Dyslipidemia in Thai population, National Health Examination Survey IV, 2009

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Collaborating Institutes

- Chiangmai University
- Chulalongkorn University
- Konkaen University
- Mahidol University
- Songkla University
- National Statistics Office, Thailand
- Health System Research Institute
- Health Policy and Planning, Ministry Of Public Health, Thailand

Acknowledgement

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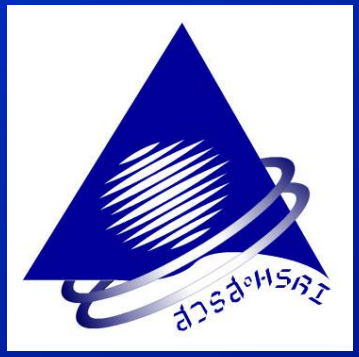

http://www.nheso.or.th

Background

- Cardiovascular diseases are among the leading causes of death in Thai population.
- Low HDL-C and high LDL-C are associated with increased risk of CVD outcomes.
- The prevalence of lipid abnormality other than total cholesterol is not clear in Thai population.
- Previous study show that screening and treatment rates were low.
- Monitoring and evaluate the situation of dyslipidemia in the population is importance.

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CARDIOVASCULAR DISEASE

Twelve-year changes in vascular risk factors and their associations with mortality in a cohort of 3499 Thais: the Electricity Generating Authority of Thailand Study

Piyamitr Sritara,[1] Sayan Cheepudomwit,[1,2] Neil Chapman,[2] Mark Woodward,[2] Chomsri Kositchaiwat,[1] Supoch Tunlayadechanont,[1] Tanyachai Sura,[1] Bunlue Hengprasith,[3] Vichai Tanphaichitr,[1] Somchart Lochaya,[1] Bruce Neal,[2] Supachai Tanomsup[1] and Tada Yipintsoi[4]

Table 3 Hazard ratios (95% CI) for the association of risk factors with vascular death among 3318 Thais followed for an average of 12 years

	Unadjusted	Adjusted[a]
Age (10 years)	3.7 (2.1, 6.5)	2.7 (1.5, 4.8)
Sex (male/female)	6.7 (1.6, 27.7)	2.6 (0.6, 11.1)
Body mass index (5 kg/m^2)	1.6 (1.1, 2.4)	1.0 (0.6, 1.6)
Systolic blood pressure (10 mmHg)[b]	1.7 (1.3, 2.2)	1.3 (1.0, 1.8)
Diastolic blood pressure (5 mmHg)[b]	1.7 (1.4, 2.2)	1.5 (1.1, 1.9)
Total cholesterol (1.0 mmol/l)[b]	1.1 (0.8, 1.7)	1.0 (0.7, 1.6)
HDL[c] cholesterol (0.2 mmol/l)	0.6 (0.5, 0.8)	0.7 (0.6, 0.9)
Diabetes[d] (yes/no)	5.3 (2.7, 10.2)	3.3 (1.6, 6.6)
Current smokers (yes/no)	2.8 (1.5, 5.2)	2.2 (1.1, 4.1)

[a] Adjusted for every other variable in the Table (except that diastolic and systolic blood pressure were not adjusted for each other).

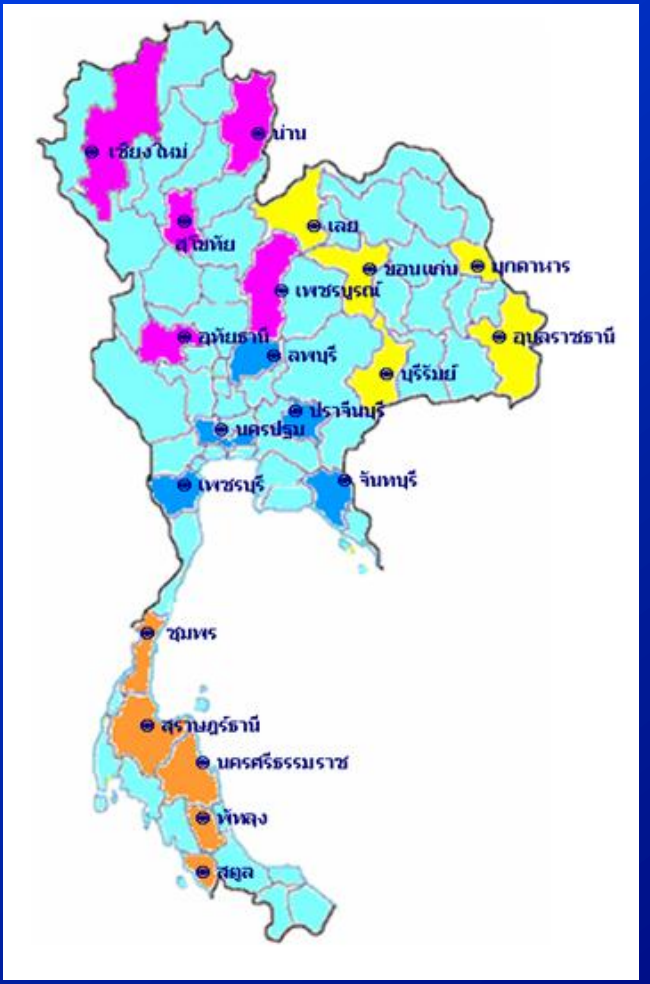
Outline

- Epidemiology of dyslipidemia in Thailand.
  - High total cholesterol, high LDL-C,
  - Low HDL-C, High triglyceride
  - By age, sex, urban/rural
  - Among CVD high risk group.

Thai NHES IV , 2009

- Multi-stage random sampling of 30 000 individuals age 1+ yr, non-institutionalized of registered population
- 5 provinces / regions + Bangkok = 21 provinces
- Population aged ≥20 ≈19,000 persons
- Blood samples (Fasting),

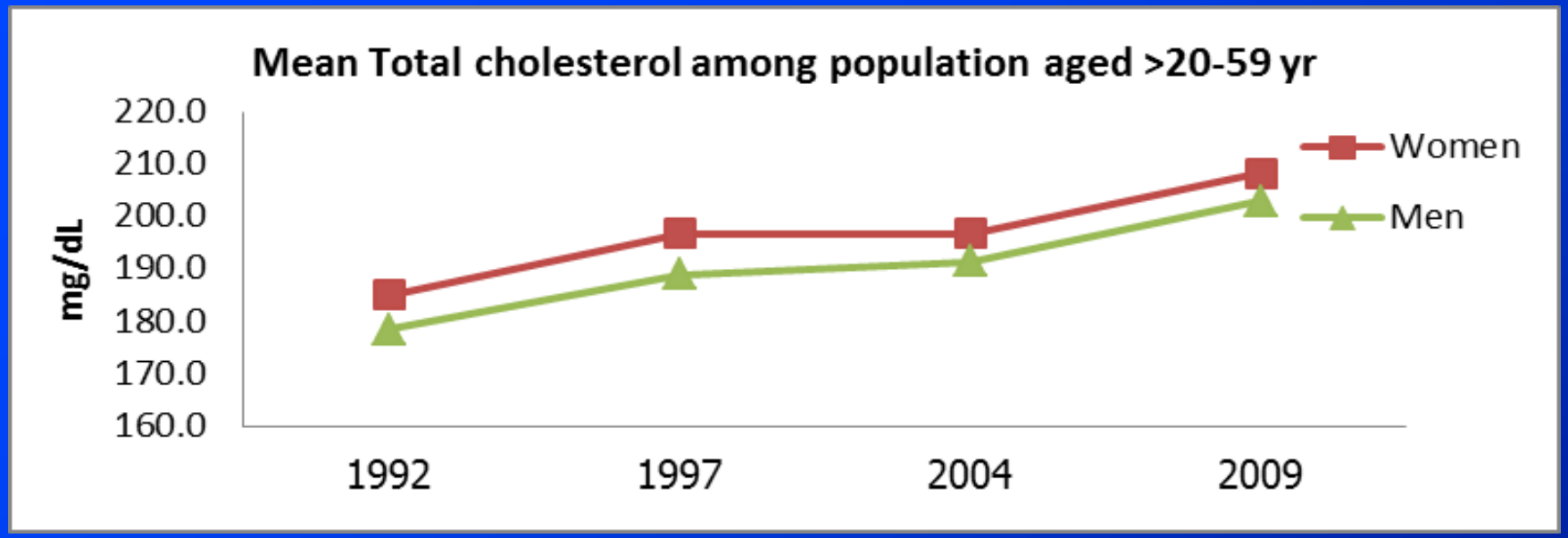
  Lipid: TC, HDL-C, TG
  Calculated LDL-C if TG<400
  and direct measure of LDL-C
  if TG>=400 mg/dL

