CHAPTER IV

RESULTS

This chapter provides a detailed description of the results obtained from the analysis of the survey. The variables are described as simple percentage, means and standard deviations as appropriateness. It starts with the socio-demographics data followed by the responses for each part of the questionnaire. The level of knowledge, attitude and practice score were then presented and followed by the results of statistic test used as appropriated. Lastly, the relationship between knowledge, attitude and practice scores and level of cholinesterase in farmer's blood respondents was described by correlation.

4.1 Socio-demographics information

This study was conducted in Nang Ler sub-district, Mueang district,Chainart province, Thailand. The participants were willing to complete the interviewed questionnaires. The questions were administered by researcher and research assistance.

98 participants agreed to attend the study. As shown in Table 4.1, age of all respondents ranged from 18 to 65 years. The average age of the participants was 46 years with a standard deviation of 12.3. The majority of the respondents were in the range of 51-60(31.6%) and 41-50 years (26.5%), while 18.4% and 14.3% of participants were in range of 31-40 years and younger than 30 years, respectively. Only 9.2% were older than 60 years.

The majority of participants were female (55.1%). The result of education status showed that of 90.8% had education. More than 50% of respondents had graduated from primary school, 24.5% had graduated from secondary school, 8.2%

had graduated from high school, and 3% had education more than high school. Subjects surveyed performed transporting pesticides 48%, mixing pesticide 27.6% and spaying pesticide 24.5%. Approximately, 80.6% used pesticides on 9.00 a.m. – 12.00 a.m. The most of participants were 39.8% had duration time as farmer in range from 1 – 10 years, 24.5% had duration time as farmer in range from 11 – 20 years, 17.3% had duration time as farmer in range from 21 – 30 years, 13.3% had duration time as farmer in range from 31 – 40 years, and 5.1% had duration time as farmer in range more than 40 years.

Table 4.1: Social and demographic characteristics of the farmers who participated in this study

Characteristics	Number (n = 98)	Percentage (%)
Age (years)		
≤ 30	14	14.3
31 – 40	18	18.4
41 – 50	26	26.5
51 – 60	31	31.6
>60	9	9.2
Gender		
Male	44	44.9
Female	54	55.1
Education		
No education	9	9.2
Primary school	54	55.1
Secondary school	24	24.5
High school	8	8.2
Diploma	2	2.0
Bachelor's degree	1	1.0
Activities related of farm		
Direct exposed farmer(n=51)		
Spaying pesticides	24	24.5
Mixing pesticides	27	27.5

Table 4.1: Social and demographic characteristics of the farmers who participated in this study (Cont)

Characteristics	Number (n = 98)	Percentage (%)
Indirectly exposed farmer (n=47)		
Glowing and Harvesting rice	47	48.0
Daily pesticides application period		
Morning (9.00 – 12.00 am.)	79	80.6
Afternoon (13.00 – 16.00 pm.)	19	14.3
Evening (after 16.00 pm.)	5	5.1
Duration time as farmers (years)		
1 - 10	39	39.8
11 - 20	17	17.3
21 – 30	24	24.5
31 – 40	13	13.3
> 40	5	5.1

Table 4.2 showed that the majority ages of both farmers were in the range of 51 – 60 years (direct exposed farmers 29.4% and indirect exposed farmers 34.1%). Most of direct exposed farmers were male (51.0%) but mostly of in direct exposed farmers were female (61.7%).

The result of education status showed that more than 90% of direct and indirect exposed farmers had education. Most of them had graduated from primary school (47.1% of direct exposed farmers and 61.8% of indirect exposed farmers), 25.5% of both farmers had graduated from secondary school. Mostly of direct and indirect exposed farmers had duration time as farmer in range from 1 – 10 years (37.3% and 42.6%, respectively), more than 20% of both farmers had duration time as farmer in range from 21 – 30 years, Approximately 17% of direct and indirect exposed farmers had duration time as farmer in range from 11 – 20 years, and less than 20.0% had duration time as farmer in range more than 30 years.

