Atheromatous Risk Factors Among Thai Labor Forces by Socioeconomic Status

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Abstract

The purpose of this study was to describe atheromatous risk factors among Thai labor forces by socioeconomic status (SES) such as income, education and occupation. Undesirable levels of arthero-matous risk factors were specified as: total serum cholesterol (TC) > 200 mg per cent, body mass index (BMI) > 25 kg/m^2, fasting blood sugar (FBS) > 126 mg/dL, systolic blood pressure (SBP) > 140 mmHg and diastolic blood pressure (DBP) > 90 mmHg. Data from the Second National Health Examination survey in Thailand from 1996 to 1997 was used, with a total number of 4,198 participants (1,634 males, 2,561 females) aged 13-60 years old.

Results from multivariate analysis demonstrated differences in means TC, BMI, SBP and DBP among different age-groups, both in males and females ($p < 0.001$). TC, BMI, and SBP increased with age in both sexes, but DBP increased with age in females only. Males who lived in a municipality had a higher risk of having undesirable TC and DBP than those who did not. Risk of undesirable BMI varied according to levels of income in males. Males with an income of 5,001-10,000 and > 25,000 baht/month had OR = 1.57 (95% CI = 1.04-2.39) and OR = 2.59 (95% CI = 1.18-5.66) compared to males with an income of < 5,000 baht/month. TC and DBP varied with levels of income in females. For undesirable TC, females with an income of 5,001-10,000 and > 25,000 baht/month had OR = 1.48 (95% CI = 1.01-2.18) and OR = 2.17 (95% CI = 1.03-4.88) compared to females with an income of < 5,000 baht/month. For undesirable DBP, females with an income > 25,000 baht/month had OR = 3.39 (95% CI = 1.31-8.78) compared to females with income an < 5,000 baht/month. Among different levels of education in males, different risks of undesirable TC, BMI, SBP and DBP were not signifi-cant, except a borderline significance in TC among vocational graduates. The same phenomenon was observed among females, except that females only a primary education tended to have a higher risk of undesirable BMI (OR = 2.64, 95% CI = 1.39-5.02) compared to females with graduate studies. The level of occupation seemed not to affect the risk of unfavorable atheromatous risk factors among males. Nonetheless, females in the agricultural section seemed to have a lower risk of undesirable TC (OR = 0.38, 95% CI = 0.18-0.78) compared to the professional group.

The results suggested the consideration of critical guidance of epidemiological studies in using SES as the control variable, or for selection of subjects or matching criteria. Specific preventive programs on atheromatous risk factors should be launched for some specific socio-demographic groups in order to prevent coronary heart diseases (CHD) in the future.

Key word : Socio-Economic, Atheromatous Risk Factors, Thai Labor Forces, National Health Examination Survey

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Findings in association between CHD mortality or morbidity and SES were inconsistent, and could not indicate any single socioeconomic group which confered a remarkable high or low risk of CHD. Many studies showed inverse mortality with levels of education[1-3] and many studies demonstrated the opposite evidence[4,5]. For example, several studies demonstrated that lower SES groups had higher CHD rates [6-8]. At the same time, association between SES and each of CHD risk factors were also different[9,10]. The Oslo study showed that mean serum cholesterol and blood pressure were found to be highest among the lowest SES[11]. Also some studies indicated that education was the only SES measure which was significantly associated with CHD risk factors[12] Cardiovascular disease studies showed that a lower level of education was associated with hypertension[13-17], cigarette smoking[13,16] and high cholesterol [13,17]. This study aimed to describe the atheromatous risk factors as total serum cholesterol (TC), fasting blood sugar (FBS), body mass index (BMI), systolic blood pressure (SBP) and diastolic blood pressure (DBP) by demographic and socioeconomic status such as income, education, occupation among a Thai labor force population.

MATERIAL AND METHOD

Participants

Data from the Second National Health Examaination survey in Thailand which was conducted from 1996 to 1997 by the Ministry of Public Health were used. The multistage random sampling by households from every region of Thailand was used to get the sample subjects. There were 4,230 (1,649 males, 2,518 females) participants in the labor force aged between 13-60 years who participated in the survey.