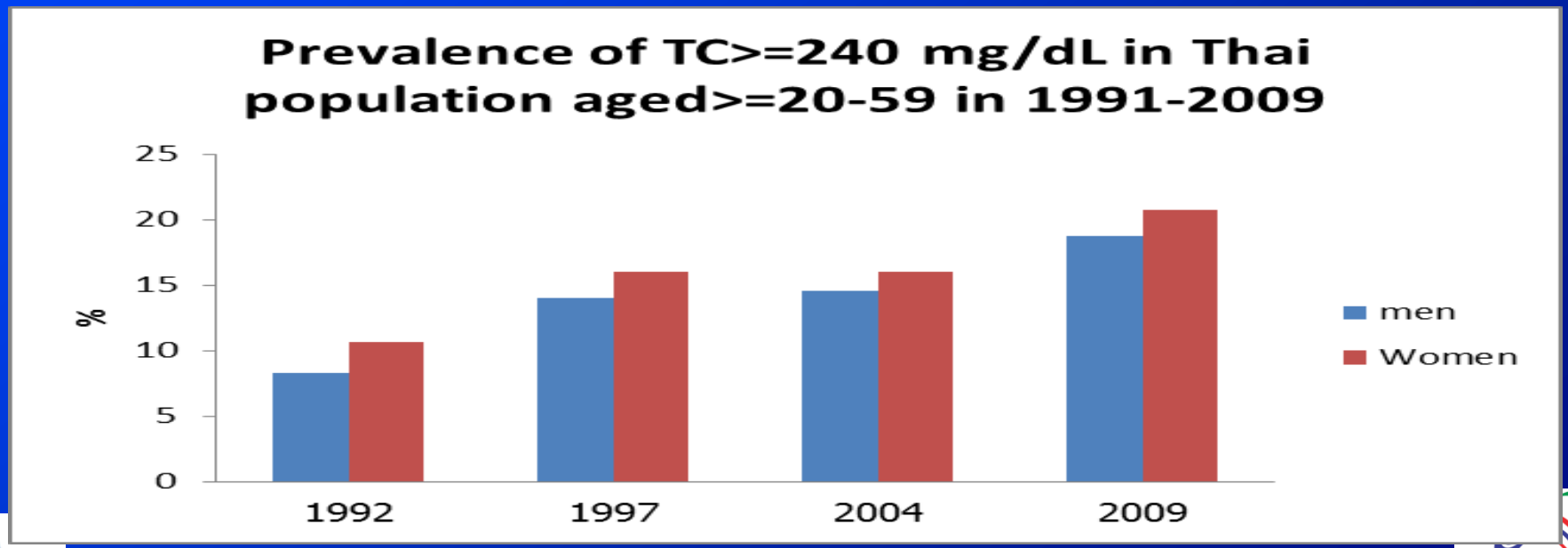


สสก.
สำนักงานสำรวจสุขภาพประชาชนไทย

Characteristics of participants aged≥20, NHES4, 2009

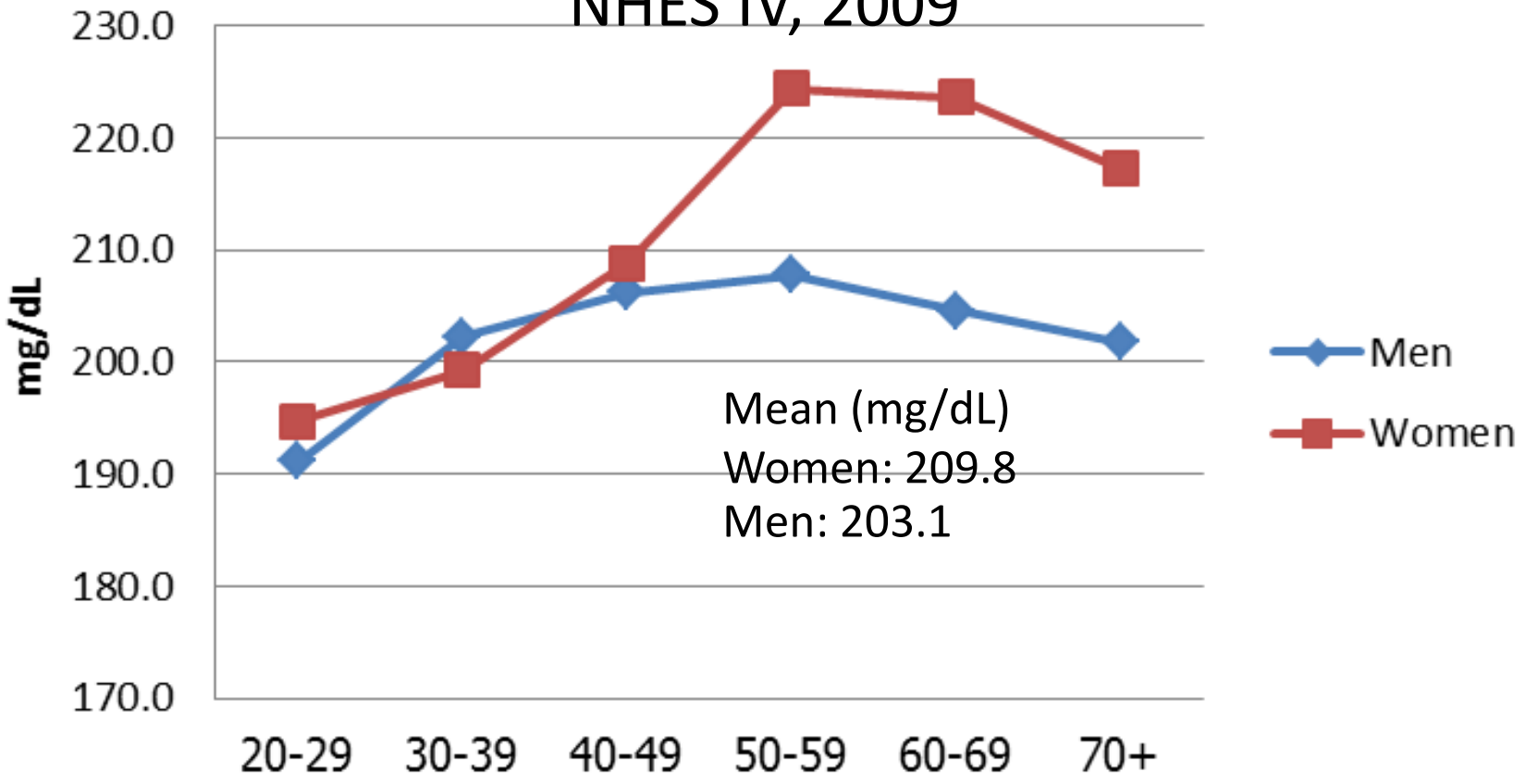
	Men (n=9021)	Women (n=10,000)
Variable	Mean (SE)	Mean (SE)
Age (yr)	45.3 (0.1)	46.4 (0.04)
Total Cholesterol, (mg/dL)	203.1 (1.2)	209.8 (1.0)
Triglyceride (mg/dL)	171.9 (2.9)	140.8 (2.6)
HDL (mg/dL)	45.2 (0.3)	48.7 (0.4)
LDL (mg/dL)	124.3 (1.2)	133.2 (1.1)
Non-HDL-C (mg/dL)	157.9 (1.0)	161.1 (0.9)
TC/HDL-C	4.7 (0.02)	4.5 (0.03)
LDL/HDL-C	2.9 (0.02)	2.9 (0.02)
BMI (kg/m^2)	23.4 (0.1)	24.6 (0.1)
WC (cm)	80.6 (0.3)	79.5 (0.3)
SBP (mmHg)	124.6 (0.5)	121.0 (0.3)
DBP (mmHg)	77.4 (0.3)	74.3 (0.2)
Smoking (%)	40.2 (1.1)	2.2 (0.2)
Diabetes (%)	6.4 (0.4)	8.1 (0.3)
Hypertension (%)	23.0 (1.0)	22.6 (0.5)

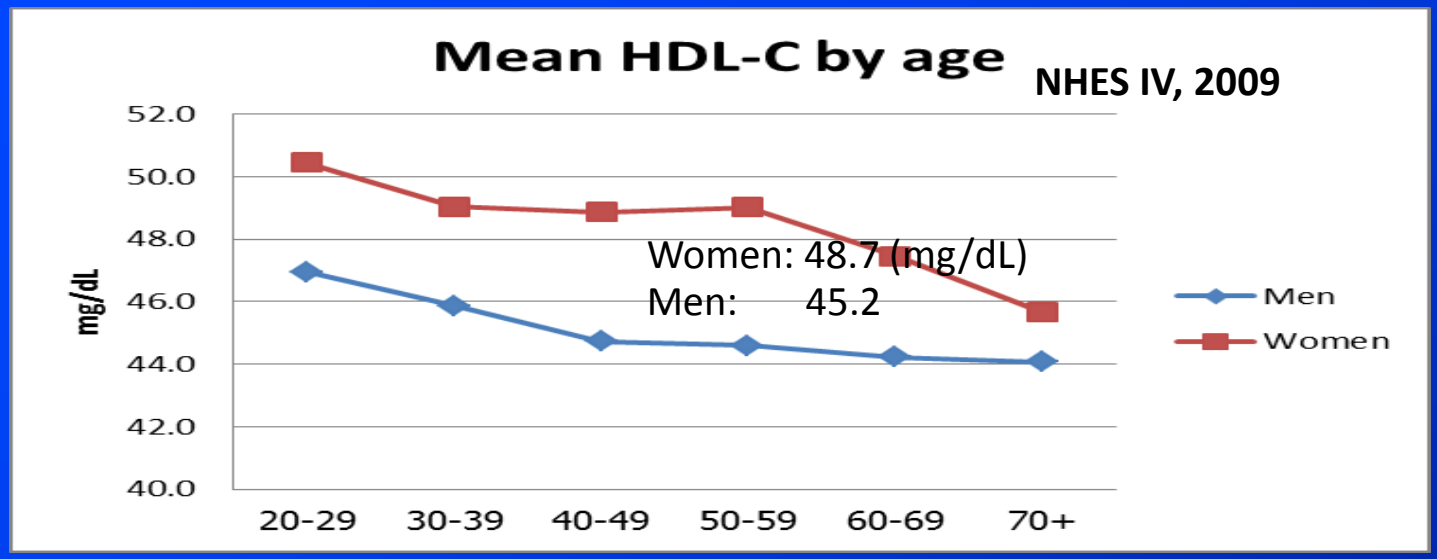

Mean Total cholesterol among population aged >20-59 yr
mg/dL
220.0
210.0
200.0
190.0
180.0
170.0
160.0
1992
1997
2004
2009
Women
Men

