awareness of pesticide use and handling.

RQ4: What is the work practices regarding the use of protective measures and hygiene practices with the potential for exposure to pesticides?

The results of work practices regarding the use of protective measures and hygiene practices with the potential for exposure to pesticides are displayed in Table 9 where 5.7%, 10.0%, 14.3%, 33.3%, 33.7% and 3.0% of the farmers use gloves, face mask, respirator, boots, coverall and all PPE respectively as protective cloth. Moreover, 20.7% of the farmers keep their working cloths at home while 20.7% of them keep the cloth in the farmhouse (Fig. 5). In addition, the farmers were asked which spraying methods they used and 11.0% indicated that they use knapsack sprayer, 45.3% use handheld can, 22.0% tractor, and 21.7% uses any container available for the spraying (Fig. 6).

Table 2. Knowledge on the effects of pesticides

Item	Statement	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
13	Pesticide affects the health of humans?	41(13.7%)	38 (12.7%)	31 (10.3%)	107 (35.7%)	83 (27.7%)
14	Pesticides affect the environment	34 (11.3%)	42 (14.0%)	30 (10.0%)	102 (34.0%)	92 (30.7%)
15	Pesticide has effect on fish and rivers?	35 (11.7%)	29 (9.7%)	28 (9.3%)	110 (36.7%)	96 (32.7%)
16	Pesticides can remain in the soil for a long time	19 (6.3%)	18 (6.7%)	20 (6.7%)	106 (35.3%)	137 (13.7%)

Note: SD and D = disagreement while SA and A = Agreement

Table 3. Practices with respect to pesticides use

Item	Statement	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
21	Farmers re-spray the crops with surplus pesticide mixture.	18(6.0%)	30 (10.0%)	45 (15.0%)	105 (35.0%)	102 (34.0%)
22	Farmers throw away surplus pesticide mixture on uncultivated land.	18(6.0%)	37 (12.3%)	37 (12.3%)	112 (37.3%)	96 (32.0%)
23	Farmers wash and reuse emptied pesticide containers to store water	15(5.0%)	29 (9.7%)	34 (11.3%)	120 (40.0%)	102 (34.0%)
24	Farmers return emptied pesticide containers to dealers.	16 (5.3%)	18 (6.0%)	21 (7.0%)	101 (33.7%)	144 (48.0%)
25	Farmers reuse emptied pesticide containers to store pesticides.	10 (3.3%)	17 (5.7%)	26 (8.7%)	91 (30.3%)	156 (52.0%)
26	Farmers bury or burn emptied pesticide containers.	28 (9.3%)	28 (9.3%)	26 (8.7%)	89 (29.7%)	129 (43.0%)
27	Farmers throw away emptied pesticide containers to rubbish dump	24 (8.0%)	26 (8.7%)	22 (.7%)	107 (35.7%)	121 (40.3%)
28	Farmers hire trained sprayer to spray the farm.	25 (8.3%)	19 (6.3%)	29 (9.7%)	121 (40.3%)	106 (35.3%)
29	Farmers in West Libya wear protective clothes before spraying.	13 (4.3%)	20 (6.7%)	18 (6.0%)	100 (33.3%)	149 (49.7%)
30	Farmers feel comfortable wearing the protective clothing.	22 (7.3%)	27 (9.3%)	25 (8.3%)	108 (36.0%)	118 (39.3%)
31	Farmers in the region drink water while spraying.	15 (5.0%)	20 (6.7%)	27 (9.0%)	89 (29.7%)	149 (49.7%)
32	Farmers wash their protective clothing with personal clothes	23 (7.7%)	24 (8.0%)	28 (9.3%)	95 (31.7%)	130 (43.3%)
33	All farmers bath with soap and water after pesticide application	16 (5.3%)	25 (8.3%)	31 (10.3%)	117 (39.0%)	111 (37.7%)
34	Farmers drink water while spraying	14 (4.7%)	21 (9.0%)	27 (9.0%)	120 (40.0%)	118 (39.3%)