Measurements

Data collection was performed by:

1. 10 ml of blood sample was obtained after at least eight hours over night fasting. Fasting blood sugar was determined by enzymatic test at the field site and the rest of the blood was sent to the Division of Medical Science laboratory, Ministry of Public Health within one day for determination of total cholesterol and triglyceride.

2. Physical examination included measurement of weight and height without shoes and BMI was calculated. Blood pressure was measured by trained nurses after 5 minutes of resting.

3. An interview for SES information as direct and indirect monthly income, current occupation and education through a questionnaire, including age and area of residence (municipality and non-municipality).

Data analysis

Artheromatous risk factors were analyzed in crude mean and standard deviation. Adjusted means by Multi-Classification analysis (MCA) were calculated to demonstrate the levels of artheromatous risk

factors by different levels of SES, age and residence. Based on the criteria of International Lipid Information Bureau and the National Cholesterol Education program[18,19], artheromatous risk factors were grouped into dichotomous variables, desirable and undesirable level.

Desirable levels

Mean total serum cholesterol (TC) less than 200 mg per cent, BMI less than 25 kg/m^2, systolic blood pressure (SBP) lower than 140 mmHg and diastolic blood pressure (DBP) lower than 90 mmHg, and fasting blood sugar (FBS) lower than 126 mg/dL. Prevalence of undesirable risk factors in males and females were calculated. Multiple logistic regression analysis was used to calculate adjusted odds ratio (OR) with 95 per cent confidence intervals of the presence of undesirable atheromatous risk factors in each age-group, residence (municipality and non-municipality), level of income, level of education and occupation, adjusted for other variables in the model.

RESULTS

1. Characteristics of participants

Among the total of 4,230 participants, the majority of male participants lived in the north-eastern part of Thailand (24.7%), were aged between 25-44 years old (41.8%), had an income of 5,000 baht or less (58.1%), had finished secondary school (50.4%), and had an occupation in agriculture and transportation (35.4%). Among females, the majority lived in the central region (25.8%), and were aged 25-44 years old (48.4%), had a monthly income 5,000 baht or less (65.5%), had finished secondary school (42.6%) and unemployed or were studying (38.1%) (Table 1)

Table 1. Percentages of the study population by region, age group, residence, income, education and occupation.

Variables	Male (n = 1,649)	Female (n=2,581)
Regions		
Bangkok	10.3	15.9
Central	17.4	25.8
North	23.5	19.7
Northeast	24.7	18.9
South	24.0	19.8
Age group (year)		
13-24	34.4	29.3
25-45	41.8	48.4
46-60	23.8	22.3
Residence		
Municipality	58.8	54.2
Non municipality	41.2	45.8
Income (baht)		
< 5,000	58.1	65.5
5,001-10,000	23.6	20.9
10,001-25,000	14.4	10.5
> 25,000	3.9	3.1
Education		
Primary school and lower	35.1	41.1
Secondary school	50.4	42.6
Vocational school	8.2	8.1
University	6.3	7.7
Occupation		
Professional	7.2	6.2
Administration	3.1	3.0
Business and clerk	10.7	16.4
Agriculture and laborer	35.4	26.1
Factory workers/ Services	14.2	10.2
Not working and studying	29.4	38.1

2. Association and Relationship between monthly income and level of education, and occupation

There were significance differences of means of monthly income among different levels of education ($p < 0.001$) and among occupation ($p < 0.001$). Spearman's correlation coefficients demonstrated positive relationships between monthly income and level of education (*rho* = 0.454, $p < 0.001$) and occupation (*rho* = 0.396, $p < 0.001$). Participants with a business occupation had the highest monthly income.

3. Crude mean and standard deviation of Atheromatous factors among participants by regions

Only participants who lived in Bangkok and in the central region of Thailand had the highest mean TC and highest prevalence of undesirable TC. There were differences of means of other artheromatous risk factors of participants from various parts of Thailand, for both males and females. (Table 2 and Table 3).