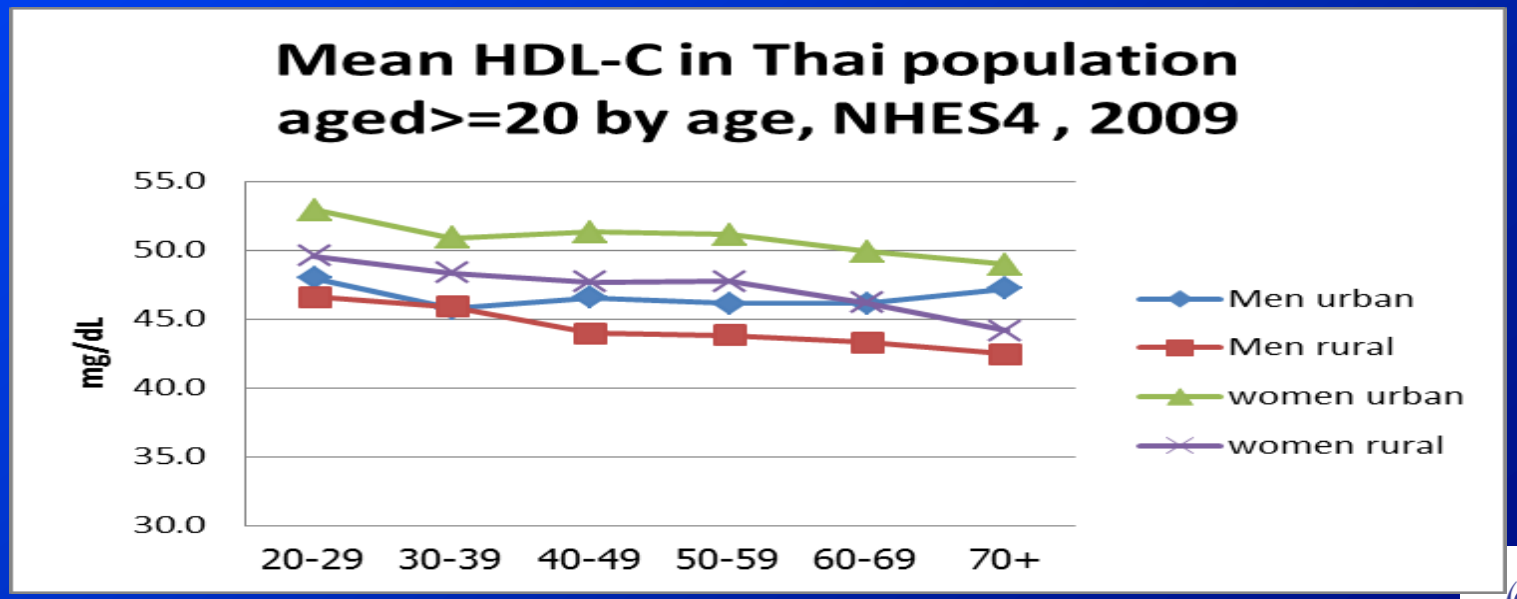

Prevalence of TC>=240 mg/dL in Thai population aged>=20-59 in 1991-2009
%
25
20
15
10
5
0
1992
1997
2004
2009
men
Women