Table 4. Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	2.979	.330		9.038	.000	2.331	3.628					
	Knowledge	-.116	.067	-.118	-1.724	.086	-.248	.016	-.086	-.100	-.100	.707	1.415
	Practice	.083	.096	.059	.862	.390	-.107	.273	-.005	.050	.050	.707	1.415

Table 5. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	0.100[a]	0.010	0.003	0.854	0.010	1.489	2	297	.227	1.897

a. Predictors: (Constant), Practice, Knowledge
b. Dependent Variable: Educational

Table 6. Analysis of Variance (ANOVA)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.171	2	1.086	1.489	0.227[b]
	Residual	216.495	297	.729		
	Total	218.667	299			

a. Dependent Variable: Educational
b. Predictors: (Constant), Practice, Knowledge

Table 7. Group Statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Awareness	Female	157	3.93	.759	.061
	Male	143	3.97	.787	.066

Table 8. Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Awareness	Equal variances assumed	.189	.664	-.461	298	.645	-.041	.089	-.217	.135
	Equal variances not assumed			-.460	293.020	.646	-.041	.089	-.217	.135

Table 9. Work practices and hygiene practices with the potential for exposure to pesticides?

Item	Statement	Frequency	Percentage
35	What protective clothing do you wear		
	Gloves only	17	5.7
	Face Mask only	30	10.0
	Respirator	43	14.3
	Boots only	100	33.3
	Overall only	101	33.7
	All of the above	9	3.0
	Total	**300**	**100**
36	Where do you keep your working clothes		
	Home	62	20.7
	Hand- held can	238	79.3
	Total	**300**	**100**
37	What spraying methods do you use		
	Knapsack	33	11.0
	Hand- held can	136	45.3
	Tractor	66	22
	Any container available	65	21.7
Total		**300**	**100**