4. Adjusted means of artheromatous risk factors by SES

Using Multiclassification analysis (MCA), all independent variables of age-group, area of residence, level of income, level of education and occupation were entered into the analysis, and adjusted mean of atheromatous factors were calculated. The results were as follows:

Age group

There were differences in mean TC, BMI, SBP and DBP among both male and female participants (p-value < 0.001).

Table 2. Number of persons (n), mean and standard deviation (in parenthesis) of atheromatous risk factors by regions among male participants.

	TC		FBS		BMI		SBP		DBP	
	N	Mean (sd)	N	Mean (sd)	N	Mean (sd)	N	Mean (sd)	N	Mean (sd)
Bangkok	164	214.6 (76.6)	164	101.7 (36.0)	169	22.8 (4.6)	165	120.0 (18.6)	165	73.9 (14.2)
Central	141	200.6 (47.1)	180	91.6 (31.4)	283	21.7 (3.9)	287	122.9 (18.7)	286	73.2 (13.0)
North	315	186 (45.9)	323	109 (126.1)	378	21.8 (3.8)	388	120.3 (21.1)	387	72.9 (13.9)
N-E	59	129 (32.8)	276	88.8 (23.1)	361	21.4 (3.5)	399	118.4 (17.6)	399	70.2 (13.5)
South	290	190.6 (43.9)	331	87.9 (31.6)	366	21.2 (4.1)	395	118.8 (17.2)	395	71.2 (13.3)
		$p < 0.00$		$p \leq 0.001$		$p < 0.001$		$p = 0.02$		$p = 0.006$

Table 3. Number of persons (n), mean and standard deviation (in parenthesis) of atheromatous risk factors by regions among female participants.

	TC		FBS		BMI		SBP		DBP	
	N	Mean (sd)	N	Mean (sd)	N	Mean (sd)	N	Mean (sd)	N	Mean (sd)
Bangkok	391	211.6 (51.7)	392	97.5 (34.3)	406	22.9 (5.1)	406	112.9 (20.6)	405	71.4 (5.1)
Central	285	206.4 (47.1)	363	93.9 (38.5)	663	23.5 (4.9)	664	118.4 (19.4)	664	73.4 (12.1)
North	449	196 (44.7)	448	105.3 (112.2)	492	22.7 (4.4)	507	113.0 (17.0)	507	70.5 (11.5)
N-E	45	140.6 (36.8)	329	87.7 (29.8)	428	22.5 (4.2)	478	111.8 (16.2)	478	69.2 (12.4)
South	399	202.5 (41.7)	435	87.0 (32.6)	468	22.3 (4.4)	509	114.5 (17.1)	507	71.1 (17.1)
		$p < 0.001$		$p < 0.001$		$p < 0.001$		$p < 0.001$		$p < 0.001$

Residential area

There were significant differences of mean TC ($p = 0.033$), FBS ($p = 0.014$), and DBP ($p < 0.001$) among males. Among females, difference was found only in mean TC ($p = 0.009$) between those who lived in municipality and non-municipality.

Income

Only males had differences of mean TC ($p = 0.031$), BMI ($p = 0.001$), and DBP ($p = 0.05$) among levels of monthly income.

Education

Only females had differences of mean BMI ($p = 0.001$), SBP ($p = 0.004$) and DBP ($p = 0.004$) among levels of education.

Occupation

There were differences of mean BMI ($p = 0.002$) in both genders among various types of occupations (Table 4, Table 5).

5. Prevalence of undesirable artheromatous risk factors by sex

Females had a higher prevalence of undesirable level of TC and BMI than males (47.1% and 27.9% compared to 38.3% and 17.5% respectively). Males had a higher prevalence of high SBP and DBP (45% and 28.7% in males compared to 21.7% and 19.3% in females (Table 6).

6. Significant risk of having undesirable artheromatous risk factors by SES

Multivariate analysis by logistic regression allowed the estimation of risk of having an undesirable level of TC, FBS, BMI, SBP and DBP after entering all other independent variables such as age group, residence, income, level of education and occupation into the model. Despite the fact that the data source used in this analysis came from a large-scale survey, completeness of data was one of the limitations of the present study. The investigators found that the availability of persons with complete data on

Table 4. Adjusted means* of artheromatous risk factors among male participants by age, sex, residence and SES.