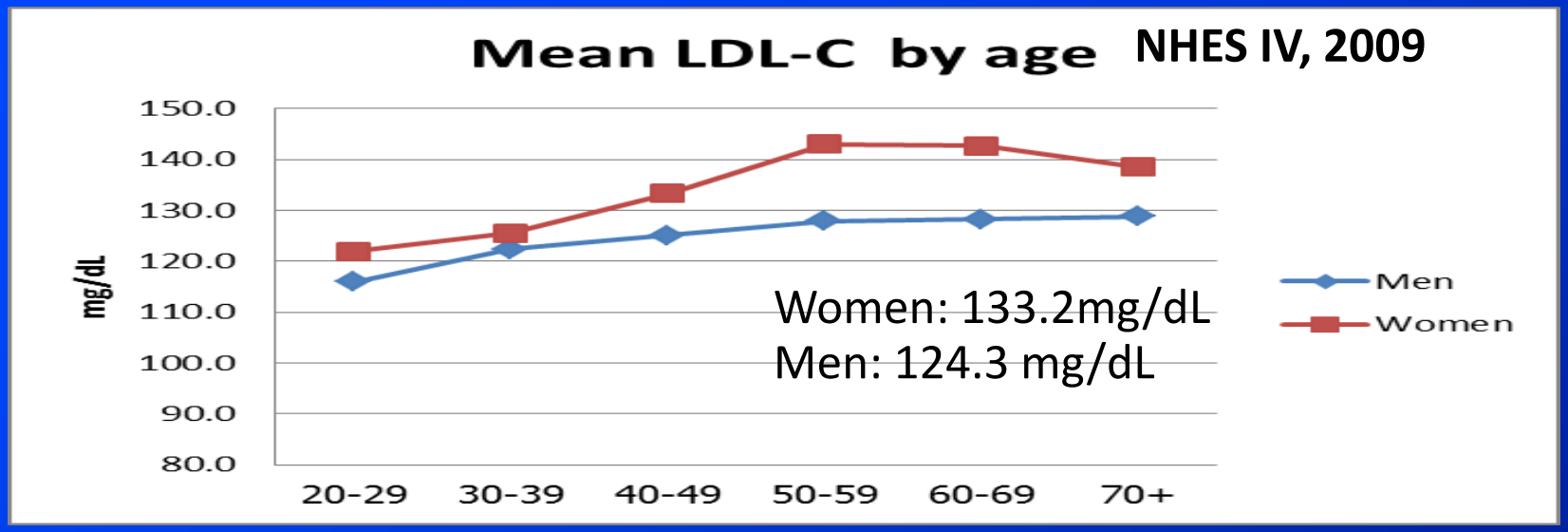
Mean total cholesterol by age

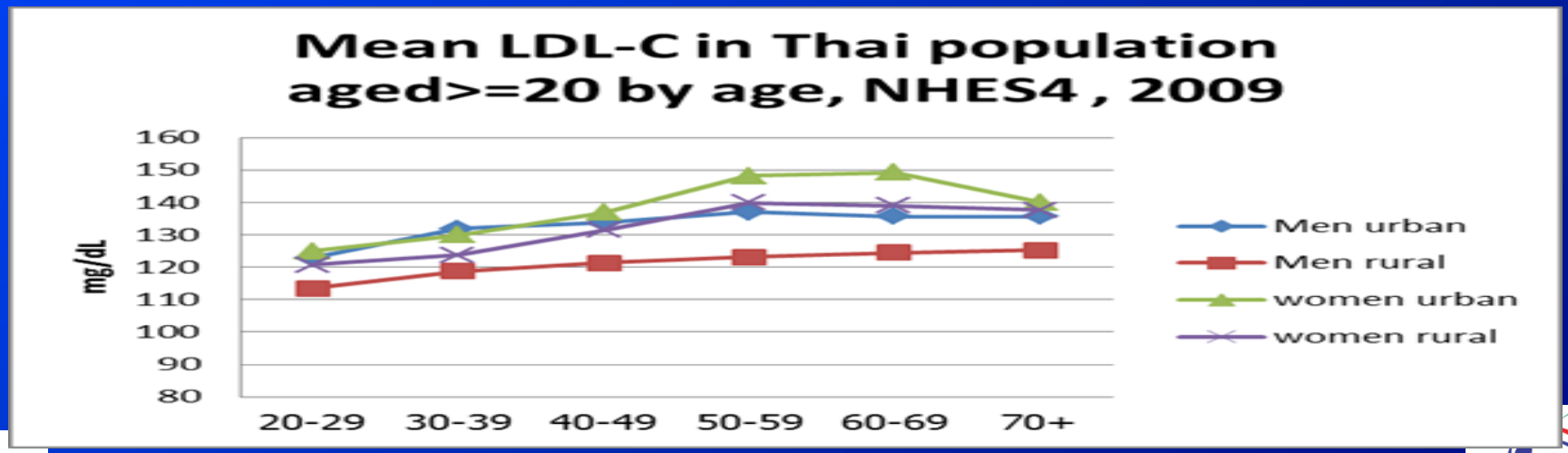
NHES IV, 2009

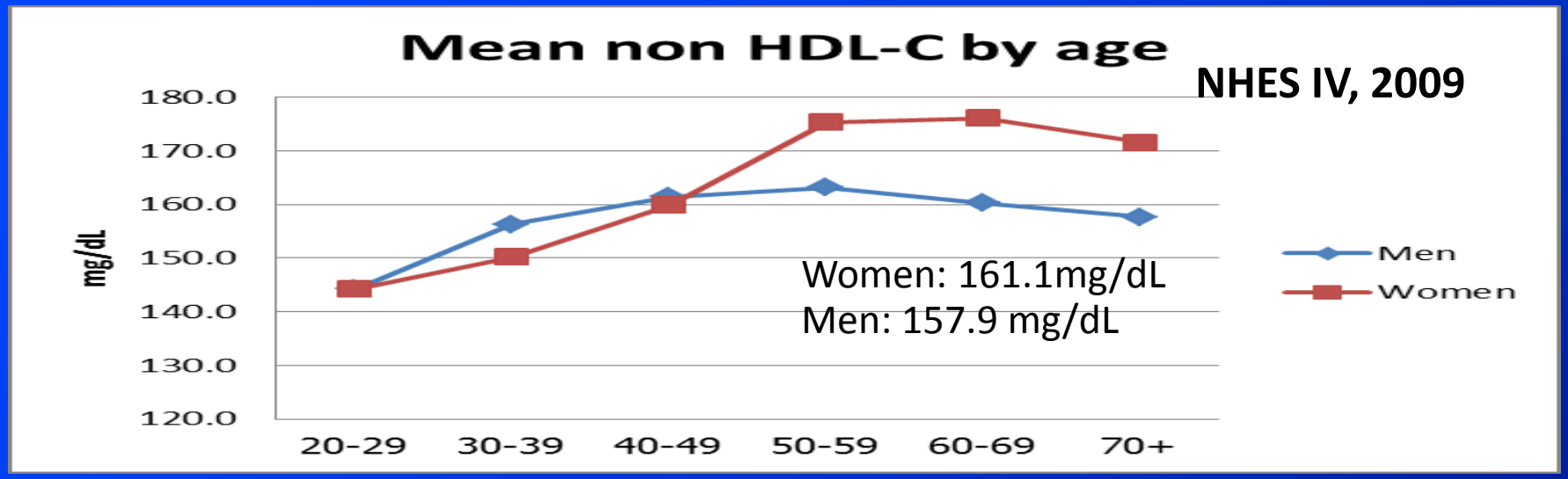


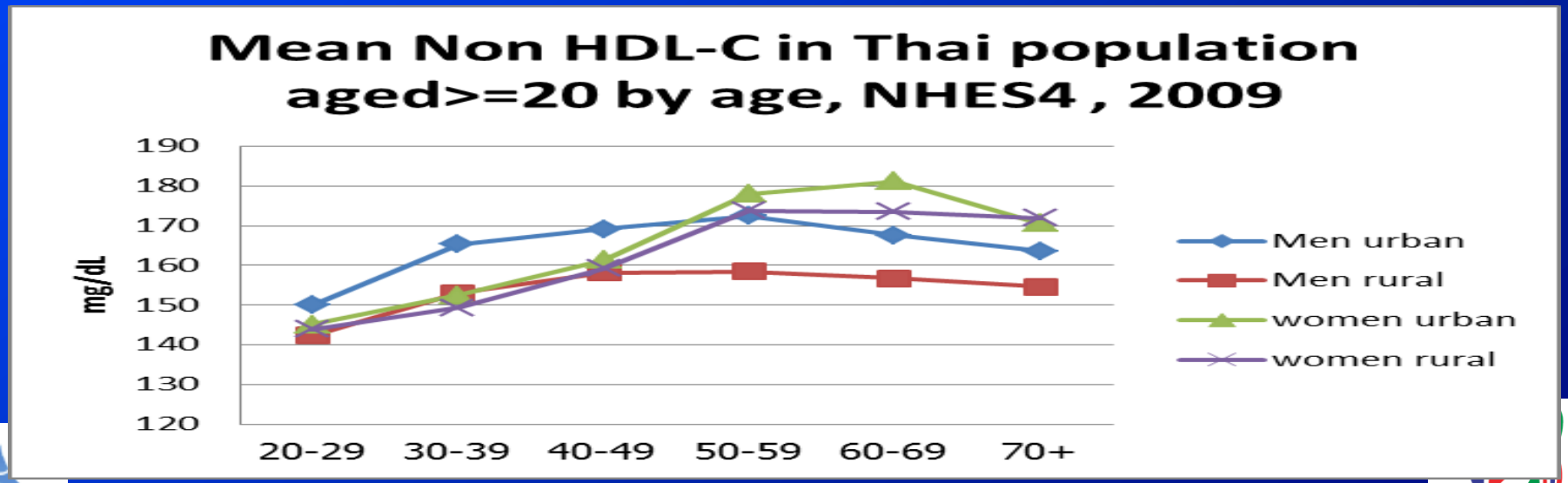

Mean HDL-C by age
NHES IV, 2009
52.0
50.0
48.0
46.0
44.0
42.0
40.0
mg/dL
Women: 48.7 (mg/dL)
Men: 45.2
20-29
30-39
40-49
50-59
60-69
70+
Men
Women

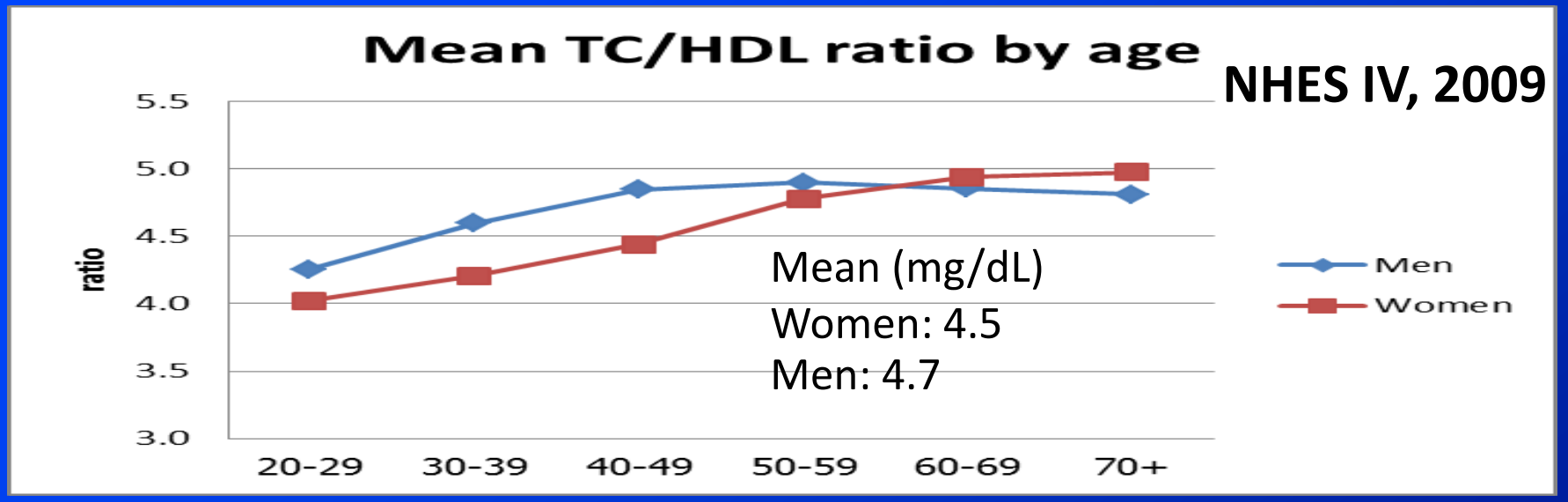

Mean HDL-C in Thai population aged>=20 by age, NHES4 , 2009
55.0
50.0
45.0
40.0
35.0
30.0
mg/dL
20-29
30-39
40-49
50-59
60-69
70+
Men urban
Men rural
women urban
women rural

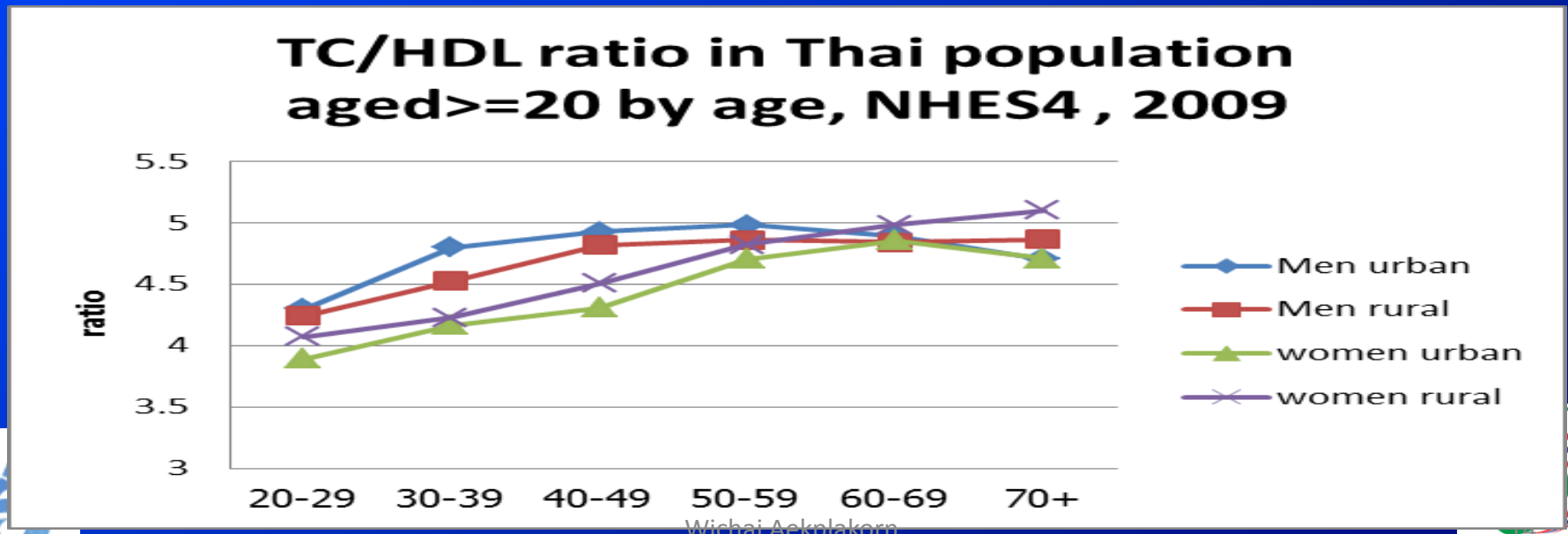

Mean LDL-C by age
NHES IV, 2009
mg/dL
150.0
140.0
130.0
120.0
110.0
100.0
90.0
80.0
20-29
30-39
40-49
50-59
60-69
70+
Men
Women
Women: 133.2mg/dL
Men: 124.3 mg/dL

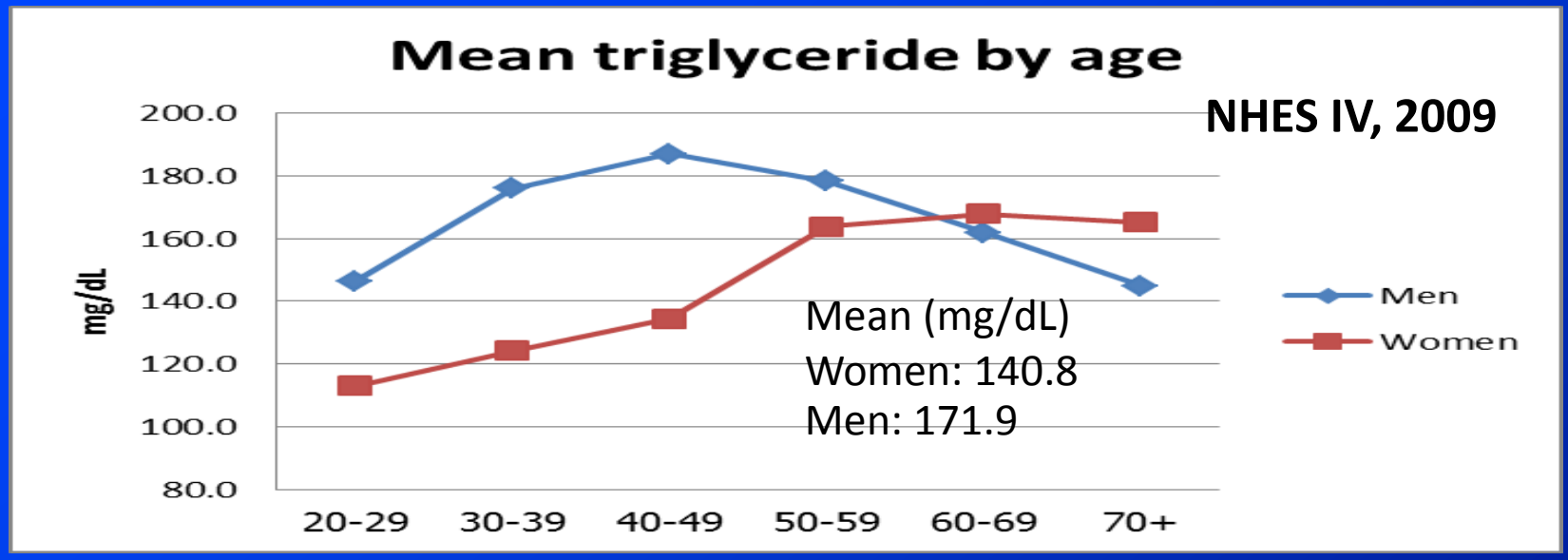

Mean LDL-C in Thai population aged>=20 by age, NHES4 , 2009
mg/dL
160
150
140
130
120
110
100
90
80
20-29
30-39
40-49
50-59
60-69
70+
Men urban
Men rural
women urban
women rural