Table 4.2: Social and demographic characteristics of direct exposed farmers and indirect exposed farmers

Characteristics	Number (n = 98)		Percentage (%)	
	Direct exposed farmers (n=51)	Indirect exposed farmers (n=47)	Direct exposed farmers (n=51)	Indirect exposed farmers (n=47)
Age (years)				
≤ 30	9	5	17.6	10.6
31 – 40	11	7	21.6	14.9
41 – 50	11	15	21.6	31.9
51 – 60	15	16	29.4	34.1
>60	5	4	9.8	8.5
Gender				
Male	26	18	51.0	38.3
Female	25	29	49.0	61.7
Education				
No education	5	4	9.8	8.5
Primary school	24	29	47.1	61.8
Secondary school	13	12	25.5	25.5
High school	8	-	15.6	-
Diploma	1	1	2.01	2.1
Bachelor's degree	-	1	-	2.1
Duration time as farmers (years)				
1 - 10	19	20	37.3	42.6
11 - 20	9	8	17.6	17.0
21 – 30	13	11	25.5	23.4
31 – 40	8	5	15.7	10.6
> 40	2	3	3.9	6.4

4.2 Information regarding pesticide use

Table 4.3 illustrated the problems experienced by rice farmers while they were growing there were insect (99%), weed (94.9%), plant disease (77.6%), and animal

disease (55.1%). Popular chemicals used during rice growing were abamectin, organophosphate, and carbamate.

The most of participants got the information about pesticide from agriculture officer (57.1%), from television (48.0%), from Neighbor, and community header (36.7% and 35.7%), respectively. 3.1% of the participants had a cholinesterase test in the last 12 mounts using the reactive paper by Health Center. Reactive paper is a popular method using by the ministry of public health in Thailand. It is cheaper and able to monitor the workers' health and to prevent pesticide poisoning. This method was used to measure the inhibition of acetylcholinesterase enzyme of organophosphorus or carbamate groups only in plasma (PChE) which result in the accumulation of acetylcholine increasing and stimulate the nervous system (Division of Occupational Health, 1986).

Table 4.3: Information of the problem of weed, insect, pesticide use of the rice farmers who participated in the study

Characteristics	Number (n = 98)	Percentage (%)
Insect problem		
Yes	97	99.0
No	1	1.0
Weed problem		
Yes	93	94.9
No	5	5.1
Plant disease		
Yes	76	77.6
No	22	22.4
Animal disease		
Yes	54	55.1
No	44	44.9
Common pesticides		
Abamectin (abamectin)	84	85.7
Organophosphate (chlorpyrifos)	68	69.4
Carbamate (carbosunfan, carbofuran)	47	47.9
Herbicide (glyphosate)	33	33.7
Others (mancozeb, alonil)	46	46.9

Table 4.3: Information of the problem of weed, insect, pesticide use of the rice farmers who participated in the study (Cont)

Characteristics	Number (n = 98)	Percentage (%)
Source of pesticides information		
Radio	29	29.6
TV	47	48.0
Document/article	27	27.6
Broadcast tower	8	8.2
Neighbor	36	36.7
Agriculture officer	56	57.1
Public health office	28	28.6
Pesticide salesman	15	15.3
Community header	35	35.7
Health volunteer	22	22.4
Cholinesterase check up in last 12 months		
Never	95	96.9
Yes but not know result	0	0
Yes and normal	3	3.1
Yes and not normal	0	0
Yes with health effects	0	0

4.3 Information of toxicity symptom of the rice farmers

As seen in Table 4.4, more than half of the respondents never had toxicity symptom whereas almost 34% of the respondents had few toxicity symptoms such as headache, fatigue, dizziness, stomach cramps and throat irritation and less than 15% had moderate symptoms, for example, contracted pupils of the eyes, excessive sweating and salivation.

When they had the toxicity symptom related to pesticide exposure, they had treat by health center (77.6%), Provincial hospital (25.5%), and Herbals use by themselves (13.7%), District hospital (7.1%), and private clinic (6.1%).