Risk factors/SES	Total cholesterol		Fasting blood sugar		BMI		Systolic BP		Diastolic BP	
	N	Adjusted means	N	Adjusted means	N	Adjusted means	N	Adjusted means	N	Adjusted means
Age group										
13-24	66	168.98	89	91.19	107	20.06	114	115.76	114	66.33
25-44	343	194.39	468	95.95	547	22.41	572	120.57	571	73.26
45-60	205	212.61	266	100.71	318	23.85	326	128.67	325	79.23
		$p < 0.001$		$p = 0.633$		$p < 0.001$		$p < 0.001$		$p < 0.001$
Residence										
Urban	231	211.82	297	107.21	372	23.35	386	125.15	386	77.91
Rural	383	189.25	526	91.19	600	22.17	626	121.09	642	72.22
		$p = 0.033$		$p = 0.014$		$p = 0.067$		$p = 0.054$		$p < 0.001$
Income (baht/month)										
< 5,000	336	187.12	475	91.57	550	21.94	575	120.78	574	72.29
5,001-10,000	151	201.21	193	101.99	235	22.90	243	123.46	242	74.83
10,001-25,000	99	219.29	120	107.62	146	24.00	152	126.42	152	79.26
> 25,000	28	230.36	35	106.17	41	25.22	42	129.69	42	83.05
		$p = 0.031$		$p = 0.391$		$p = 0.001$		$p = 0.190$		$p = 0.050$
Education										
Primary school	277	193.18	372	92.62	426	22.61	445	123.12	444	73.78
Secondary school	231	193.86	315	101.93	382	22.22	395	121.83	394	74.01
Vocational school	55	217.89	70	98.40	87	23.57	93	122.17	93	76.23
University	51	218.39	66	96.33	77	23.63	79	124.52	79	77.66
		$p = 0.090$		$p = 0.328$		$p = 0.309$		$p = 0.856$		$p = 0.282$
Occupation										
Professional	68	218.49	88	107.36	108	24.38	112	126.71	112	78.66
Administration	27	216.33	34	93.35	40	22.66	41	119.32	41	75.02
Business	91	208.51	115	98.96	143	23.80	146	124.14	145	78.61
Agriculture	288	191.59	413	91.03	458	22.28	485	122.13	484	72.73
Factory workers	144	189.47	179	109.14	217	21.98	224	122.35	224	73.43
Not working	8	204.19	9	87.89	24	19.23	24	111.21	24	67.92
		$p = 0.697$		$p = 0.144$		$p = 0.002$		$p = 0.152$		$p = 0.699$

* adjusted for all variables in table by Multiclassification analysis

every variable became very limited. Some of the variables could not be used because of too small a number of persons with complete data in each cell, therefore some risk estimates became unsatisfactorily reliable.

6.1. Risk (OR) of undesirable arthromatous risk factors among male participants

By age group

Using the 13-24 year age-group as baseline, the risks of having TC > 200 mg per cent among male participants aged between 25-45 and 46-60 years were 4.19 (95% CI = 1.92-8.49) times and 9.09 times (95% CI = 4.03-20.46); risk of having BMI > 25 kg/m^2 among the age group between 46-60 years old was 4.03 times (95% CI = 1.86-8.74); risk of having SBP > 140 mmHg among the age group 46-60 years old was 3.89 times (95% CI = 1.64-9.26); and the risk of having DBP > 90 mmHg among age were not available because the number of persons was too small (Table 7).

Table 5. Adjusted means* of artheromatous risk factors among female participants by age, sex, residence and SES.