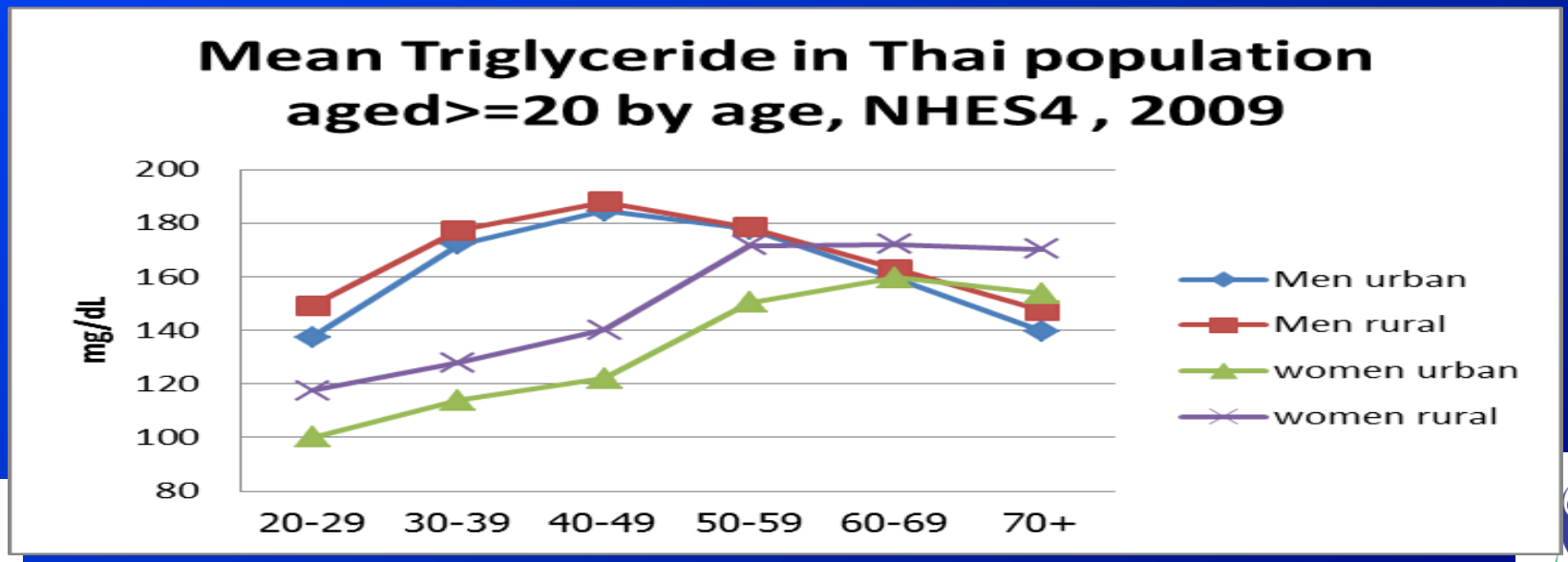

Mean non HDL-C by age
NHES IV, 2009
180.0
170.0
160.0
150.0
140.0
130.0
120.0
mg/dL
20-29
30-39
40-49
50-59
60-69
70+
Women: 161.1mg/dL
Men: 157.9 mg/dL
Men
Women


Mean Non HDL-C in Thai population aged>=20 by age, NHES4 , 2009
190
180
170
160
150
140
130
120
mg/dL
20-29
30-39
40-49
50-59
60-69
70+
Men urban
Men rural
women urban
women rural


Mean TC/HDL ratio by age
NHES IV, 2009
ratio
5.5
5.0
4.5
4.0
3.5
3.0
20-29
30-39
40-49
50-59
60-69
70+
Mean (mg/dL)
Women: 4.5
Men: 4.7
Men
Women


TC/HDL ratio in Thai population aged>=20 by age, NHES4 , 2009
ratio
5.5
5
4.5
4
3.5
3
20-29
30-39
40-49
50-59
60-69
70+
Men urban
Men rural
women urban
women rural


Mean triglyceride by age
NHES IV, 2009
200.0
180.0
160.0
140.0
120.0
100.0
80.0
mg/dL
20-29
30-39
40-49
50-59
60-69
70+
Men
Women
Mean (mg/dL)
Women: 140.8
Men: 171.9


Mean Triglyceride in Thai population aged>=20 by age, NHES4 , 2009
200
180
160
140
120
100
80
mg/dL
20-29
30-39
40-49
50-59
60-69
70+
Men urban
Men rural
women urban
women rural

LDL-C Goals and Cut-points: ATP-III

Risk Category	LDL-C Goal	Consider Drug Therapy
CHD or CHD risk equivalent	<100 mg/dL	≥130 mg/dL*
≥2 Risk Factors		
10-yr risk 10–20%	<130 mg/dL	≥130 mg/dL
10-yr risk <10%	<130 mg/dL	≥160 mg/dL
<2 Risk Factors	<160 mg/dL	≥190 mg/dL

RF: smoking, DM, HT, HDL-C<40, fam Hx, age>=45 in men, >=55 women

Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults. *JAMA* 2001;285:2486-2497.

Estimate CVD risk

EVIDENCE BASED PUBLIC HEALTH POLICY AND PRACTICE

Cardiovascular risk prediction tools for populations in Asia

Asia Pacific Cohort Studies Collaboration

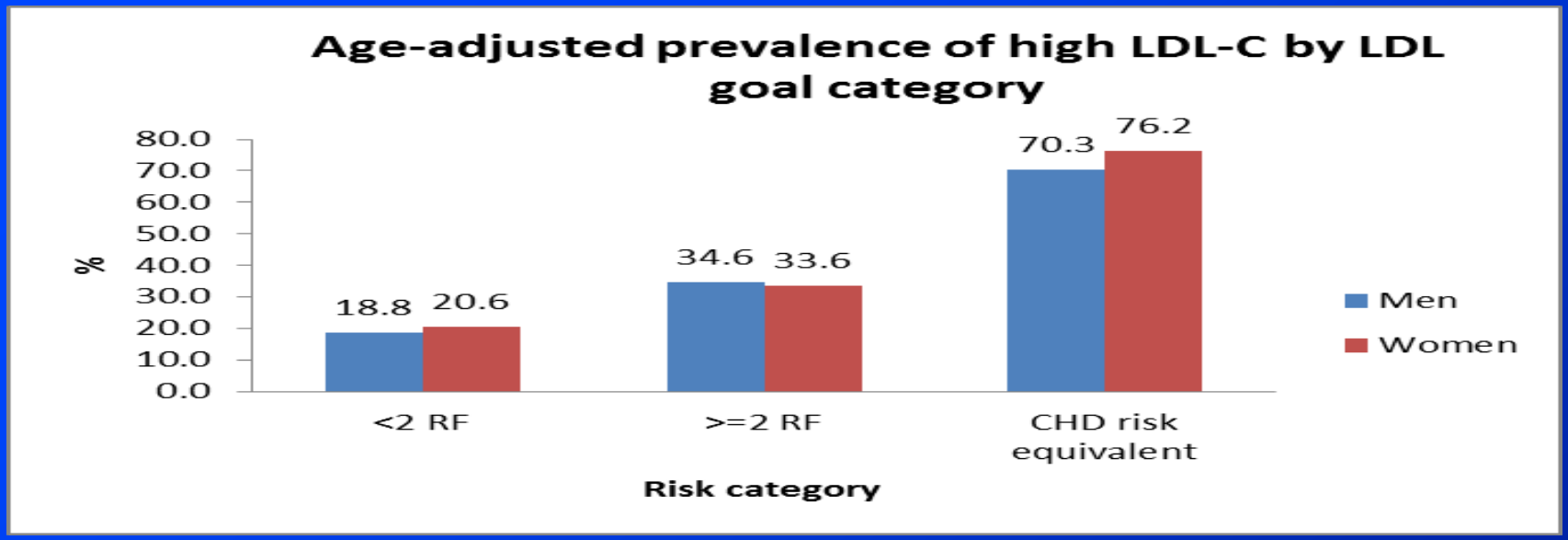
J Epidemiol Community Health 2007;**61**:115–121. doi: 10.1136/jech.2005.044842

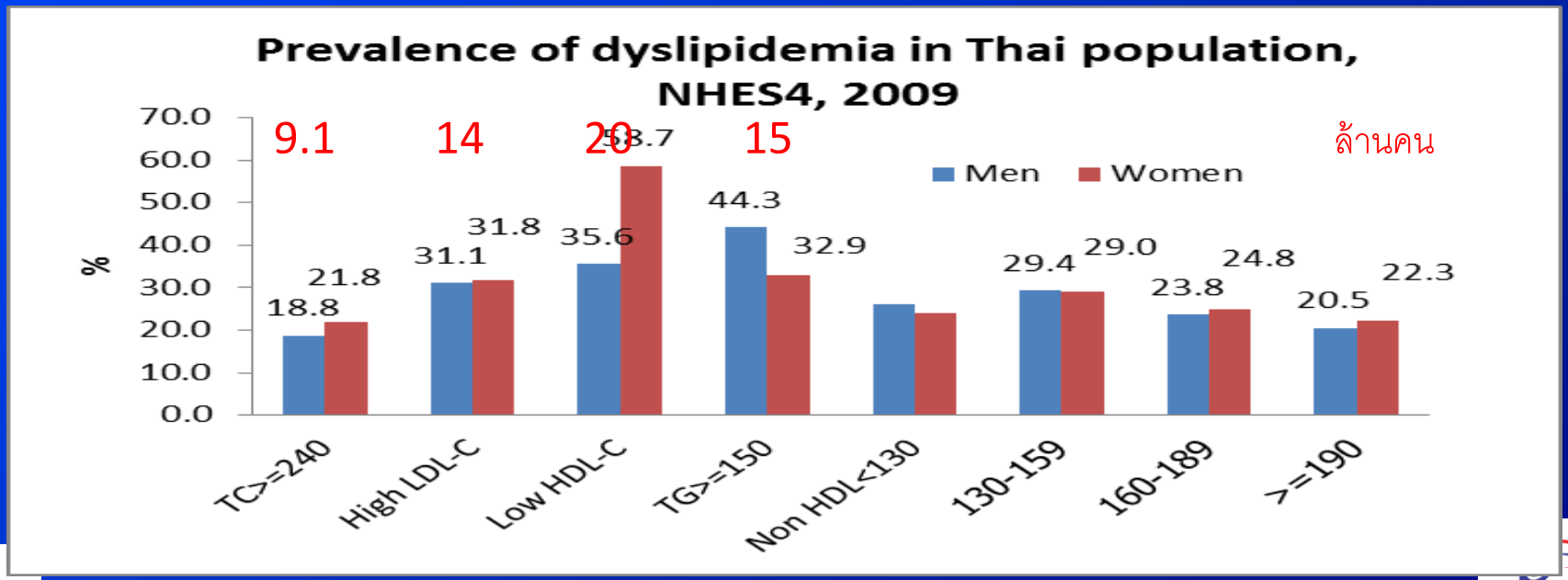
$$p(8)_{men} = 1 - S(8)_{men}^{\exp\{0.068\,(age_i - \overline{age}) + 0.012\,(SBP_i - \overline{SBP}) + 0.15\,(TC_i - \overline{TC}) + 0.37\,(smoke_i - \overline{smoke})\}}$$