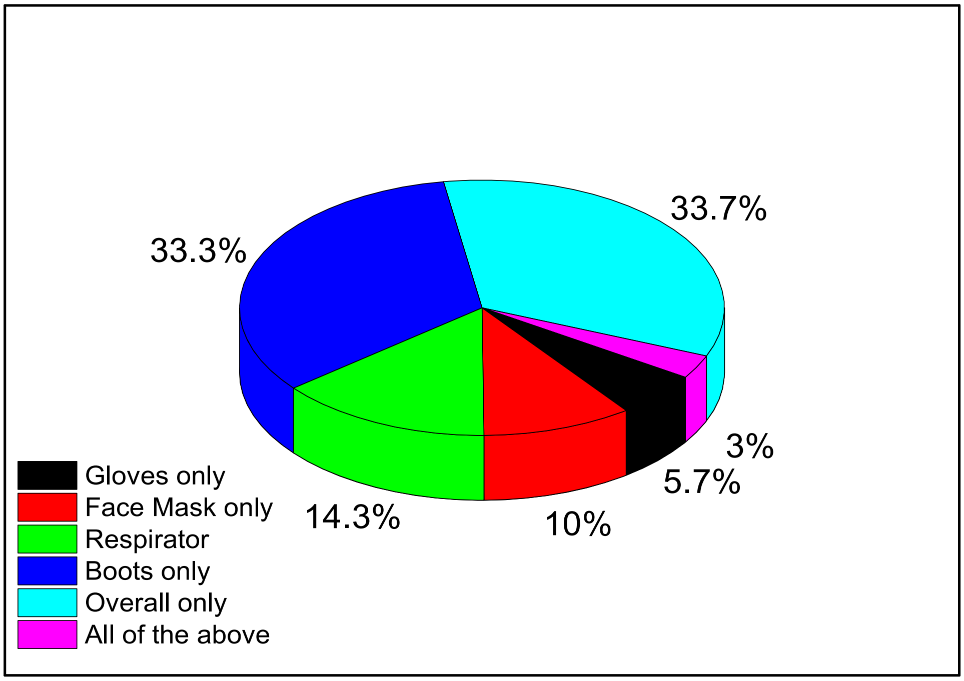

Fig. 5. Distribution of the PPE use by the farmers

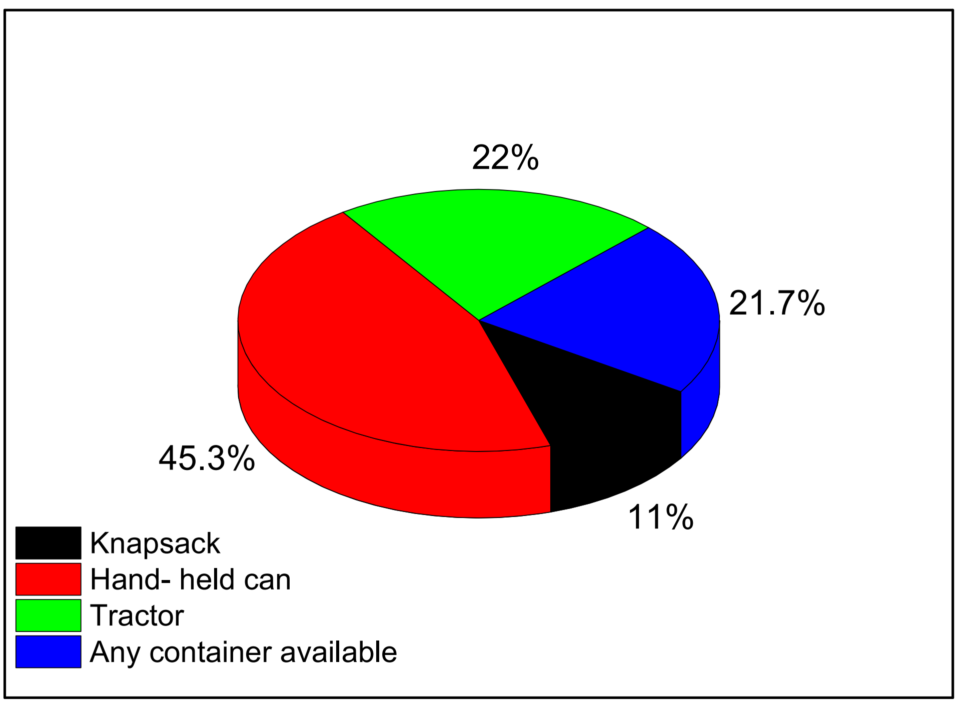

Fig. 6. Farmers methods of spraying pesticides

RQ5: Is there a relationship between farmer's monthly income and farmer's knowledge/work practices regarding pesticide use?

Pearson correlation was employed to assess whether there was a relationship between monthly income and farmer's knowledge practices regarding pesticide use. From Table 10, there is a correlation between the two variables. Therefore, there is no significant (p = 0.178, >0.005) relationship between farmers' monthly income and their knowledge/work practices regarding pesticide use. Table 11 shows the standard regression model summary and Table 12 provides the Analysis of Variance (ANOVA) test of statistical significance of regression model. From the ANOVA, F = 19.456 and p =.000 (< .05) suggests that the test was statistically significant. Therefore, linear relationship practices with respect to pesticides were used and symptoms experienced were after exposure to pesticides. Farmers feel comfortable wearing the protective clothing, the standard regression model summary (Table 12) indicates the value of the regression coefficient (R =0.406). Moreover, the Adjusted R2 = 0.156 shows that all the factors combine contributed 15.6% of the variances in the dependent factor. In Table 13, it is seen that apart from Factor 1 (Farmers feel comfortable wearing the protective clothing) which was not statistically significant (B = .037, t = .596; p = .551 > .05), Factor 2 (Farmers feel comfortable wearing the protective clothing) was statistically significant (B = .281, t = 4.574; p = .000 < .05) and Factor 3 (Farmers return emptied pesticide containers to dealers) was statistically significant (B = .268, t = 5.089; p = .000 < .05). Therefore, in general there is a positive relationship between practices with respect to pesticides used and symptoms experienced after exposure to pesticides.

