

## CHAPTER IV

### RESULTS

In this study, the results of data analysis are presented as tables and are divided into two parts.

1. General information about the population

2. Analysis of the chlorinated hydrocarbon insecticides in blood samples and statistical analysis of the population's insecticides blood level as influenced by various factors.

1. General information about the population

Table 4. Number of population categorized by sex

Sex	Cancer patient		Normal		Total	
	No. of subject	%	No. of subject	%	No. of subject	%
Male	23	18.55	23	18.55	46	37.10
Female	39	31.45	39	31.45	78	62.90
Total	62	50.00	62	50.00	124	100.00

As shown in table 4, there are female more than male subjects in the population selected for this study, i.e., 62.9 % and 37.10 % of the population are female and male subjects respectively. Since the cancer and control subjects are matched by sex, the number of female and male subjects in the cancer and control groups are equal. Accordingly, the female and male population in each group are 31.45 % and 18.55 % respectively.

**Table 5.** Number of population categorized by geographic area of residence

Geographic area	cancer patient		Normal		Total	
	No. of subject	%	No. of subject	%	No. of subject	%
Northern region	9	7.25	9	7.25	18	14.50
Central region	32	25.8	32	25.80	64	51.60
Southern region	7	5.65	7	5.65	14	11.30
Northeastern region	13	10.50	13	10.50	26	21.00
Eastern region	1	0.80	1	0.80	2	1.60
Total	62	50.00	62	50.00	124	100.00

Approximately half of the population reside in the central part while less than 2 % come from eastern part of Thailand (Table 5.). This may be related to the fact that the National Cancer Institute is situated in Bangkok which is located in the central region of Thailand. Each region has equal number of cancer and normal subjects because the case and control are also matched by geographic area of residence.

**Table 6.** Number of population categorized by age

Age (year)	Cancer patient		Normal		Total	
	No. of subject	%	No. of subject	%	No. of subject	%
≤ 35	8	6.45	8	6.45	16	12.90
36-45	14	11.29	13	10.48	27	21.77
46-55	19	15.32	20	16.13	39	31.45
56-65	19	15.32	17	13.71	36	29.03
≥ 66	2	1.61	4	3.23	6	4.84
Total	62	50.00	62	50.00	124	100.00

Table 6. shows that in this study the large proportion of cancer patients are over 35 years of age. Highest cancer incidence (15.3% of population) was observed with patients in the age groups 46-55 and 56-65 years. However, the subjects in the age group  $\geq$  66 years comprise less than 5 % of the population. This is because the investigator can find only a few normal subjects in this age group to match with the corresponding cancer case.

Table 7. Number of cancer population categorized by occupation

Occupation	Cancer patient	
	number	%
agriculturist	26	42.0
merchant	7	11.2
hireling	10	16.2
private business employee	4	6.4
government employee	8	12.8
housewife	7	11.2
Total	62	100.0

**Table 8.** Number of population categorized by the family history of cancer

Family history of cancer	Cancer patient		Normal		Total	
	No. of subject	%	No. of subject	%	No. of subject	%
No	52	41.90	41	33.10	93	75.00
Yes	10	8.10	21	16.90	31	25.00
Total	62	50.00	62	50.00	124	100.00

It is particularly interesting to note that the occupation with highest incidence of cancer is agriculturist, i.e., 42 % of the population (table 7.). Other professions have cancer incidence ranging between 6.4-16.2 % with lowest cancer case in the private business employee category (6.4 %). The majority of the population (75 %) have family with no history of cancer as shown in table 8. When the population was analysed according to cancer type, the most and least frequent cancer observed are cancer of buccal cavity and mass of orbit respectively (table 9.).