Table 4.4: Information of toxicity symptom related to pesticide exposure of the rice farmers who participated in the study

Characteristics	Number (n = 98)	Percentage (%)
Toxicity symptom		
Never	52	53.0
Few symptom (Headache, fatigue, dizziness, stomach cramps and throat irritation)	33	33.7
Moderate symptom (Nausea, vomit, blurs vision, shivering, constriction, cramp, and hyperventilation)	13	13.3
Nervous symptoms (Contracted pupils of the eyes, excessive sweating and salivation)	0	0
Treatment of toxicity symptom associated with pesticide exposure		
By themselves	0	0
Harbal use by themselves	14	13.7
Alternative medicine	0	0
Health center	76	77.6
Private clinic	6	6.1
District hospital	7	7.1
Provincial hospital	25	25.5

4.4 Knowledge of rice farmers regarding pesticide use and prevention themselves from pesticides

Table 4.5 illustrated the knowledge of the participants answered a total of 15 questions. Each correct answer was given one point with a total of 15 points. The average knowledge score from the respondents was 11.39 (SD = 1.28). The knowledge score was in range from 8 to 15. Approximately, 74.5% of respondents got the score in range from 10 to 12.

The questionnaire, the highest item of the correct answer was question no.9 "What is the correct practice when you were spraying pesticide?" and no.11 "How to storage residual pesticide product?" in which 81.6% of they knew that they have to use cover mask and glove, closed dressing, and wearing boot before using pesticides and they have to keep the pesticides in special box and close the door after finished. Many respondents (80.6%) knew that to manage pesticide packet after it was finished by burn and bury. Additional, the lower score of correct answer was question no.13 "What is symptom of long term pesticide exposure?" which the respondents only 6.1% selected that they was dizzy, and be parched.

Table 4.5: Number and percentage of knowledge for pesticide use and prevention

Knowledge item	Correct	
	Number (n = 98)	Percentage (%)
1. How many route the pesticide can go inside the body? What?	75	76.53
2. What is disadvantage of pesticide use?	61	62.24
3. How to correct pesticide use?	69	70.40
4. When you want to buy pesticide, should you considerate?	17	17.34
5. How to known toxicity of pesticide?	70	71.42
6. What is the correct method of pesticide use?	66	67.34
7. How to correct mix pesticide?	61	62.24
8. Where is the pesticide residual after spraying?	76	77.55
9. What is the correct practice when you were spraying pesticide?	80	81.63
10. What are the correct practices after pesticide used?	77	78.57
11. How to storage residual pesticide product?	80	81.63
12. How to manage pesticide packet after it was finished?	79	80.61
13. What is symptom of long term pesticide exposure?	6	6.12
14. How to practices the first aid if you acute exposed pesticide?	75	76.53
15. How to practices the first aid if you drunk pesticide?	15	15.30

As shown in table 4.6, the distribution of the knowledge of the respondents showed that 15.3 % of respondents had "Low Knowledge", 74.5%of them had "Moderate knowledge", and had "High Knowledge" 10.2%. The average attitude score for all respondents were 11.39 out of a possible 15 point.

Table 4.6: Distribution of knowledge levels on using PPE

Knowledge level	Number (n = 98)	Percentage (%)
Low levels (Less than 60%)	15	15.3
Moderate levels (60% – 80%)	73	74.5
High levels (81% - 100%)	10	10.2

4.5 Attitudes of rice farmers regarding pesticide use and prevention themselves from pesticides

Table 4.7 illustrated the attitude of the participants answered a total of 15 questions. The average attitude score from the respondents was 54.87 (S.D. = 5.24). Approximately, 81.6% of respondents got the score in range from 49 – 60.

According to table 4.7, they had agree that pesticide can residues in agricultural product and its harm to consumer (60.2%), using wood or stick to mix pesticide is safe than using hand (44.9%), pesticides are harmful to the human health and environmental(43.9%), and exercise can excrete pesticide toxins through sweat (32.7%).