Therefore, level of education does not affect the farmers' knowledge and practices associated with pesticide use though as reported by Atreya [17] on distinction of gender in knowledge on pesticide use and practices and found out that female farmers had lower levels of education than male, making them less inclined to read and comprehend names on pesticides. According to the study of Remoundou [8], the result is similar to this study in which the researcher states that education was not found to impact farmers' practices since greater part of farmers conceded getting data/training from the legislature and asserted reading label directions and warning but Dey [2] states that the lack of education can lead to unsafe act by farmers and that farmers' education is the key in the increasing in knowledge in safety practices. Gender effect on awareness of pesticide use and handling indicates that both genders are aware of pesticide use and handling so there was no statistically significant difference between a male and female farmers' awareness of pesticide use and handling. Therefore, male and female gender do not affect the awareness about pesticide use and handling and it is similar to the study of Gupta [22], which shows that there is no difference between male and female awareness of pesticide usage and handling. However, by any international standard, both males and females had very low level of knowledge, but these are consistent with other studies done in developing countries [23-25]. This is due to the fact that the farmers in developing countries are illiterate. The results of work practices regarding the use of protective measures and hygiene practices with the potential for exposure to pesticides indicates that farmers use gloves, face mask, respirator and boots. Moreover, the farmers keep their working clothe at home and the spraying methods used are knapsack, hand-held can, and tractor. Though the protective equipment used in the study of Sosan and Akingbohungbe [26] is overalls (safety cloth) as different from our present study still shows that the use of protective equipment while applying pesticide is crucial to avoid health effect and as concluded by Christos and Ilias [6]. Great knowledge of farmers on pesticide use and practices, for example, transfer, storage and transportation will fundamentally reduce the routes in which pesticides influence human health and the environment. There is a relationship between monthly income and farmer's knowledge practices regarding pesticide use. Therefore, there is no significant relationship between farmer's monthly income and farmer's knowledge/work practices regarding pesticide use. Similar to the study by Subashiny and Thiruchelvam [27] incomes of farmers had showed no relationship with the knowledge level of pesticide management but contrary to the study of Suthep et al [28] monthly income was totally correlated with safe use of pesticides. The study suggests that the test was statistically significant. Therefore, linear relationship practices with respect to pesticides used and symptoms experienced after exposure to pesticides. The danger of exposure increase when farmers disregard safety directives on the correct utilization of pesticides, PPE utilization and using sanitary practices [14].

Table 10. Correlations

		Monthlyincome	Knowledge
Monthlyincome	Pearson Correlation	1	-.078
	Sig. (2-tailed)		.178
	N	300	300
Knowledge	Pearson Correlation	-.078	1
	Sig. (2-tailed)	.178	
	N	300	300

Table 11. Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig.F Change	
1	.406[a]	.165	.156	.559	.165	19.456	3	296	.000	1.549

a. Predictors: (Constant), Farmers return emptied pesticide containers to dealers, Farmers feel comfortable wearing the protective clothing, Farmers feel comfortable wearing the protective clothing

b. Dependent Variable: Practice

Table 12. ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	18.250	3	6.083	19.456	.000[b]
	Residual	92.554	296	.313		
	Total	110.804	299			

a. Dependent Variable: Practice

b. Predictors: (Constant), Farmers return emptied pesticide containers to dealers,