Risk factors/SES	Total cholesterol		Fasting blood sugar		BMI		Systolic BP		Diastolic BP	
	N	Adjusted means	N	Adjusted means	N	Adjusted means	N	Adjusted means	N	Adjusted means
Age group										
13-24	95	184.80	121	88.50	168	21.50	172	110.10	172	67.11
25-44	543	200.08	674	90.69	827	23.61	855	113.32	854	71.76
45-60	224	225.86	281	102.13	346	24.97	355	124.13	355	76.06
		p < 0.001		p = 0.042		p < 0.001		p < 0.001		p < 0.001
Residence										
Urban	387	212.82	461	94.34	585	23.51	605	115.44	605	72.66
Rural	475	198.80	615	92.76	756	23.85	777	115.89	776	71.99
		p = 0.009		p = 0.298		p = 0.785		p = 0.234		p = 0.099
Income (baht/month)										
< 5,000	522	199.14	685	94.25	848	23.68	879	116.06	878	72.04
5,001-10,000	191	212.92	223	92.26	288	23.91	296	116.08	297	72.41
10,001-25,000	110	214.73	127	87.48	159	23.33	161	112.41	160	72.44
> 25,000	39	219.31	41	104.61	46	24.06	46	117.80	46	75.63
		p = 0.155		p = 0.546		p = 0.188		p = 0.395		p = 0.055
Education										
Primary school	437	206.49	551	97.34	669	24.55	694	118.90	693	73.90
Secondary school	249	197.28	312	89.56	416	22.94	426	113.51	426	71.04
Vocational school	71	202.65	90	88.82	115	22.96	119	111.41	118	70.31
University	105	219.49	123	89.11	141	22.51	143	110.20	144	69.82
		p = 0.146		p = 0.756		p < 0.001		p = 0.004		p = 0.004
Occupation										
Professional	92	219.08	115	86.50	140	23.01	146	111.28	146	70.93
Administration	45	204.93	50	89.98	67	23.02	66	111.05	66	69.68
Business	222	207.76	260	95.90	342	24.43	350	117.84	351	73.39
Agriculture	321	195.89	425	92.33	496	23.77	511	116.21	510	72.05
Factory workers	142	206.84	180	93.22	224	23.20	237	116.33	237	72.87
Not working	40	226.00	46	111.61	72	23.27	72	112.74	71	71.79
		p = 0.051		p = 0.408		p = 0.017		p = 0.316		p = 0.652

* adjusted for all variables in table by Multiclassification analysis

By residential area

Using non-municipality area as baseline group, risk of having TC > 200 mg per cent among male participants living in a municipality area was 1.77 times (95% CI = 1.14-2.75); risk of having DBP > 90 mmHg was 2.18 (95% CI = 1.24-3.82) (Table 7).

By income

Using males with an income <5,000 baht/month as the baseline group, the risk of having BMI > 25 kg/m^2 among those with an income of 5,000-10,000 baht/month was 1.57 times (95% CI = 1.04-2.39) and income > 25,000 baht/month was 2.59 times (95% CI = 1.18-5.66) (Table 7).

By occupation

No significant difference in risk among various levels of occupations of males was observed (Table 7).

Table 6. Prevalence of undesirable level of artheromatous factors by sex.

Artheromatous factors	Male			Female			P-value
	Number examined	N	%	Number examined	n	%	
Total serum cholesterol (> 200 mg%)	967	370	38.3	1,568	739	47.1	< 0.001
Fasting blood sugar (> 126 mg/dL)	1,265	64	5.1	1,956	94	4.8	0.403
Body mass index (> 25 kg/m^2)	1,552	27.2	17.5	2,445	682	27.9	< 0.001
Systolic blood pressure (> 140 mmHg)	1,634	179	11.0	2,564	189	7.4	< 0.001
Diastolic blood pressure (> 90 mmHg)	1,632	127	7.8	2,561	160	6.2	0.032

n = number with undesirable levels

Table 7. Adjusted odd ratio* (and 95% CI) of having undesirable artheromatous risk factors by SES among male participants.