For negative statement, 42.9% had strongly disagree on should not wear clothes when spraying pesticides. Approximately 58.1% had disagree to stand above the wind when spraying pesticide don't concern about clothes, 56.1% had disagree that pesticide can only enter the body by ingestion, 52.0% had over mixture more than label recommendation should increase yield, 50.0% had disagree pesticides only harm

insects, not humans, 44.9% had disagree various pesticide mixtures are effectiveness of pesticide use, 43.6% had disagree that they should increase the amount of pesticides used at any time. They had neutral agree 42.9% on drink coconut water after pesticide exposure to excrete toxins and 37.7% on drink water after pesticide exposure to excrete toxins. Moreover 59.2% had agreed that expensive chemicals are effective to control pest better than inexpensive chemicals.

Table 4.7: Percentages of attitude regarding pesticide use and prevention

Attitude items	Strongly Agree	Agree	Neutral	Disagree	Strongly disagree
	%	%	%	%	%
1. I think pesticide can only enter the body by ingestion. *	3.1	0	7.1	56.1	33.7
2. I think pesticides only harm insects, not humans. *	4.1	5.1	6.1	50.0	34.7
3. I think I should increase the amount of pesticides used at any time. *	2.0	10.2	20.4	43.9	23.5
4. I think various pesticide mixtures are effectiveness of pesticide use and no disadvantage. *	0	6.1	29.6	44.9	19.4
5. I think that using wood or stick to mix pesticides is safe than using hand.	44.9	29.6	10.2	6.1	9.2
6. I think that over mixture more than label recommendation should increase yield. *	1.0	8.2	33.7	52.0	5.1
7. I think that if I stand above the wind when spraying pesticide, don't concern about clothes. *	8.1	3.1	3.1	58.1	27.6
8. I think pesticides harm humans and the environment.	38.7	43.9	4.1	9.2	4.1
9. I think I should drink coconut water after pesticide exposure to excrete toxins. *	7.1	18.4	42.9	27.5	4.1
10. I think I should drink water after pesticide exposure to excrete toxins. *	10.2	16.3	37.7	32.7	3.1

* Negative statement

Table 4.7: Percentages of attitude regarding pesticide use and prevention (Cont)

Attitude items	Strongly Agree	Agree	Neutral	Disagree	Strongly disagree
	%	%	%	%	%
11. I think that exercise can excrete pesticide toxins through sweat.*	9.2	32.7	26.5	30.6	1.0
12. I think while I am spraying pesticides, I should not wear clothes. *	4.1	10.2	4.1	38.7	42.9
13. I think pesticide can residues in agricultural product and its harm to consumer.	24.5	60.2	4.1	4.1	7.1
14. I think that pesticides are not the only way to eradicate pest.	14.3	59.2	14.3	11.2	1.0
15. I think that expensive chemicals are effective to control pest better than cheap chemicals. *	2.0	19.4	23.5	49.0	6.1

* Negative statement

Table 4.8 illustrates rice farmers answered a total of 15 questions with the total score of 75 points. The distributions of attitudes of respondents were shown in table 4.6, there were 10.2% had "Not concern attitude", 81.6% of them had "neutral attitude", while there was 8% farmers had "Concern attitude". The average attitude score for all respondents were 54.87 out of a possible 60 point.

Table 4.8: Distribution of attitude level regarding pesticide use and prevention of the respondents

Attitude level	Number (n = 98)	Percentage (%)
Concern Attitude (81% - 100%)	8	8.2
Neutral Attitude (60% – 80%)	80	81.6
Not concern Attitude (Less than 60%)	10	10.2

4.6 Practices of rice farmers regarding pesticide use and prevention themselves from pesticides

Table 4.9 illustrates the practice of the participants answered shower a total of 23 questions. The respondents usually learn about appropriate type of pesticide 73.5%. 66.4% of them should select pesticide follow neighbor advised sometime. More than 70% should be read and followed all label and instructions, checked before use all equipment and materials, closely wear cloths while spraying, removed cloths worn during spraying immediately, and stored pesticides in cabinets. In negative statement, the respondents 84.7% never left pesticide in the river after used. More than 70% never inhaled pesticide for confirming real or fake pesticide, mix pesticide by hand, stand in the wind while spraying, unless use protective equipment.

