

*Reality & problems of Vietnam:  
Hypertension & Heart disease;  
We do this*

**Prof. Pham Gia Khai**

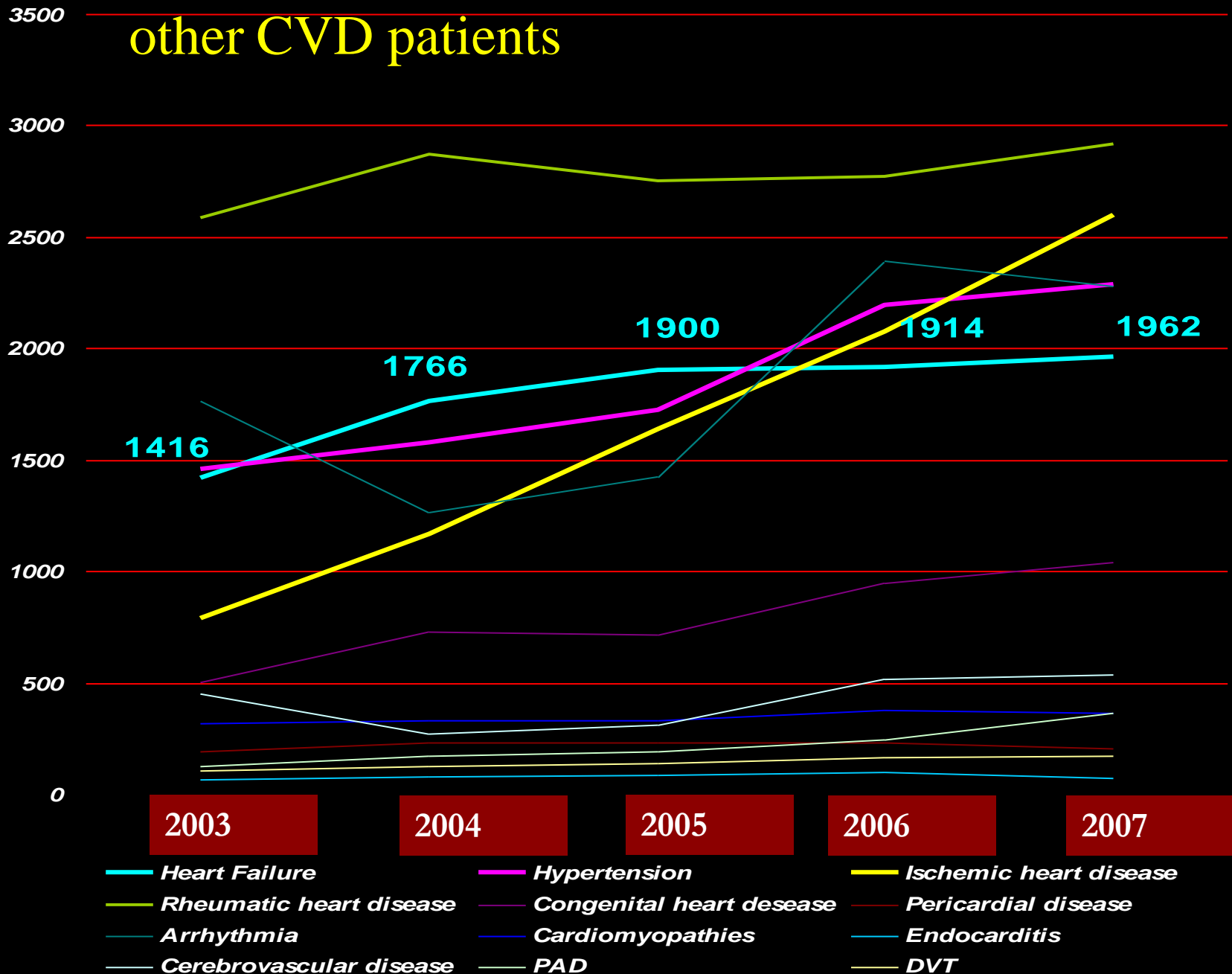
**VNHA**

**FACC, FESC, FsACC**

## *Evolution of CVD patterns at VNHI*

- Gradual changes of CVD patterns at VNHI :
  - Infection related CVD still prevalent, but High Blood pressure & allied affections are increasing.
  