SES/Factors	TC > 200 mg%	BMI > 25 kg/m^2	SBP > 140 mmHg	DBP > 90 mmHg
Age group				
13-24	1	1	1	n/a
25-45	4.19 (1.92-8.49)**	1.79 (0.86-3.71)	1.33 (0.58-3.03)	
46-60	9.09 (4.03-20.46)**	4.03 (1.86-8.74)**	3.89 (1.64-9.26)*	
Residence				
Rural	1	1	1	1
Urban	1.77 (1.14-275)**	1.06 (0.71-1.59)	1.51 (0.93-2.46)	2.18 (1.24-3.82)**
Income (baht/month)				
< 5,000	1	1	1	1
5,001-10,000	1.23 (0.79-1.91)	1.57 (1.04-2.39)**	1.05 (0.63-1.74)	1.29 (0.72-2.31)
10,001-25,000	1.04 (0.57-1.89)	1.56 (0.90-2.70)	1.28 (0.66-2.47)	1.17 (0.56-2.47)
> 25,000	1.81 (0.68-4.80)	2.59 (1.18-5.66)**	1.79 (0.69-4.60)	1.27 (0.46-3.48)
Eduacation				
Primary school	1	1	1	1
Secondary school	1.24 (0.80-1.92)	1.04 (0.68-1.59)	1.24 (0.76-2.02)	1.34 (0.76-2.37)
Vocational school	2.18 (1.03-4.61)**	1.68 (0.87-3.25)	0.64 (0.26-1.60)	1.61 (0.67-3.82)
University	0.96 (0.40-2.32)	1.22 (0.57-2.67)	0.87 (0.33-2.29)	1.32 (0.49-3.56)
Occupation				
Professional	0.82 (0.12-5.68)	5.38 (0.64-45.05)	3.19 (0.36-28.13)	0.98 (0.09-10.07)
Administration	1.02 (0.13-7.77)	3.11 (0.34-28.15)	1.04 (0.09-11.89)	0.74 (0.06-8.88)
Business	0.71 (0.10-4.68)	3.65 (0.44-29.72)	1.77 (0.21-15.00)	0.72 (0.07-7.21)
Agriculture	0.60 (0.91-3.95)	2.66 (0.33-21.41)	2.19 (0.26-18.02)	0.72 (0.07-7.10)
Factory workers	0.62 (0.09-4.04)	3.10 (0.38-24.97)	2.49 (0.03-20.38)	0.71 (0.70-7.127)
Unemployed	1	1	1	1

* adjusted for all others in table, ** significant risk.

6.2 Risk (OR) of having undesirable arthromatous risk factors among female participants

By age group

When compared to the age group 13-24 years the risk of having TC > 200 mg per cent among male participants aged between 25-45 and 46-60 years was 1.17 times (95% CI = 1.02-2.83) and 4.85 times (95% CI = 2.67-8.81), the risk of having BMI > 25 among the age group between 25-45 and 46-60 years old was 2.37 times (95% CI = 1.44-3.88) and 4.05 (95% CI = 2.34-7.00), the risk of having SBP > 140 mmHg among the age group 46-60 years old was 6.03 times (95% CI = 1.94-18.75), and the risk of having DBP > 90 mmHg among the age between 25-45 and 46-60 years old was 5.13 times (95% CI = 1.21-21.73) and 8.82 (95% CI = 1.98-39.17) (Table 8).

By income

Using female participants with a low income (< 5,000 baht) as the baseline group, the risk of having TC > 200 mg per cent among female participants with an income of 5,001-10,000 baht was 1.48 times (95%

Table 8. Adjusted odd ratio* (and 95% CI) of having undesirable artheromatous factors by SES among female participants