Table 4.9: Percentages of practice towards using pesticide and prevention

Practice items	Usually (%)	Sometime (%)	Never (%)
1. I learn about appropriate type of pesticide.	73.5	24.5	2.04
2. I select pesticide follow neighbor advised.*	26.5	66.4	7.1
3. I read and followed all label and instructions.	72.4	19.4	8.2
4. I checked before use all equipment and materials.	71.4	20.4	8.2
5. Humans and animals prohibited from the spraying area.	67.3	23.5	9.2
6. Gloves and masks worn when spraying and mixing.	62.2	33.7	5.1
7. Inhale pesticide for confirming real or fake pesticide. *	10.2	13.3	76.5
8. I mix pesticide by hand. *	8.2	21.4	70.4
9. I mix various pesticides for increase effective eradication of weed and pest. *	16.3	68.3	21.4
10. I should be mixed pesticides by hand.*	7.1	23.5	69.4

* Negative statement

Table 4.9: Percentages of practice towards using pesticide and prevention (Cont)

Practice items	Usually (%)	Sometime (%)	Never (%)
11. I should be mixed various pesticides together to make them more effective in eradicating weeds and pests.*	8.2	57.14	34.7
12. I closely wear cloths while spraying.	76.5	13.3	10.2
13. I wore boots during spraying.	63.3	20.4	16.3
14. I smoke and drink while spraying. *	2.0	18.4	79.6
15. I sprayed pesticides when windy. *	8.2	30.6	63.2
16. I stand in the wind while spraying, unless use protective equipment. *	18.4	10.2	71.4
17. Pesticide containers can be cleaned in the river after use.*	12.2	15.3	72.5
18. Pesticide containers can be left in the river after use.*	15.3	0	84.7
19. I wash pesticide applicators with detergent before storage.	70.4	25.5	4.1
20. I removed cloths worn during spraying immediately.	80.6	2.0	17.4
21. I stored pesticides in cabinets.	80.6	19.4	0
22. I buried or burned Empty pesticide containers.	61.2	28.6	10.2
23. I should be washed with soap before eating.	82.7	12.2	5.1

* Negative statement

Table 4.10 illustrates the respondents answered a total of 23 questions with the total score of 69. The distributions of attitudes of attitudes of respondents, there were 8.2% of respondents who had "Good practice", 78.5% of them had "Fair practice" and 13.3% of respondents had "Poor practice". The average practice score for all respondents were 60.69 (S.D = 4.88) out of a possible 69 points.

Table 4.10: Distribution of practices towards using pesticide and prevention

Practice level	Number (n = 98)	Percentage (%)
Good Practice (81% - 100%)	8	8.2
Fair Practice (60% – 80%)	77	78.5
Poor Practice (Less than 60%)	13	13.3

4.7 Differences between direct exposed farmers and indirect exposed farmers

Table 4.11 – 4.12 showed the difference median, mean, and S.D. between directly exposed farmers and indirectly exposed farmers. The difference characteristics and KAP scores of farmer groups were performed by Mann – Whitney U test.

Table 4.11 Comparison of characteristics between direct exposed farmers and indirect exposed farmers

Characteristics	Direct exposed farmers (n=51)			Indirect exposed farmers (n=47)			P-value*
	Median	Mean	S.D.	Median	Mean	S.D.	
Age	47.00	44.53	13.37	50.00	47.19	10.95	0.344
Education years	6.00	7.27	3.37	6.00	6.64	2.94	0.188
Duration time as farmers	20.00	20.78	13.54	15.00	19.94	15.60	0.562

* Nonparametric, Mann – Whitney U test

Table 4.12 Comparison of KAP between direct exposed farmers and indirect exposed farmers

Variables	Direct exposed farmers (n=51)			Indirect exposed farmers (n=47)			P-value*
	Median	Mean	S.D.	Median	Mean	S.D.	
Knowledge	12.00	11.35	1.28	11.00	11.43	1.32	0.941
Attitude	54.00	54.06	5.36	58.00	55.74	5.08	0.079
Practice	62.00	59.90	5.42	62.00	61.55	4.09	0.171