- Diagnostic & therapeutic approach should be adapted to new CVD patterns : 3 arms have been considered & applied nationwide :
  - Medical
    - Interventional
    - Surgical

# Trends of absolute numbers of heart failure and other CVD patients

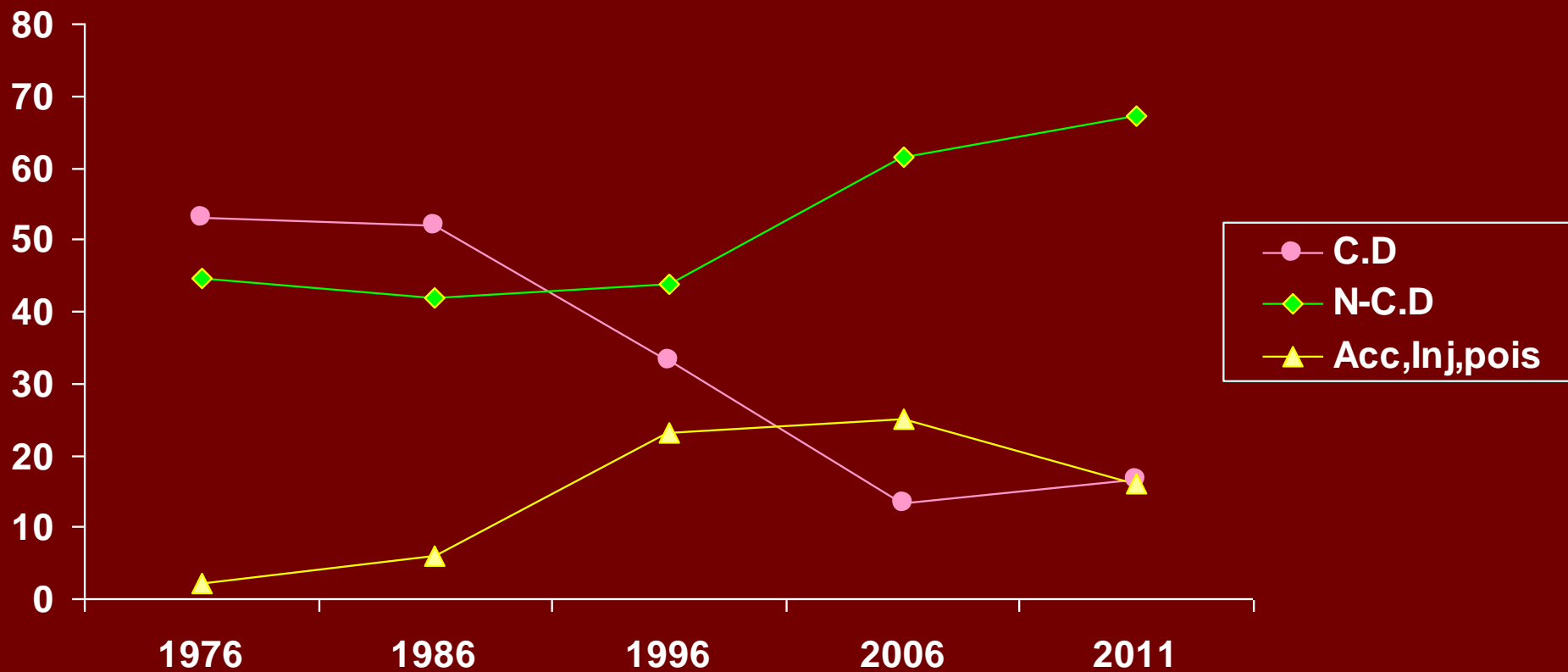


# *Whole country*

## *Health statistics Yearbook*

### *VN MOH*

**TREND OF MORTALITY BY CATEGORY**  
(%)

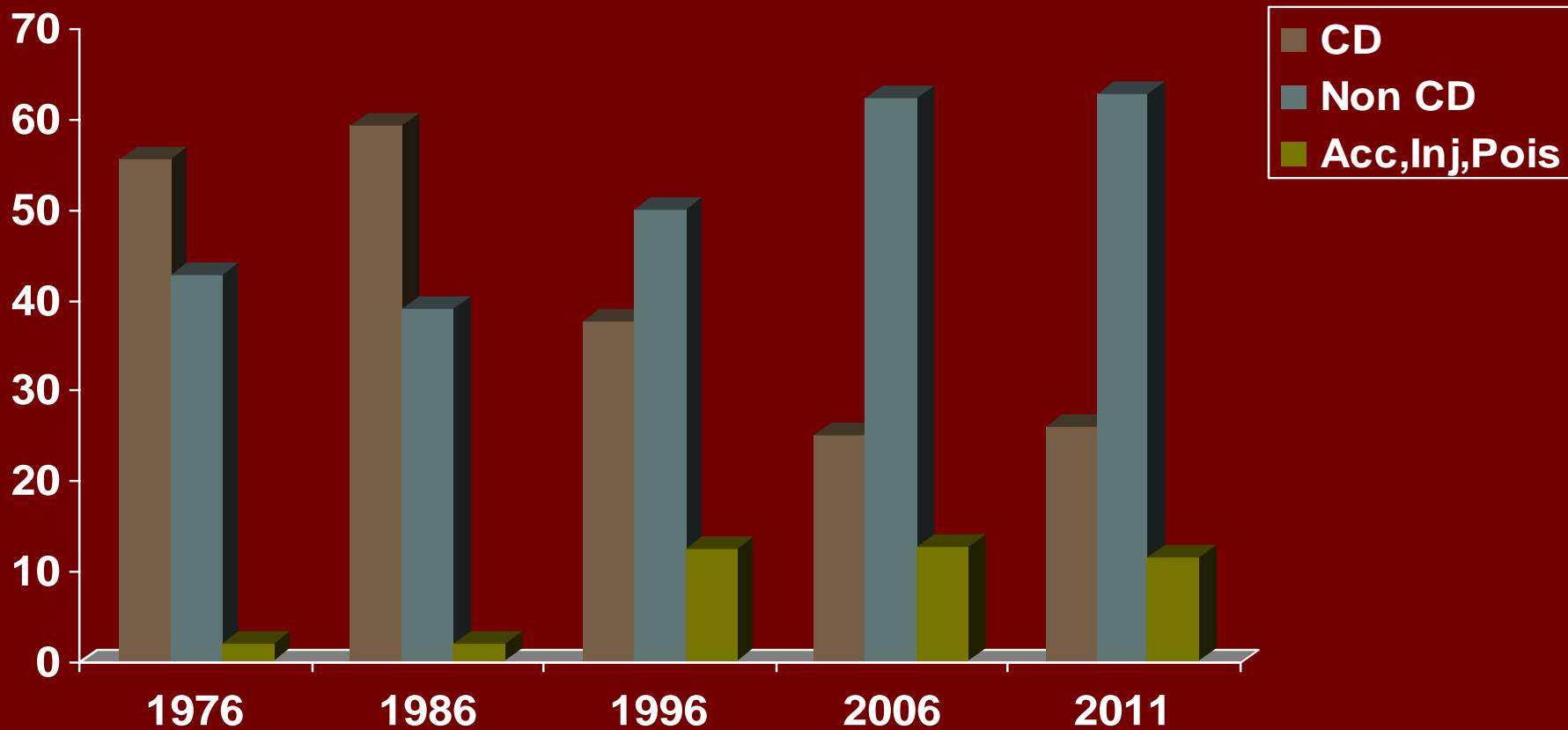


# *Whole country*

## *Health statistics Yearbook*

### *VN MOH*

#### TREND OF MORBIDITY BY CATEGORY (%)



- New trend in morbidity & mortality since last decades : *Increased NCD vs decreased CD*

as shown by hospital – based statistics

(1976-2011)

- *Hypertension (essential or primary) comes 3<sup>rd</sup> among the 10 most encountered diseases nationwide*

Code report 145; Disease report **317.6/100,000;**

- *Hospital based statistics of **Hypertension** according to geographic locations :*
  - ***Red River delta : 209.23/100,000, 5<sup>th</sup> rank***
  - ***Northern midland & mountain areas :***
    - 242.46/100,000, 6<sup>th</sup> rank***
  - ***North central & central coastal areas :***
    - 287.20/100,000, 5<sup>th</sup> rank***
  - ***Central Highlands: 184.17/100,000, 10<sup>th</sup> rank***