SES/factors	TC > 200 mg%	BMI > 25 kg/m^2	SBP > 140 mmHg	DBP > 90 mmHg
Age group				
13-24	1	1	1	1
25-45	1.17 (1.02-2.83)**	2.37 (1.44-3.88)**	1.53 (0.51-4.58)	5.13 (1.21-21.73)**
46-60	4.85 (2.67-8.81)**	4.05 (2.34-7.00)**	6.03 (1.94-18.75)**	8.82 (1.98-39.17)**
Residence				
Rural	1	1	1	1
Urban	0.91 (0.62-1.35)	0.96 (0.70-1.32)	1.19 (0.69-2.06)	1.07 (0.61-1.86)
Income (baht/month)				
< 5,000	1	1	1	1
5,001-10,000	1.48 (1.01-2.18)**	1.08 (0.79-1.50)	1.22 (0.53-2.82)	1.05 (0.59-1.87)
10,001-25,000	1.23 (0.72-2.18)	0.95 (0.59-1.52)	2.08 (0.72-5.98)	1.35 (0.60-3.04)
> 25,000	2.17 (1.03-4.88)**	1.20 (0.60-2.41)	1.87 (0.57-6.11)	3.39 (1.31-8.78)**
Eduacation				
Primary school	0.92 (0.46-1.82)	2.64 (1.39-5.02)**	1.87 (0.57-6.11)	1.98 (0.63-6.18)
Secondary school	0.82 (0.42-1.57)	1.65 (0.90-3.05)	1.08 (0.34-3.39)	1.60 (0.54-4.76)
Vocational school	0.64 (0.33-1.25)	1.64 (0.88-3.04)	1.62 (0.52-5.00)	1.75 (0.57-5.37)
University	1	1	1	1
Occupation				
Professional	1	1	1	1
Administration	0.57 (0.26-1.2)	1.04 (0.52-2.07)	0.78 (0.19-3.71)	0.83 (0.20-3.43)
Business	0.63 (0.33-1.20)	1.15 (0.66-2.03)	1.23 (0.44-3.40)	1.40 (0.51-3.83)
Agriculture	0.38 (0.18-0.78)**	0.63 (0.33-1.17)	0.87 (0.28-2.71)	0.98 (0.31-3.04)
Factory workers	0.80 (0.39-1.66)	0.83 (0.43-1.54)	1.24 (0.40-3.75)	1.31 (0.44-4.06)
Unemployed	0.87 (0.36-2.10)	0.92 (0.44-1.91)	0.73 (0.18-2.98)	1.49 (0.41-5.32)

* adjusted for all others in table, ** significant risk.

CI = 1.01-2.18) and > 25,000 baht was 2.17 times (95% CI = 1.03-4.88); the risk of having DBP > 90 mmHg was 3.39 times (95% CI = 1.31-8.78) (Table 8).

By education

Using female participants who were University graduates as the baseline group, the risk of having BMI > 25 kg/m^2 was 2.64 times (95% CI = 1.39-5.02) (Table 8).

By occupation

Female with occupation of agriculture had lower risk of having TC>200 mg% than professional with OR = 0.38 (95% CI = 0.18-0.78) Table 8).

DISCUSSION

Since this second health examination survey was designed to get an estimated prevalence of some risk factors in a Thai population and was not specifically designed for the purpose of this study, the use of this secondary data was somewhat limited. There were a lot of missing values in the dataset due to non-cooperation of participants in the survey, especially the blood examination among apparently healthy persons. This caused some limitations in some parts of the analysis, especially the multiple logistic regression by which the adjusted OR was obtained. Nonetheless, available data suggested some useful information.

This health examination survey seemed to have a proper plan of sampling technic and sample size. However, sampled participants might not be available at the time of data collection, especially persons who had high SES, persons who were available were not eligible for blood test, persons who agreed to participate but reluctant to have the blood test, caused incomplete information in the survey.

The finding from the present study had the limitation to extrapolate the result to every levels of

SES. Participants in the labor force who participated in the present survey were mainly from low income and had a low and moderate educational level.

Logically, one usually regards education as a prerequisite of occupation and income. But sometimes, a better education does not come along with higher ranks of occupation, and higher education does not come with a better income. This highly depends on the socioeconomic situation in the area. This study showed a low relationship between income and level of education (coefficient = 0.454, $p < 0.001$) and income and occupation (coefficient = 0.396, $p < 0.001$). This view point suggested separated analysis of income, level of education and occupations instead of using the theme as composite variable of SES.

The results of this study suggested age is a potential risk for having undesirable risk factors of coronary heart diseaes in both males and females. The male Thai labor force with a higher level education had a higher risk of having TC > 200 per cent mg, those with a higher income had a higher risk of having BMI > 25 kg/m^2 and those who lived in the municipality had a higher risk of having DBP > 90 mmHg. Life styles or ways of living, such as lack of exercise, dietary habit could be the main explanation for this finding. The female Thai labor force with a higher income had a higher risk of having TC > 200 mg per cent and a higher risk of having DBP > 90 mmHg. But there was inversed risk of BMI > 25 kg/m^2 with levels of education among females.