* Non – parametric, Mann – Whitney U test

4.8 Cholinesterase level of the respondents

Table 4.13 in AChE level showed that 75.5% of total participants had AChE level normally (> 50% Normal). 60.8% of the direct exposed farmers weren't risk and 91.5% of the indirect exposed farmers had AChE level normally. The average AChE score ± S.D for all respondents were 2.92 ± 0.63. The average of AChE between direct exposed farmers and indirect exposed farmers was significant (independent t-test, p-value = 0.001)

About PChE level showed that 87.8% of total participants had PChE level normally. 86.3% of direct exposed farmers weren't risk and 89.4% of the indirect exposed farmers had PChE level normally. The average PChE score ± S.D for all respondents were 1.56 ± 0.33. The average of AChE between direct exposed farmers and indirect exposed farmers was not significant (independent t-test, p-value = 0.145)

Table 4.13: Percentages of cholinesterase level and comparison of cholinesterase level of the respondents (n = 98)

Cholinesterase level	Number	Percentage (%)
AChE		
All (n=98)		
Normal	74	75.5
Risk	24	24.5
Direct exposed farmer (n = 51)		
Normal	31	60.8
Risk	20	39.2
Indirect exposed farmers (n=47)		
Normal	43	91.5
Risk	4	8.5
*Comparison of AChE level between direct and indirect exposed farmer : **Mean ± S.D. (2.92 ± 0.63)** **p-value = 0.001**		
PChE		
All (n=98)	86	87.8
Normal	12	12.2
Risk		
Direct exposed farmer (n = 51)	44	86.3
Normal	7	13.7
Risk		
Indirect exposed farmers (n=47)	42	89.4
Normal	5	10.6
Risk		
Comparison of PChE level between direct and indirect exposed farmer : **Mean ± S.D. (1.56 ± 0.33)** **p-value = 0.145**		

* Parametric, Independent t-test

4.9 The association between knowledge and attitude, knowledge and practice, and attitude and practice

Table 4.14 showed that knowledge, attitude and practice regarding pesticide use and prevention were treated by Spearman's rank correlation coefficients. The association between knowledge and attitude, and attitude and practice were low positive correlation (Spearman's rank correlation coefficients 0.014, and 0.015, respectively) and the association between knowledge and practice was moderate positive correlation (Spearman's rank correlation coefficients 0.522, p-value < 0.001)

Table 4.14: Association among knowledge, attitude, and practice of using PPE

Variables	Spearman's rank correlation coefficients
Knowledge & Attitude	0.014
Knowledge & Practice	0.522 **
Attitude & Practice	0.015

** Correlation was significant at the 0.01 level.

Table 4.15 showed that knowledge, attitude and practice regarding pesticide use and prevention of direct exposed farmers were treated by Spearman's rank correlation coefficients. The association between knowledge and attitude, and attitude and practice were low positive correlation (Spearman's rank correlation coefficients 0.105 and 0.008, respectively). The association between knowledge and practice was moderate positive correlation (0.412, p-value < 0.001).

Table 4.15: Association among knowledge, attitude, and practice of pesticide use and prevention of direct exposed farmers

Variables	Spearman's rank correlation coefficients
Knowledge & Attitude	0.105
Knowledge & Practice	0.412 **
Attitude & Practice	0.008

** Correlation was significant at the 0.01 level.

Table 4.16 showed that knowledge, attitude and practice regarding to pesticide use and prevention of indirect exposed farmers were treated by Spearman's rank correlation coefficients. The association between knowledge and attitude, and attitude and practice were low negative correlation (Spearman's rank correlation coefficients -0.054 and -0.067, respectively) and the association between knowledge and practice was moderate positive correlation (Spearman's rank correlation coefficients 0.622, p-value < 0.001).