and for women is

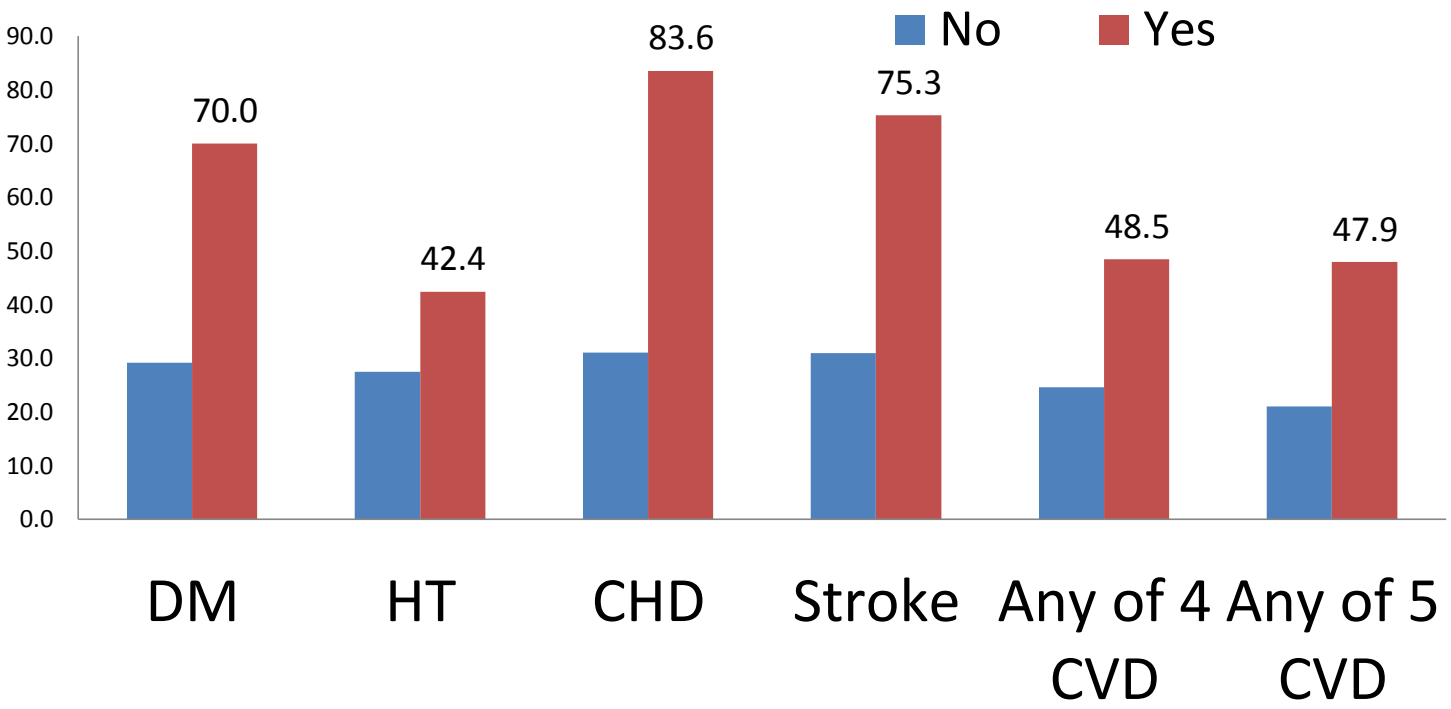
$$p(8)_{women} = 1 - S(8)_{women}^{\exp\{0.078\,(age_i - \overline{age}) + 0.017\,(SBP_i - \overline{SBP}) + 0.14\,(TC_i - \overline{TC}) + 0.55\,(smoke_i - \overline{smoke})\}}$$

- Estimate CVD risk for assigning LDL-C goal for each persons based on ATP III
  Asian Equation and survival prob. from EGAT study


Age-adjusted prevalence of high LDL-C by LDL goal category
%
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
18.8
20.6
34.6
33.6
70.3
76.2
<2 RF
>=2 RF
CHD risk equivalent
Risk category
Men
Women

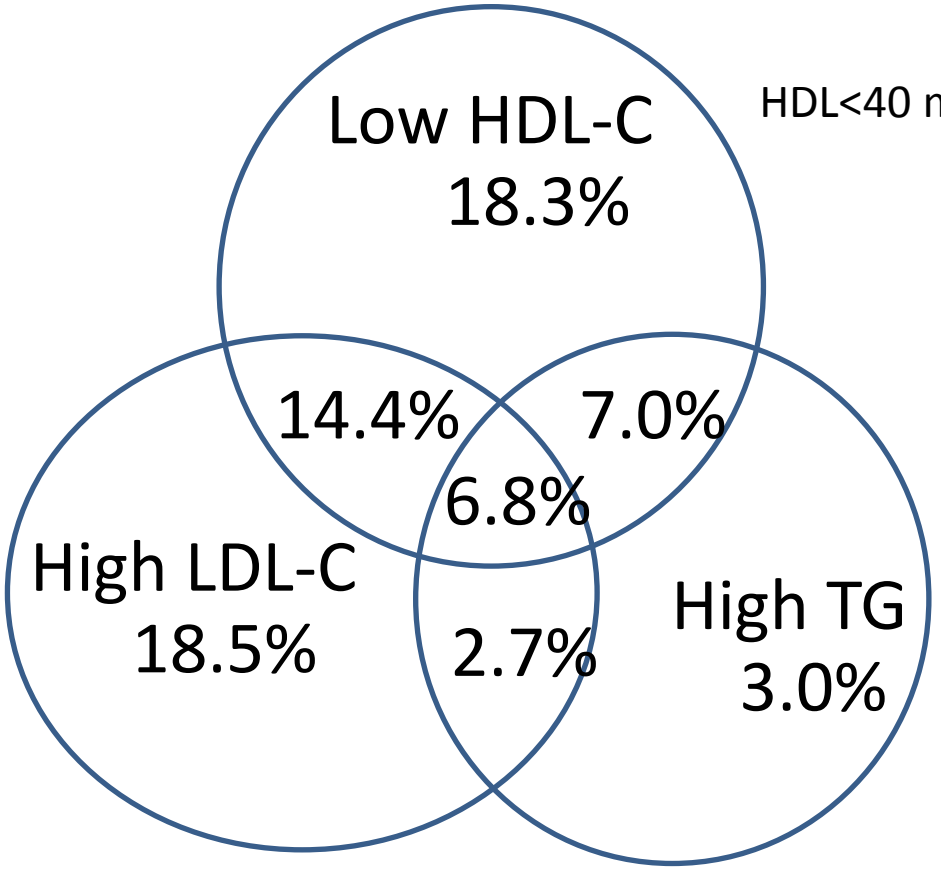

Prevalence of dyslipidemia in Thai population, NHES4, 2009
%
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
9.1
14
20
15
ล้านคน
Men
Women
18.8
21.8
31.1
31.8
35.6
53.7
44.3
32.9
29.4
29.0
23.8
24.8
20.5
22.3
TC>=240
High LDL-C
Low HDL-C
TG>=150
Non HDL<130
130-159
160-189
>=190

Prevalence of high LDL-C in people with and without CVD risk factors



any 4 CVD: DM, HT, CHD, Stroke, any 5 CVD : + BMI>=25

Age-adjusted prevalence (%) of dyslipidemia in Thai population aged ≥ 20, NHES IV 2009