- *South-Eastern lowland area :*

**448.03/100,000**      *1<sup>st</sup> rank*

- *Mekong River delta :*

**534.06/100,000**      *1<sup>st</sup> rank*



- *As related to leading causes of mortality, Hypertension has not been registered as a cause by itself in most statistics, target organs have been :*

*Whole country*

- **Intracerebral haemorrhage : 6<sup>th</sup> rank**  
**0.74/100,000**
- **Acute myocardial infarction : 7<sup>th</sup> rank**  
**0.69/100,000**

■ *Red River delta :*

- *Acute myocardial infarction :* *3<sup>rd</sup> rank*

**0.31/100,000**

- *Intracerebral haemorrhage :* *6<sup>th</sup> rank*

**0.19/100,000**

- *Stroke, not specified as haemorrhage or infarction :*

**0.09/100,000** *10<sup>th</sup> rank*

■ *Northern midland & mountain areas :*

- *Intracerebral haemorrhage :* 6<sup>th</sup> rank

**0.49/100,000**

- *Stroke, not specified as haemorrhage or infarction :*

**0.45/100,000** 9<sup>th</sup> rank

- *Acute myocardial infarction :* 10<sup>th</sup> rank

**0.41/100,000**

■ *North central and central coastal areas :*

■ - *Intracerebral haemorrhage :* 7<sup>th</sup> rank

**0.82/100,000**

■ - *Essential (primary) Hypertension :* 9<sup>th</sup> rank

**0.59/100,000**

■ **Central Highlands :**

*Intracerebral haemorrhage :* 3<sup>rd</sup> rank  
**2.40/100,000**

- *Acute myocardial infarction :* 7<sup>th</sup> rank  
**1.01/100,000**

■ **South-Eastern lowlands :**

- *Acute myocardial infarction :* 7<sup>th</sup> rank  
**1.37/100,000**

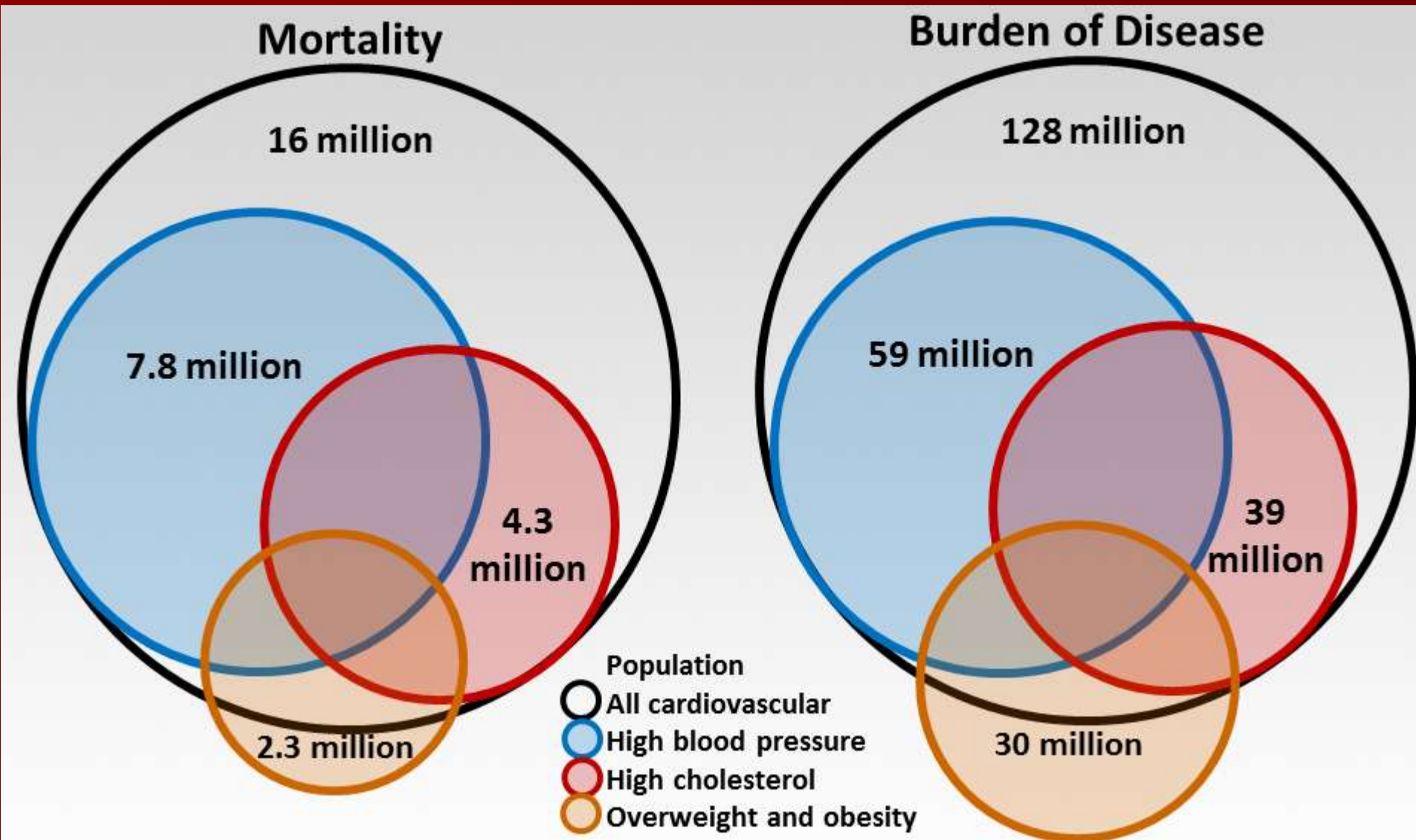
- *Intracerebral haemorrhage :* 10<sup>th</sup> rank  
**1.23/100,000**