Table 4.16: Association among knowledge, attitude, and practice of pesticide use and prevention of indirect exposed farmers

Variables	Spearman's rank correlation coefficients
Knowledge & Attitude	-0.054
Knowledge & Practice	0.662 **
Attitude & Practice	-0.067

** Correlation was significant at the 0.01 level.

4.10 Association of cholinesterase level in farmers and their characteristics

Table 4.17-4.20 showed that the association of cholinesterase level in blood (AChE and PChE) of the direct exposed and indirect exposed between ages, sex, education years, duration time as farmers, knowledge, attitude, and practice. They were treated by Spearman's rank correlation coefficients.

Table 4.17 Association of AChE of farmers and their characteristics

Characteristics	Correlation (Spearman' s rho)			
	Direct exposed farmers (n = 51)		Indirectly exposed farmer (n = 47)	
	Coefficients (r_s)	P-value	Coefficients (r_s)	P-value
Age	0.089	0.537	-0.415	0.004**
Sex	-0.007	0.963	0.023	0.880
Education years	-0.48	0.736	0.277	0.059
Duration time as farmers	0.031	0.831	-0.683	< 0.001**

** Correlation was significant at the 0.01 level.

Table 4.17 showed that the associations between AChE of direct exposed farmers with ages, sex, education years, and duration time as farmers were treated by Spearman's rank correlation coefficients. In direct exposed farmers the association between AChE and ages, and AChE and duration time as farmers were low positive correlation (Spearman's rank correlation coefficients 0.089, and 0.031, respectively) but the association between AChE and sex and AChE and education years were low negative correlation (Spearman's rank correlation coefficients -0.007 and -0.48, respectively).

In the indirect exposed farmer's part were also treated by Spearman's rank correlation coefficients. The association between AChE and sex, AChE and education years were low positive correlation (Spearman's rank correlation coefficients 0.023 and 0.277, respectively) but the association between AChE and ages was low negative correlation and the association between AChE and duration time be farmers was moderate negative correlation (Spearman's rank correlation coefficients -0.415 and -0.683, p-value < 0.001).

Table 4.18 Association of AChE of farmers and KAP

Characteristics	Correlation (Spearman' s rho)			
	Direct exposed farmers (n = 51)		Indirect exposed farmer (n = 47)	
	Coefficients (r_s)	P-value	Coefficients (r_s)	P-value
Knowledge	0.072	0.616	0.105	0.484
Attitude	0.097	0.499	0.218	0.141
Practice	0.187	0.190	0.209	0.158

* Correlation was significant at the 0.05 level.

Table 4.18 was shown associations between AChE of direct exposed farmers with knowledge, attitude and practice were treated by Spearman's rank correlation coefficients. The association between AChE and knowledge, AChE and attitude, and AChE and practice were low positive correlation (Spearman's rank correlation coefficients 0.072, 0.097 and 0.187, respectively).

In the indirect exposed farmers part was also treated by Spearman's rank correlation coefficients. The association between AChE and knowledge, AChE and attitude, and AChE and practice were low positive correlation (Spearman's rank correlation coefficients 0.105, 0.218 and 0.209, respectively).

Table 4.19 Association of PChE of farmers and their characteristics

Characteristics	Correlation (Spearman' s rho)			
	Direct exposed farmers (n = 51)		Indirect exposed farmer (n = 47)	
	Coefficients (r_s)	p-value	Coefficients (r_s)	p-value
Age	0.015	0.916	-0.241	0.102
Sex	-0.081	0.570	0.186	0.211
Education years	-0.160	0.263	0.175	0.240
Duration time as farmers	0.131	0.361	-0.222	0.134

* Correlation was significant at the 0.05 level.

Table 4.19 was shown associations between PChE of direct exposed farmers with ages, sex, education years, and duration time as farmers were treated by Spearman's rank correlation coefficients. The association between PChE and ages, and PChE and duration time as farmers were low positive correlation (Spearman's rank correlation coefficients 0.015 and 0.131, respectively) but the association between PChE and sex and PChE and education years were low negative correlation (Spearman's rank correlation coefficients -0.081 and -0.160, respectively).