The present study seemed to propose the same direction of relationship of artheromatous risk factors and SES which was opposite to studies from other countries[12,20]. In the US, the population of Standford Five-City project in 1985 suggested the relationship between SES measurements and risk factors was strongest and most consistent for education, showing a higher risk associated with lower levels of education and education was the only measure that was significantly associated with arthromatous risk factors[12].

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ความสัมพันธ์ของการมีปัจจัยเสี่ยงในการเกิดหลอดเลือดแข็งและสภาวะทางเศรษฐกิจและสังคมของประชากรไทยวัยแรงงาน

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การมีปัจจัยเสี่ยง artheromatous สามารถนำไปสู่การภาวะการเสียชีวิตกระทันหันจากโรคหัวใจขาดเลือด โรคหลอดเลือดสมอง โรคหลอดเลือดแดงส่วนปลายตีบตัน ซึ่งความชุกและความเสี่ยงในการมีปัจจัยเสี่ยง artheromatous จะมีความแตกต่างกันไปตามสภาวะเศรษฐกิจและสังคมที่แตกต่างกัน จากผลการข้อมูลการสำรวจสภาวะสุขภาพแห่งชาติของประเทศไทยครั้งที่ 2 ปี พ.ศ. 2539–2540 ด้วยวิธี Multiple logistic Regression พบว่า ประชากรไทยวัยแรงงานทั้งชายและหญิงมีความเสี่ยงในการมีภาวะไขมันในเลือด ค่าดัชนีมวลกาย และความดันโลหิตสูงกว่าปกติเมื่ออายุเพิ่มขึ้น ชายวัยแรงไทยที่อาศัยอยู่ในเขตเมืองจะมีความเสี่ยงสูงในการมีไขมันในเลือด ความดันเลือด Diastolic สูงกว่าปกติมากกว่าผู้ที่อาศัยอยู่ในชนบท และชายวัยแรงงานที่มีรายได้ต่อเดือนสูงกว่า 5,000 บาทต่อเดือน จะมีความเสี่ยงในการมีดัชนีมวลกายเกินกว่าปกติ เมื่อเทียบกับผู้มีรายได้น้อยกว่า 5,000 บาทต่อเดือน (รายได้ 5,001–10,000 และ มากกว่า 25,000 บาทต่อเดือน OR = 1.57: 95% CI = 1.04–2.39 และ OR = 2.59: 95% CI = 1.18–5.66) หญิงวัยแรงงานมีรายได้ต่อเดือนสูงกว่า 5,000 บาทต่อเดือนจะมีความเสี่ยงในการสภาวะไขมันในเลือดสูงกว่าปกติเมื่อเทียบกับผู้ที่มีรายได้น้อยกว่า 5,000 บาทต่อเดือน (รายได้ 5,001–10,000 บาทต่อเดือน OR = 1.48: 95% CI = 1.01–2.18, รายได้มากกว่า 25,000 บาทต่อเดือน OR = 2.17: 95% CI = 1.03–4.88) และการมีความเสี่ยงในการความดันโลหิต Diastolic สูงกว่าปกติของหญิงวัยแรงงานรายได้สูงกว่า 25,000 บาทต่อเดือนมีมากกว่าผู้มีรายได้ต่ำกว่า 5,000 บาทต่อเดือน (OR = 3.39: 95% CI = 1.31–8.78) ในทางกลับกันหญิงวัยแรงงานที่มีระดับการศึกษาประถมศึกษาและต่ำกว่าจะมีความเสี่ยงในการมีดัชนีมวลกายสูงกว่าปกติมากกว่าหญิงที่จบการศึกษาในระดับปริญญา (OR = 2.64: 95% CI = 1.39–5.02)

ผลการศึกษาชี้แนะให้เห็นถึงความสัมพันธ์ของการมีปัจจัยเสี่ยง artheromatous กับ พฤติกรรมการดำรงชีวิตที่จะนำไปสู่กิจกรรมการส่งเสริมสุขภาพที่เหมาะสมที่ และแตกต่างกันตามฐานะทางเศรฐกิจ ระดับการศึกษา ลักษณะอาชีพ ซึ่งเป็นตัวแปรที่มีอิทธิพลในระดับหนึ่ง

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