■ **Mekong River delta :**

- *Acute myocardial infarction :* 7<sup>th</sup> rank  
**0.88/100,000**

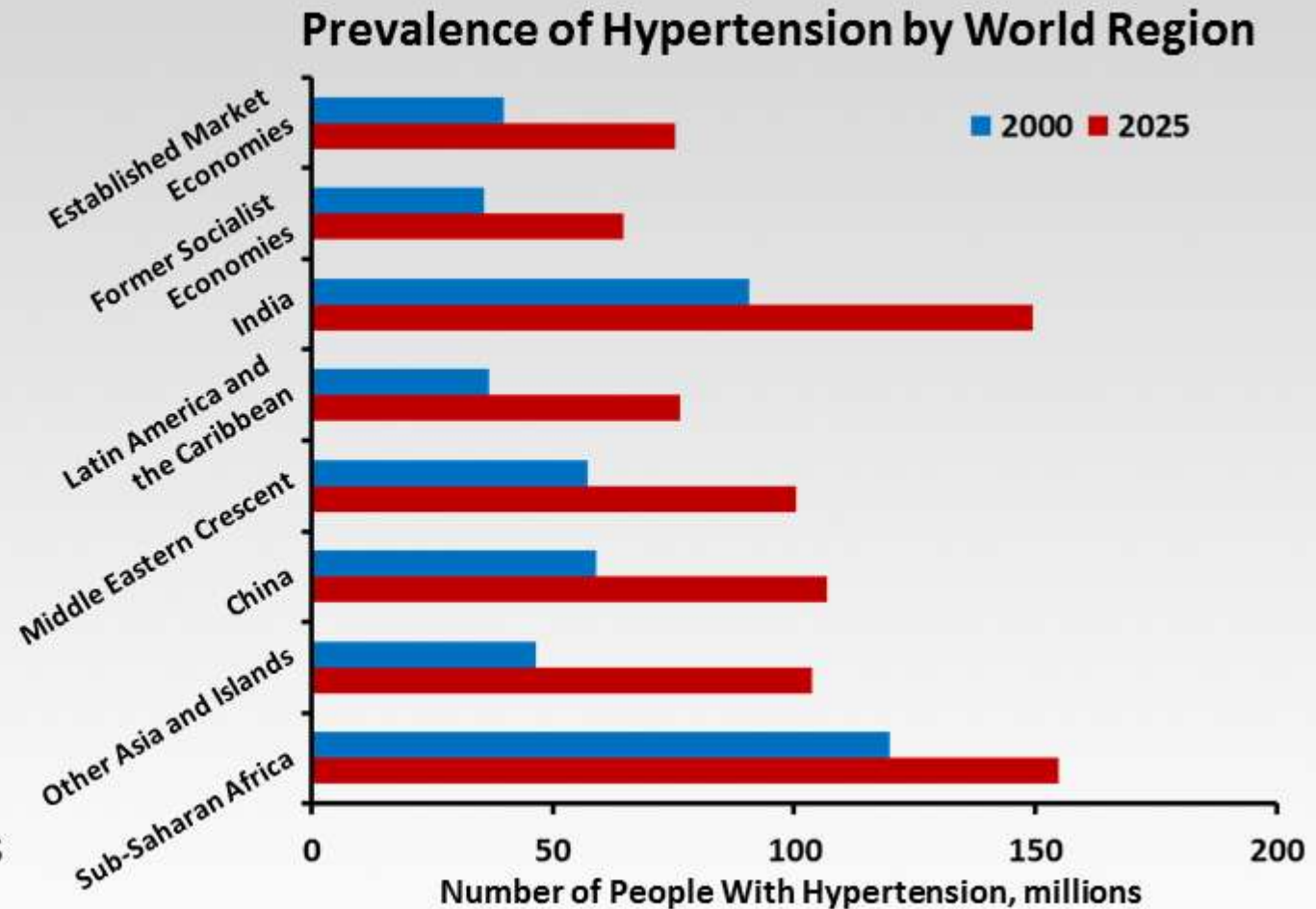
*Epidemiology of hypertension and  
cardiovascular disease risk factors  
in Vietnam (2000-2010)*