Table 13. Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	2.603	.183		14.198	.000	2.242	2.964					
	Farmers feel comfortable wearing the protective clothing	.012	.020	.037	.596	.551	-.027	.050	.161	.035	.032	.748	1.336
	Farmers feel comfortable wearing the protective clothing	.183	.040	.281	4.574	.000	.104	.261	.306	.257	.243	.750	1.333
	Farmers return emptied pesticide containers to dealers	.213	.043	.268	5.019	.000	.130	.297	.273	.280	.267	.993	1.007

a. Dependent Variable: Practice

When farmers are exposed to pesticide in high concentration and dose it can cause several effects like negative health results and this can happen because exposure to pesticides vary as per the pesticide included and the methods of exposure, with the dermal course being the most extreme, particularly for sprayers or applicators [29] Gatto et al [16] found that outcomes from human examinations recommend that exposure to neurotoxic pesticides can initiate harm to the central auditory system and even more other health effect.

4. CONCLUSION

This study shows that pesticide affects the health of humans. It also indicates that the farmers have knowledge associated with the use of pesticide to health problems. Farmers re-spray the crops with surplus pesticide mixture they throw away surplus pesticide mixture on uncultivated land, wash and reuse emptied pesticide containers to store water then return emptied pesticide containers to dealers thereby reusing emptied pesticide containers to store pesticides. A high number of the farmers in West Tripoli bury or burn emptied pesticide containers and throw away emptied pesticide containers to rubbish dump and also hire trained sprayer to spray the farm. Farmers in West Libya wear protective clothes before spraying and while using the PPEs they feel comfortable wearing the protective clothing. Farmers in the region drink water while spraying, after each use of the PPEs farmers wash their protective clothing with personal clothes and all farmers bath with soap and water after pesticide application. This majorly shows that farmers practice with respect to pesticide use is high. There is no statistically significant difference between farmer's knowledge and practices associated with pesticide use, linear combination of education factors significantly relates to the perceived practice, and knowledge. Knowledge associated with pesticide use was not statistically significant and practices associated with pesticide use was also not statistically significant related to attitudes towards educational level.

CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

ACKNOWLEDGEMENTS

The authors appreciate the department of Environmental management education jury members of Near East University for taking their time to assess and give their input in this research.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Lorenz AN, Prapamontol T, Narksen W, Srinual N, Barr DB, Riederer AM. Inter J Environ Res Pub Health. 2012;9(9):3365–3383. Available:http://doi.org/10.3390/ijerph9093365
2. Dey NC. Environ Sci Technol. 2010;11:134-140. Available:https://pdfs.semanticscholar.org/1c1b/8d5d8c8d69aa3eb4b998ab7423916ee009f0.pdf
3. Fianko JR. J Environ Prot. 2011;221–230. Available:http://doi.org/10.4236/jep.2011.23026
4. Singh B, Gupta MK. Ind J Occup Env Med. 2009;13(3):127-130. Available:http://doi.org/10.4103/0019-5278.58915
5. Sam KG, Andrade HH, Pradhan L, Pradhan A, Sones SJ, Rao PGM, Sudhakar C. Int Arc Occup Environ Health. 2007;81(6):787–795. Available:https://doi.org/10.1007/s00420-007-0263-3
6. Christos AD, Ilias GE. Int. J. Environ. Res. Public Health. 2011;8:1402-1419. Available:https://doi.org/10.3390/ijerph8051402
7. Ntow WJ, Gijzen HJ, Peter K, Pay D. Pest Manag Sci. 2006;62:356–365 Available:https://doi.org/10.1002/ps.1178
8. Remoundou K, Brennan M, Hart A, Lynn JF. Hum Ecol Risk Assess" An Inter J. 2013;20(4): 1113-1138. Available:http://doi.org/10.1080/10807039.2013.799405.
9. Ncube NM, Fogo C, Bessler P, Jolly CM, Jolly PE. Arch Environ Occup Health. 2011;66(2):65-74. Available:http://doi.org/10.1080/19338244.2010.506495