In the indirect exposed farmers part was also treated by Spearman's rank correlation coefficients. The association between PChE and sex, and PChE and education years were low positive correlation (Spearman's rank correlation coefficients 0.186 and 0.175, respectively) but the association between AChE and ages and AChE and duration time as farmers were low negative correlation (Spearman's rank correlation coefficients -0.241 and -0.222, respectively).

Table 4.20 Association of PChE of farmers and KAP

Characteristics	Correlation (Spearman' s rho)			
	Direct exposed farmers (n = 51)		Indirectly exposed farmer (n = 47)	
	Coefficients (r_s)	p-value	Coefficients (r_s)	p-value
Knowledge	0.077	0.589	0.538	0.000**
Attitude	0.054	0.707	-0.100	0.502
Practice	0.073	0.612	0.275	0 062

** Correlation was significant at the 0.01 level.

Table 4.20 showed that associations between PChE of direct exposed farmers with knowledge, attitude, and practice were treated by Spearman's rank correlation coefficients. The association between PChE and knowledge, PChE and attitude, and PChE and practice were low positive correlation (Spearman's rank correlation coefficients 0.077, 0.054 and 0.073, respectively).

In the Indirect exposed farmers part was also treated by Spearman's rank correlation coefficients. The association between PChE and attitude, and PChE and practice were low positive correlation (Spearman's rank correlation coefficients 0.100 and 0.278, respectively). The association between PChE and knowledge was moderate positive correlation (Spearman's rank correlation coefficients 0.538, p-value < 0.001).

4.11 Odds ratios and 95% confidence intervals for the significant variables (knowledge, attitude and practice) of cholinesterase level in blood

Table 4.21 - 4.22 shown that odds ratios and 95% confidence interval of significant variables (knowledge, attitude, and practice) of cholinesterase level in blood in direct exposed farmers and indirectly exposed farmers (by chi-square test). The cutoff points of variables (knowledge, attitude, and practice) were cut on median (knowledge score (K) was cut on 11.39, attitude score (A) was cut on 55.0, and practice score (P) was cut on 62.0). And the cutoff points of cholinesterase level in blood (AChE and PChE) were AChE was cut on 2.91 U/mL and PChE was cut on 1.56 U/mL.

The cutoff points of variable:

Knowledge score; $K \geq 11.39$ define as high

$K < 11.39$ define as poor

Attitude score; $A \geq 55.00$ define as good

$A < 55.00$ define as poor

Practice score; $P \geq 62.00$ define as good

$P < 62.00$ define as poor

The cutoff points of cholinesterase level:

AChE; ≥ 2.91 U/mL define as low risk, < 2.91 U/mL define as high risk

PChE; ≥ 1.56 U/mL define as low risk, < 1.56 U/mL define as high risk

Table 4.21 Odds ratios and 95% confidence interval of knowledge, attitude, and practice of AChE in direct exposed farmers and indirect exposed farmers

Type of farmers	Varibles	X^2	P-value	OR	95% CI
Direct exposed farmers (High risk and low risk)	Knowledge	0.489	0.484	1.513	0.473,4.836
	Attitude	3.063	0.080	2.840	0.868,9.289
	Practice	0.110	0.741	1.213	0.386,3.813
Indirect exposed farmers (High risk and low risk)	Knowledge	0.339	0.560	1.429	0.429,4.753
	Attitude	3.245	0.072	3.094	0.887,10.795
	Practice	0.221	0.638	1.333	0.402,4.428

Table 4.22 Odds ratios and 95% confidence interval of knowledge, attitude, and practice of PChE in direct exposed farmers and indirectly exposed farmers

Type of farmers	Varibles	X^2	P-value	OR	95% CI
Direct exposed farmers (High risk and low risk)	Knowledge	1.343	0.246	2.078	0.597,7.236
	Attitude	6.356	0.012*	4.813	1.360,17.051
	Practice	0.544	0.461	1.574	0.469,5.278
Indirect exposed farmers (High risk and low risk)	Knowledge	5.880	0.015*	6.667	1.269,35.035
	Attitude	0.056	0.813	0.846	0.212,3.371
	Practice	0.05	0.943	0.952	0.252,3.596

* There was significant at the 0.05