# Global Mortality and Burden of CVD

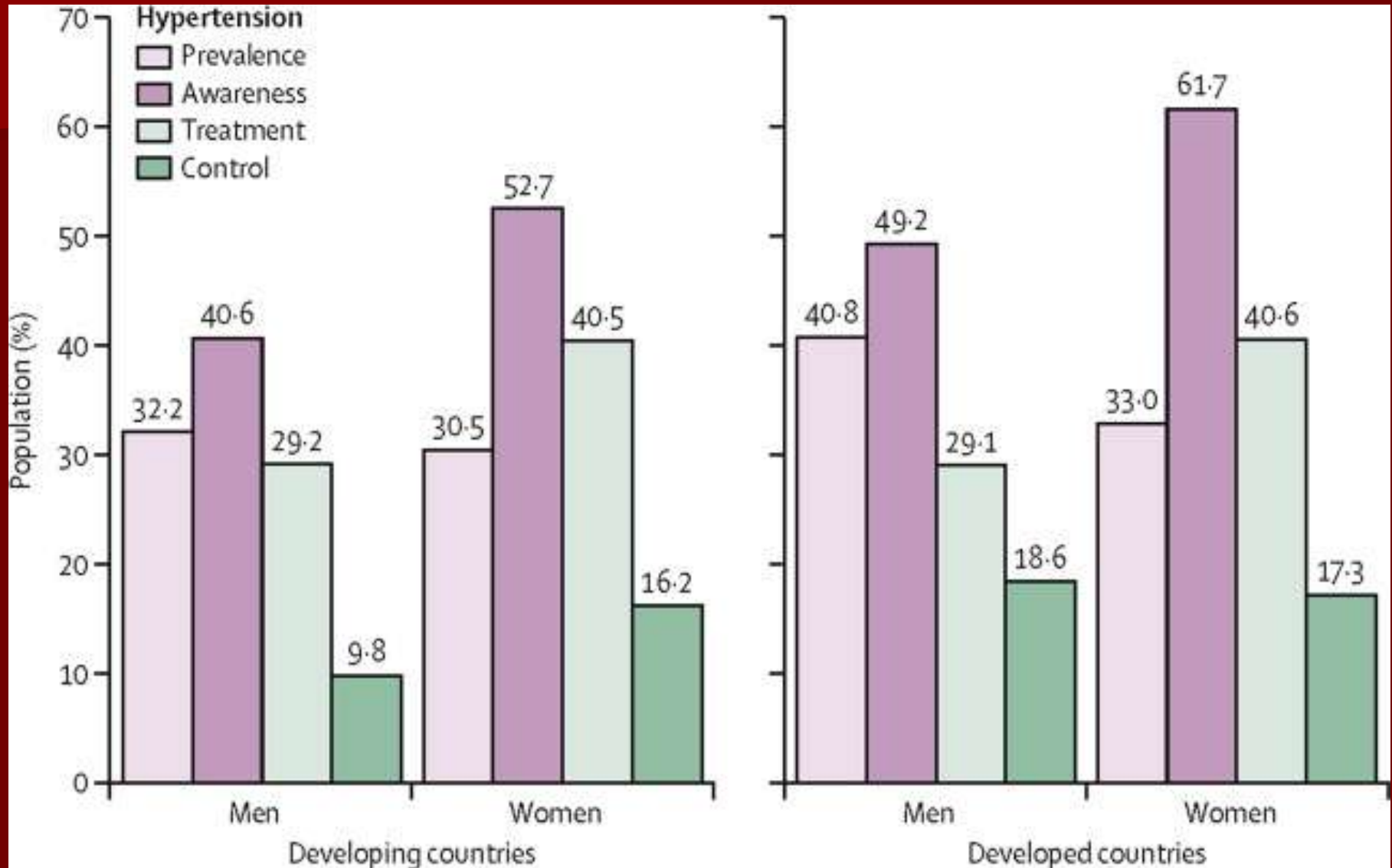


# Worldwide Prevalence of Hypertension is increasing

- In 2000, 972 million (26%) of the adult population had hypertension
- By 2025, 1.56 billion (29%) are projected to have hypertension
- Most of the expected increase will be in economically developing regions