HDL<40 mg/dL in men / 50 in women

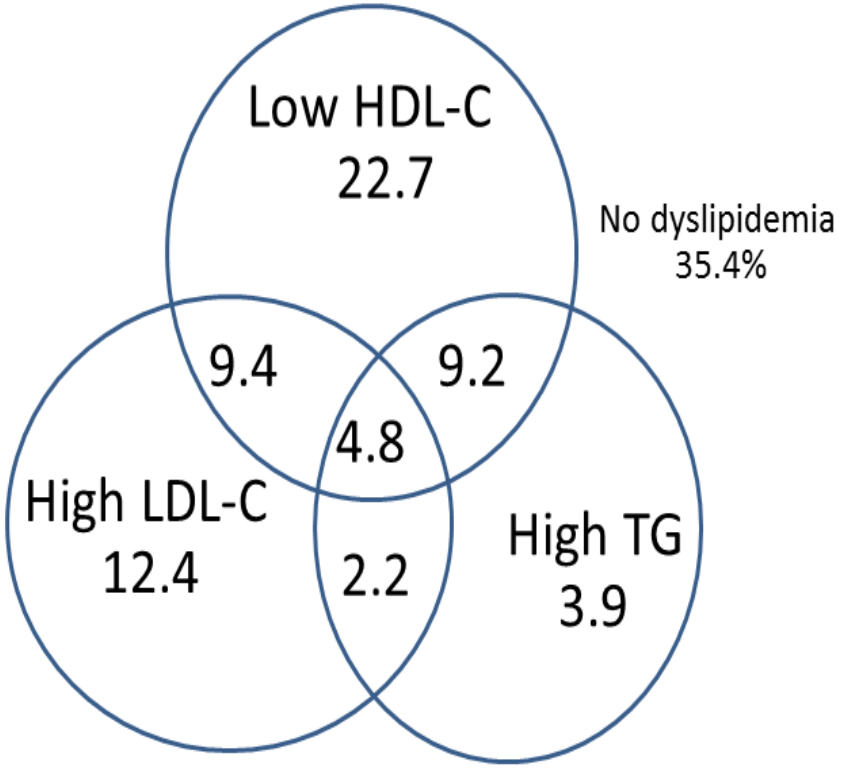
based on
risk stratification

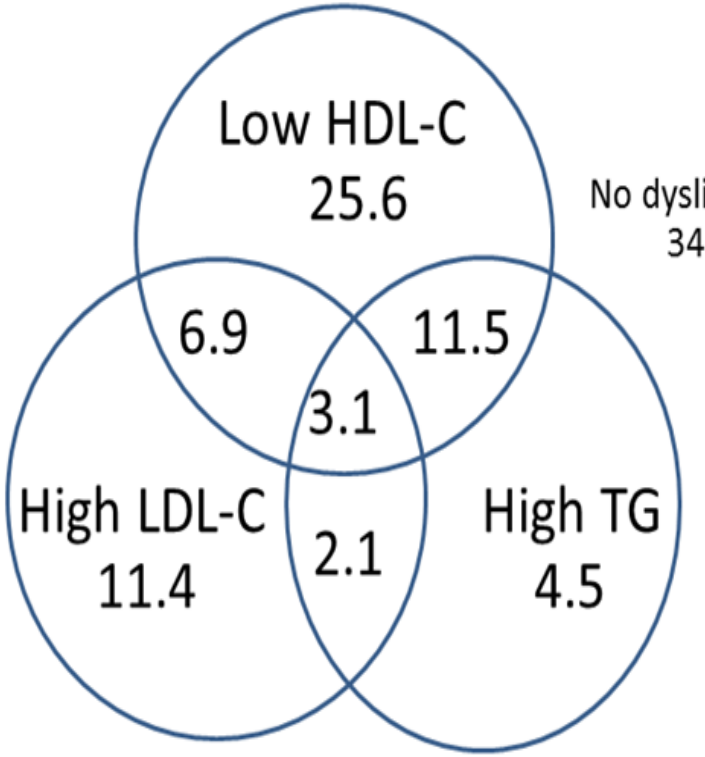
TG>=200 mg/dL

No dyslipidemia 29.2%

High LDL-C calculated based on ATPIII and estimated CVD risk, Asian equation

Age-adjusted prevalence (%) of dyslipidemia in Thai population aged ≥ 20, NHES IV 2009





High LDL-C calculated based on number of CVD risk factors (ATPIII) Not using estimated CVD risk

High LDL-C goal at LDL-C >=160 mg/dL
Low HDL-C: HDL-C <40/50 ; High TG: TG>=200 mg/dL

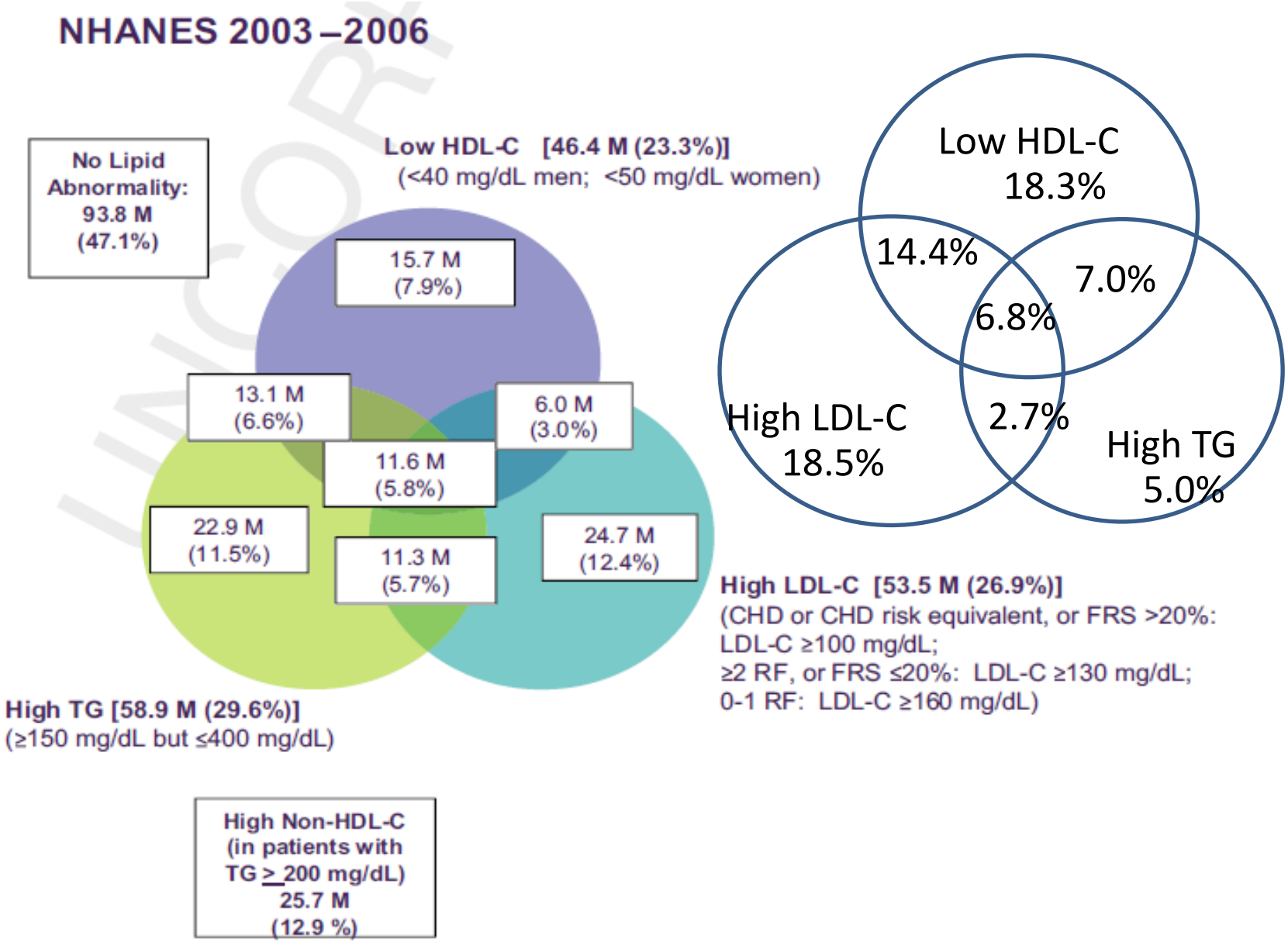
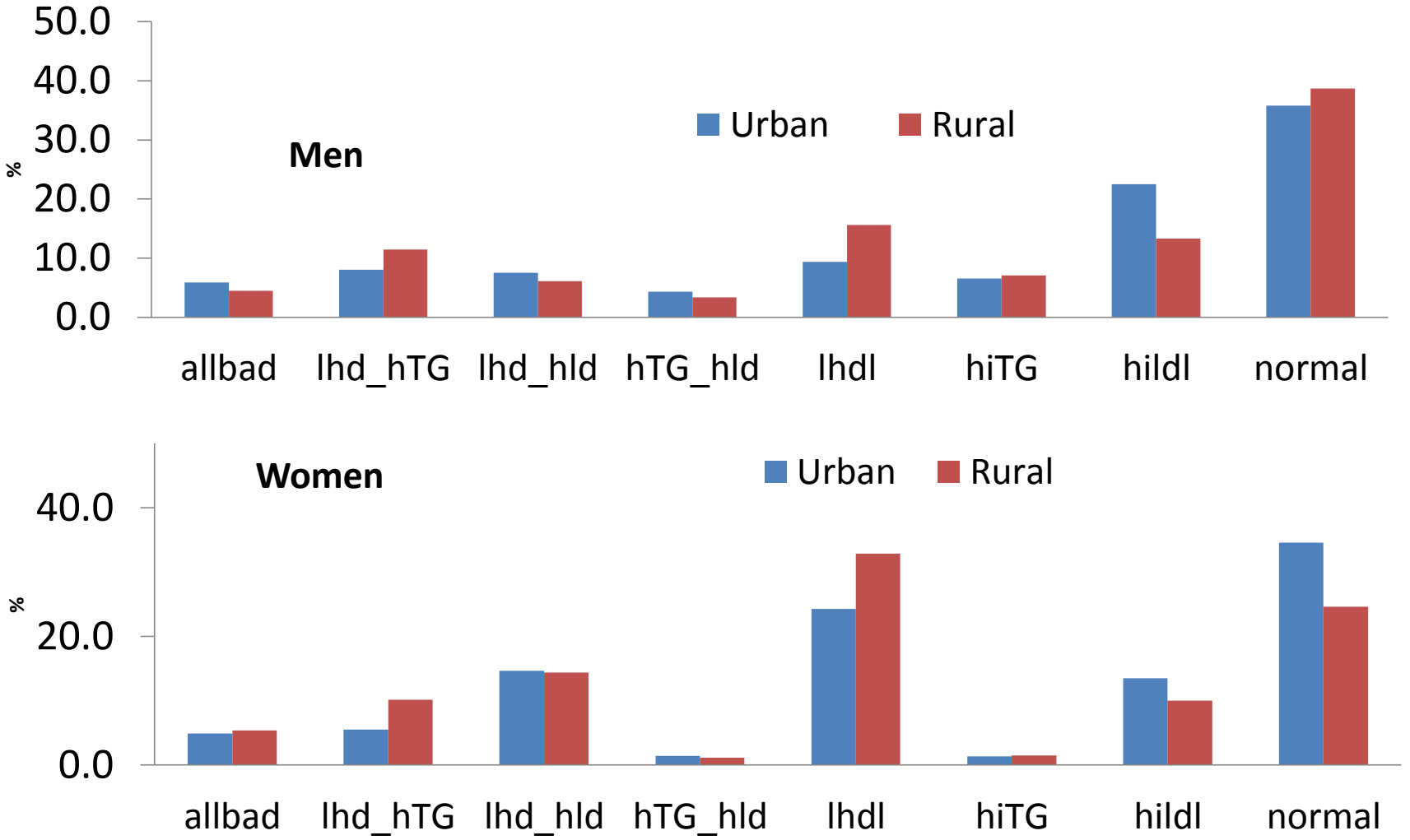


Figure 1 Prevalence of standard lipid abnormalities among U.S. adults from NHANES 2003–2006.