10. Schlosser TC. Master's thesis Virginia Polytechnic Institute and State University, Blacksburg, Virginia; 1999. Available:https://vtechworks.lib.vt.edu/handle/10919/33299
11. Thundiyil JG, Stober J, Besbelli N, Pronczuk J. Bull W H O. 2008;86(3):205–209. Available:http://doi.org/10.2471/BLT.08.041814
12. Andreatta SL. Human Org. 1998;57(3):350–358. Available:https://www.questia.com/library/journal/1P3-33799213/agrochemical-exposure-and-farmworker-health-in-the
13. Wesseling C, Aragón A, Castillo L, Corriols M, Chaverri F, Elba DLC, Keifer M, Monge P, Partanen TJ, Ruepert C, Berna VJ. Inter J Occup Environ Health. 2001;7(4):287-294. Available:http://dx.doi.org/10.1179/107735201800339236.
14. Damalas C, Telidis GK, Thanos SD. The Sci Tot Environ. 2008;390(23):341–5. Available:http://doi.org/10.1016/j.scitotenv.2007.10.028
15. Limantol AM, Bruce EK, Bismark AA, Bernd L. Springer Plus. 2016;5(830):1-38. Available:http://doi.org/10.1186/s40064-016-2433-9
16. Gatto MP, Fioretti M, Fabrizi G, Gherardi M, Strafella E, Santarelli L. "Effects of potential neurotoxic pesticides on hearing loss: A review". NeuroToxicology. 2014;42:24–32.
17. Atreya K. Environ Res. 2007;104(2):305–311. Available:http://doi.org/10.1016/j.envres.2007.01.001
18. Khan M, Mahmood HZ, Damalas C. Crop Protection. 2015;67:184-190. Available:https://doi.org/10.1016/j.cropro.2014.10.013
19. Devi PI. Agric Econ Res Rev. 2009;22:263-268. Available:https://pdfs.semanticscholar.org/0a1b/3e0d21af70a7b8c4920b7dd9877ecc029e8a.pdf
20. Akorfa D. Master Thesis. University of Ghana; 2016. Available:http://ugspace.ug.edu.gh
21. Fraenkel RJ, Wallen EN. How to design and evaluate research in education" (4th ed.). San Francisco: McGraw-Hill; 2000
22. Gupta PK. Toxicology. 2004;198: 83–90. Available:https://doi.org/10.1016/j.tox.2004.01.021
23. Recena MCP, Caldas ED, Pires DX, Pontes ERC. Environ. Res. 2006;102(2):230–236. Available:https://doi.org/10.1016/j.envres.2006.01.007
24. Yassin MM, Abu Mourad TA, Safi JM. Occup. Environ. Med. 2002;59:387–394. Available:https://doi.org/10.1136/oem.59.6.387
25. Salameh PR, Baldi I, Brochard P, Abi Saleh B. Environ. Res. 2004;94:1–6. Available:https://doi.org/10.1016/s0013-9351(03)00092-6
26. Sosan MB, Akingbohungbe AE. Arch of environ Occup Health. 2009;64(3):185-93. Available:https://doi.org/10.1080/19338240903241077.
27. Subashiny N, Thiruchelvam S. Sabaramuwa Univ J. 2008;8(1):79-89. Available:https://pdfs.semanticscholar.org/59ae/4dc8f5afa8c01a14d18670d422f5ec31715e.pdf
28. Suthep S, Tanasri S, May TK. Inter J Health Sci. 2016;4(1):48-58. Available:http://dx.doi.org/10.15640/ijhs.v4n1a6
29. Macfarlane E, Carey R, Keegel T, El-Zaemay S, Fritschi L. Safety and Health at Work. 2013;4(3):136–141. Available:http://doi.org/10.1016/j.shaw.2013.07.004
30. Sarker MNI, Ahmad MS, Islam MS, Sayed MMMA, Memon NH. Potential food safety risk: extensive use of fluorine containing agrochemical in fruit production. Fluoride. 2020;53(3):1-22

Peer-review history:
The peer review history for this paper can be accessed here:
http://www.sdiarticle4.com/review-history/60919