**Table 9.** Number of population categorized by type of cancer

Type	No.of subject	%
Buccal cavity	14	11.3
Digestive system	5	4.0
Liver	5	4.0
Nasopharynx	6	4.8
Lung	6	4.8
Breast	10	8.1
Skin	8	6.5
Lymphnode	4	3.2
Thyroid	3	2.4
Mass of orbit	1	0.8
Total	62	100.0

2. Analysis of the chlorinated hydrocarbon insecticides in blood samples and statistical analysis of the population's insecticides blood level as influenced by various factors

Blood sample analysis by gas-liquid chromatography reveals only the presence of DDT in the form of three associated compounds: p,p'-DDE, p,p'-DDD and o,p'-DDE. Their blood quantities are presented as "blood level of DDT" in the tables below.

Table 10. Number of population categorized by blood level of DDT

Blood level of DDT (ppb)	No. of subject	%
1 - 40	64	51.6
41 - 80	42	33.9
≥ 81	18	14.5
Total	124	100.0

mean DDT concentration in blood sample ( $\bar{X}$ ) = 49.09

standard deviation (SD) = 39.12

mean DDT concentration in blood of

Thai people ( $\mu$ ) = 42.20-55.98 ppb

$\mu$  is calculated by the formula :  $\mu = \bar{X} \pm Z_{0.05} \times SD/\sqrt{N}$

From table 10. it is seen that 51.6 % of the population have blood DDT level in the range 1-40 ppb whereas about 15 % of the population have DDT level in blood  $\geq$  81 ppb. The calculated mean DDT concentration in blood samples taken from the population ( $\bar{X}$ ) and standard deviation (SD) are 49.09 and 39.12 respectively. These values were used to compute the mean DDT concentration in blood of Thai people ( $\mu$ ), which was found to be 42.20 - 55.98 ppb.

The blood DDT level in male and female population is shown in table 11. In both sexes, approximately half of the population have blood DDT level in the range 1 - 40 ppb while subjects having blood DDT level  $>$  80 ppb are small in number. The mean  $\pm$  SD values of blood DDT level in male and female subjects are 51.09  $\pm$  49.12 and 47.91  $\pm$  32.16 respectively. Analysis by unpaired Student's t-test shows that the difference between blood DDT level in the male and female groups is not statistically significant ( $p > 0.05$ ).



**Table 11.** Blood level of DDT in male and female population

Sex	Blood level of DDT (ppb)			
	1-40	41-80	>81	$\bar{X} \pm SD$
Male (n=46)	22	17	7	51.09 $\pm$ 49.12
Female (n=78)	42	25	11	47.91 $\pm$ 32.16
Total	64	42	18	49.09 $\pm$ 39.12

p&gt;0.05

The blood DDT level in population categorized by age, occupation and geographic area of residence are recorded in tables 12,13 and 14 respectively. However, data analysis by ANOVA shows that the differences in blood DDT level among different populations in each category are not significant statistically (p>0.05).

**Table 12.** Blood level of DDT in population categorized by age

Age (year)	Concentration of DDT in blood (ppb)			
	1-40	41-80	≥ 81	$\bar{X} \pm SD$
≤ 35 (n=16)	7	5	4	52.12 $\pm$ 34.77
36 - 45 (n=27)	16	7	4	46.00 $\pm$ 33.12
46 - 55 (n=39)	21	14	4	45.33 $\pm$ 31.45
56 - 65 (n=36)	18	14	4	52.97 $\pm$ 53.16
≥ 66 (n=6)	2	2	2	56.00 $\pm$ 25.66
Total (n=124)	64	42	18	49.09 $\pm$ 39.12

P &gt; 0.05

**Table 13.** Blood level of DDT in population categorized by occupation

Occupation	Blood level of DDT (ppb)			
	1-40	41-80	≥ 81	$\bar{X} \pm SD$
Agriculturist (n=31)	14	11	6	52.00+32.66
Merchant (n=21)	11	7	3	48.10+29.32
Hireling (n=16)	5	8	3	68.19+74.00
Private business employee (n=5)	3	2	-	29.40+15.31
Government employee (n=35)	19	10	6	47.03+34.63
Housewife (n=16)	12	4	-	36.31+17.09
Total (n=124)	64	42	18	49.09+39.12