Toth PP et al. Jounral of clinical Lipidology 2012http://dx.doi.org/10.1016/j.jacl.2012.05.002

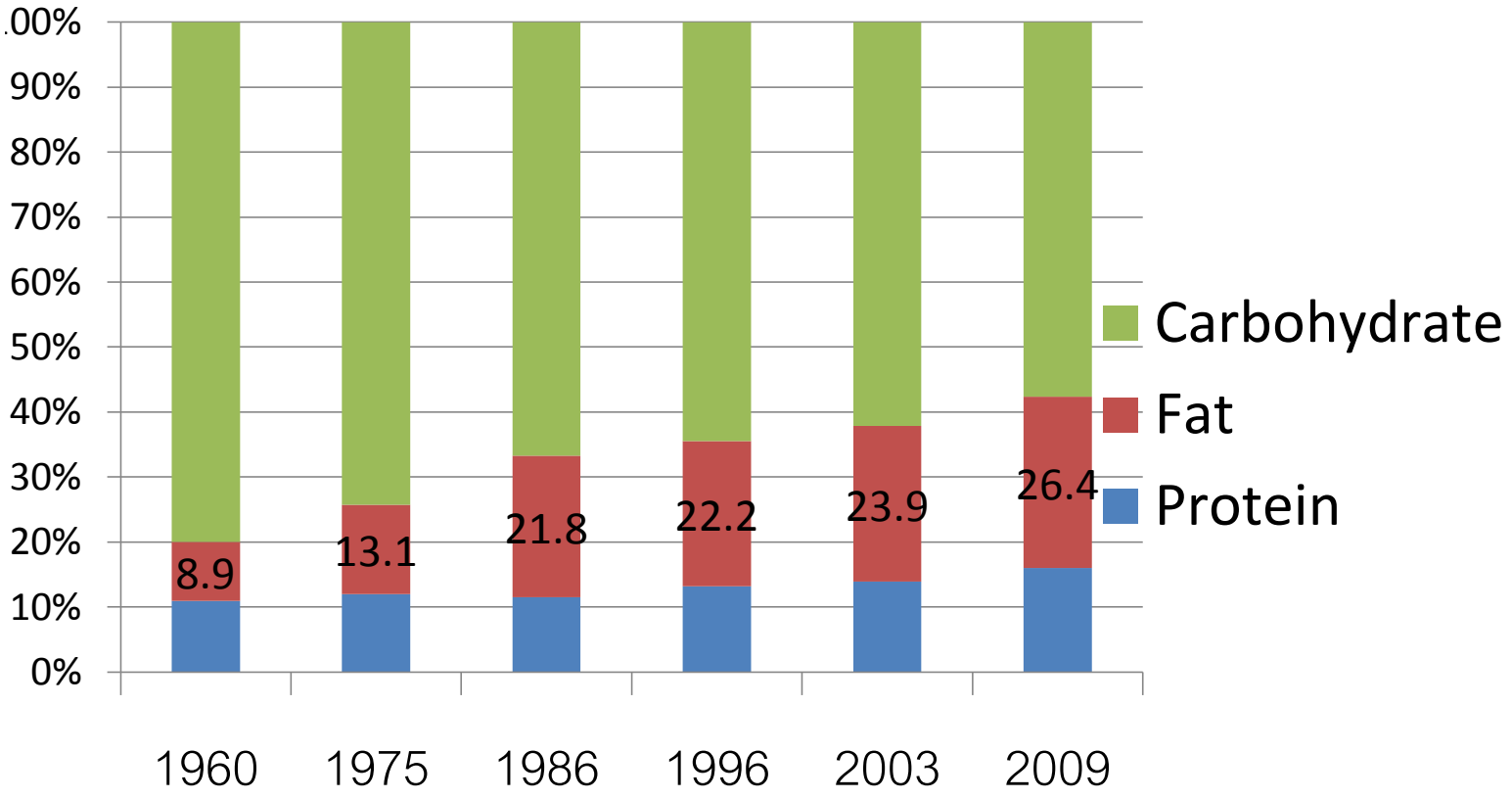
Age-adjusted prevalence of dyslipidemia by urban/rural



Mean and prevalence of CVD risk factors by type of lipid abnormality

	HighLDL LowHDL HighTG	LowHDL HighTG	LowHDL HighLDL	HighTG HighLDL	Isolated LowHDL	HighTG	HighLDL	Normal
BMI (kg/m2)	27.5	25.4	25.8	25.7	23.5	24.4	24.3	22.7
Waist (Cm)	89.3	84.6	84.5	85.8	78.6	81.9	80.8	76.4
SBP (mmHg)	128.8	124.6	124.5	133.6	118.6	125.4	125.7	119.5
DBP (mmHg)	79.7	77.8	76.3	82.9	73.2	77.6	77.9	74.2
Smoking(%)	28.9	19.8	28.0	25.4	23.3	19.9	20.0	19.1
Diabetes(%)	24.1	7.6	15.9	20.4	3.8	3.9	11.9	1.7
Hypertension(%)	34.6	26.3	26.6	45.1	14.6	25.2	28.9	15.8
MetS(%)	84.6	66.6	44.8	51.7	25.0	25.2	14.4	4.4

Trends in percentage of energy intake from macronutrients



Source: Thai National Nutritional Survey and *NHES IV

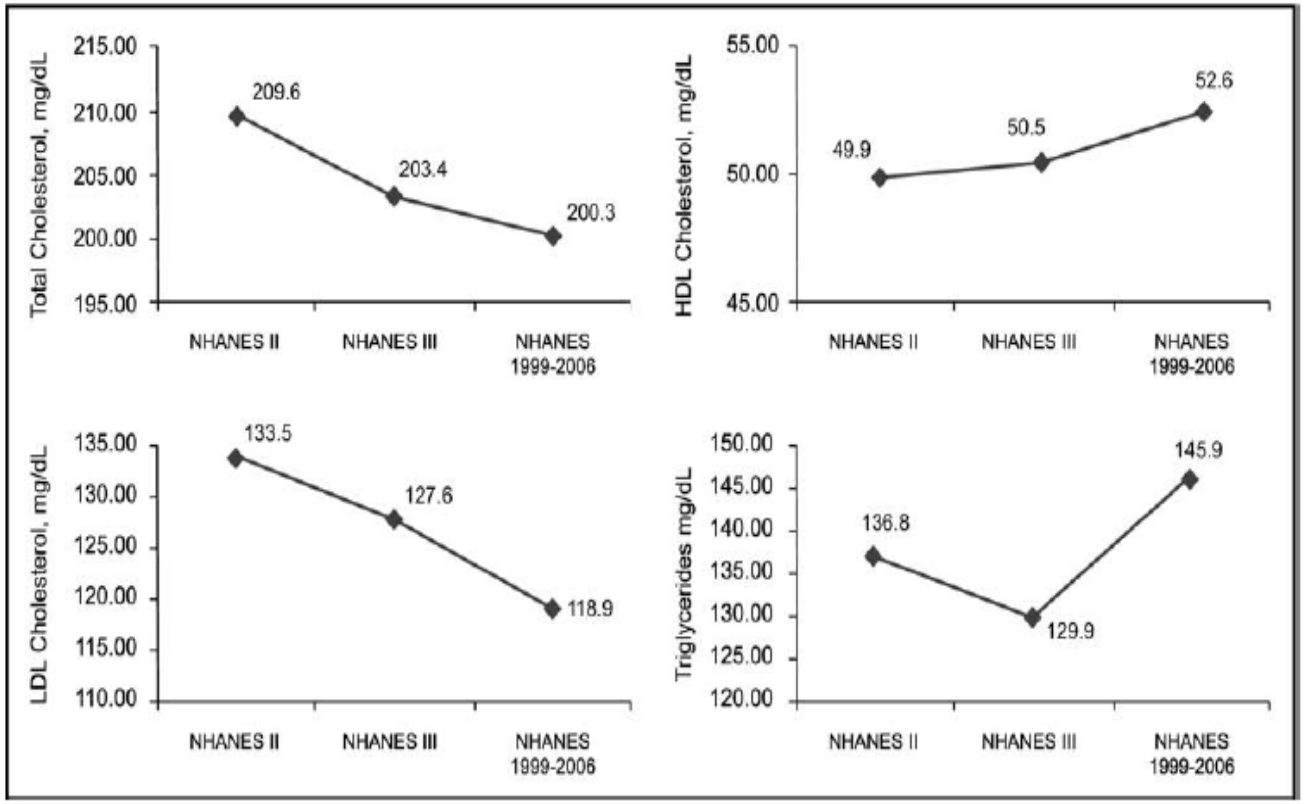


Figure 1. Trends in mean TC and individual lipid fractions of respondents 20 to 74 years old for the NHANES II, NHANES III, and NHANES 1999 to 2006. All estimates are weighted to the United States population using oral glucose tolerance test final examined weights. All estimates are age adjusted to the 2000 standard United States population using the direct method (groups 20 to 39, 40 to 59, and 60 to 74 years of age).

Cohen JD. et al. Am J Cardiol 2010;106:969–975

Summary

- Dyslipidemia is very common in Thai population and it increases with age.
- Trends in prevalence of hypercholesterolemia increase.
- The most common dyslipidemia is low HDL-C in women and high TG in men
- High LDL-C is more common in those living in urban areas.
- Low HDL-C and high TG was more prevalence in rural areas and the northeastern.
- The urban/rural difference is likely to be related to dietary pattern, but need further investigation.

Summary

- Compared to other populations, Thai population have a relatively higher prevalence of low HDL-C and high triglyceride.
- If the international cut-off points for dyslipidemia, eg. HDL/LDL is appropriate for Thais.
- Factors related to low HDL-C and high triglyceride might be due to the lifestyle including diet, alcohol drinking, smoking and physical activity.
- High proportion of population not on LDL-C target, especially those with high risk stratum.

Summary

- Socioeconomic status and education might also play role in the difference.
- More research is needed for looking into the causes.
- Guideline for Mx of dyslipidemia, definition for Thais.
- Intervention program to promote healthy lifestyle and strengthen the screening, treatment and control need to be scaled up.

ขอบคุณครับ