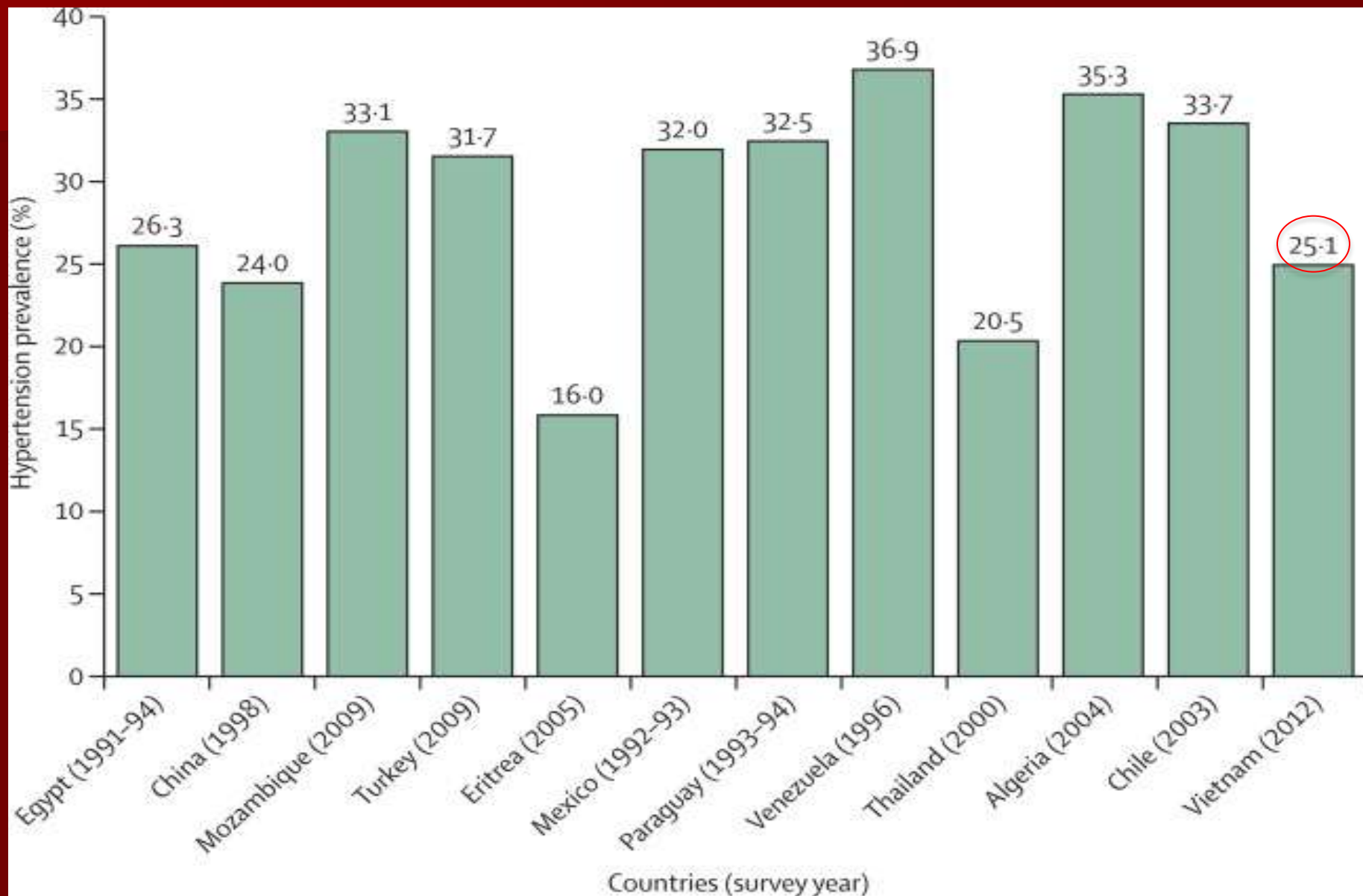


# Hypertension management over the world





# Hypertension in developing countries



# Survey Settings



1. Hanoi (city)
2. Thai-Binh (lowland)
3. Thai-Nguyen (highland)
4. Nghe-An (costal)
5. Khanh-Hoa (costal)
6. Dac-Lac (highland)
7. Dong-Thap (lowland)
8. Ho-Chi-Minh City (city)

No	Population-based cross-sectional surveys	Sample size, area and time
1	<b>NESH</b> - National epidemiological survey on hypertension and its risk factors in Vietnam	9,832 people in 8 provinces 2001-2008
2	<b>HF-S</b> - Survey on heart failure and its risk factors in northern provinces of Vietnam	4,840 people in 4 provinces 2003-2004
3	<b>DM-S</b> - Survey on diabetes and its risk factors in northern provinces of Vietnam	2,306 people in 2 provinces 2008-2009
4	<b>NCDS</b> - Survey on non-communicable disease risk factors in FilaBavi	2,362 people in 1 provinces 2005
5	<b>HMPS</b> - Surveys of Hypertension management programme in rural communes	5,855 people in 2 provinces 2004-2009

National settings for epidemiological surveys

# Sampling Strategy

**Target population:** non-pregnant adults aged 25-74 years

**Total of 9,832 people**

No	Surveys	Sampling strategy of original population cross-sectional surveys