P > 0.05

**Table 14.** Blood level of DDT in population categorized by geographic area of residence

Geographic area of residence	Blood level of DDT (ppb)			
	1-40	41-80	≥ 81	$\bar{X} \pm SD$
Northern part (n=18)	7	7	4	53.67+32.54
Central part (n=64)	32	24	8	46.64+30.64
Southern part (n=14)	7	5	2	49.07+25.26
Northeastern part (n=26)	16	6	4	53.85+63.29
Eastern part (n=2)	2	-	-	24.50+9.19
Total (n=124)	64	42	18	49.09+39.12

P > 0.05

Table 15. Level of DDT in blood sample from cancer and normal subjects

Subject	Blood level of DDT (ppb)			
	1-40	41-80	≥ 81	$\bar{X} \pm SD$
Cancer patient (n=62)	26	23	13	59.31+47.52
Normal subject (n=62)	38	19	5	38.87+24.81
Total	64	42	18	

p<0.005

Table 15 shows the blood DDT level in cancer and normal subjects. Of the 62 subjects in each group, there are 26 and 38 subjects in the case and control groups respectively having blood DDT level in the range 1-40 ppb. However, there are 13 cancer cases but only 5 normal subjects with blood DDT level ≥81 ppb. The mean  $\pm$  SD values of blood DDT level are 59.31  $\pm$  47.52 for cancer group and 38.87  $\pm$  24.81 for control group. The difference in blood DDT level between case and control groups is statistically significant (p<0.005) when analysed by unpaired Student's t-test.

**Table 16.** Comparison of blood level of DDT in cancer and control subjects categorized by type of cancer

Type of cancer	Blood level of DDT(ppb) ( $\bar{X} \pm$ S.D.)		P-value
	Case	Control	
Buccal cavity (n=14)	49.28 $\pm$ 36.65	44.93 $\pm$ 22.66	0.71
Digestive system (n=5)	50.20 $\pm$ 19.18	51.60 $\pm$ 18.27	0.91
Liver (n=5)	68.60 $\pm$ 44.61	24.60 $\pm$ 8.96	0.06
Nasopharynx (n=6)	98.67 $\pm$ 144.44	32.00 $\pm$ 27.57	0.22
Lung (n=6)	44.67 $\pm$ 31.93	17.17 $\pm$ 8.86	0.07
Breast (n=10)	67.10 $\pm$ 31.89	44.00 $\pm$ 34.38	0.14
Skin (n=8)	68.00 $\pm$ 42.11	39.00 $\pm$ 27.07	0.12
Lymphnode (n=4)	45.75 $\pm$ 18.91	53.50 $\pm$ 17.56	0.57
Thyroid (n=3)	27.67 $\pm$ 5.51	40.67 $\pm$ 24.70	0.42
Mass of orbit (n=1)	-	-	-

The blood DDT level in patients with specific cancer type are compared with that of control as shown in table 16. There are three instances, namely cancer of the digestive system, lymphnode cancer and thyroid cancer, in which control has more DDT in blood than case group. However statistical analysis by unpaired Student's t-test of the difference in blood DDT level between case and control groups gives P value greater than 0.05 in all instances.

Table 17. Blood level of DDT in the female population of user and non-user of contraceptive

Use of contraceptive	Blood level of DDT (ppb) ( $\bar{X} \pm SD$ )
User (n=22)	46.73 $\pm$ 30.06
Non-user (n=56)	48.38 $\pm$ 33.20

P > 0.05

**Table 18.** Blood level of DDT in smoker and non-smoker population

Population	Blood level of DDT (ppb) ( $\bar{X} \pm SD$ )
Smoker (n=35)	56.71 $\pm$ 53.01
Non-smoker (n=89)	46.09 $\pm$ 31.96

P > 0.05

The influence of oral contraceptive (female population only) and cigarette smoking on blood DDT level are recorded in tables 17 and 18 respectively. Although the differences in blood DDT level between oral contraceptive user and non-user and between smoker and non-smoker are not statistically significant (unpaired Student's t-test,  $P > 0.05$ ), there is a tendency for the smoker to have more DDT in blood than non-smoker group.