1	NESH (2001-2008)	<ul style="list-style-type: none"><li>- Multi-stage sampling strategy: 110 random people per commune, 3 random communes per district, 4 random districts per province.</li><li>- Calculated sample size of 1,200 people per province.</li><li>- 8 provinces: HN, TB, NA, TN, KH, DL, DT and HC.</li><li>- <i>Extracted for meta-analysis: 9,403 people (59.2% in rural area)</i></li></ul>
2	HF-S (2003-2004)	<ul style="list-style-type: none"><li>- Multi-stage: similar to NESH in 4 provinces: HN, NA, TB and TN.</li><li>- <i>Extracted for meta-analysis: 4,494 people (59.0% in rural area)</i></li></ul>
3	DM-S (2008-209)	<ul style="list-style-type: none"><li>- Multi-stage: similar to NESH in 2 provinces: HN and TB.</li><li>- <i>Extracted for meta-analysis: 2,098 people (43.1% in rural area)</i></li></ul>
4	NCDS (2005)	<ul style="list-style-type: none"><li>- Stratified random sampling: 250 random people in each sex and 10-year age group using FilaBavi sampling frame in 1 province: HT.</li><li>- <i>Extracted for meta-analysis: 2,357 people (100% in rural area)</i></li></ul>
5	HMPS (2004-2009)	<ul style="list-style-type: none"><li>- Simple random selection: 1,200 random people from the entire list of inhabitants in studied areas in 2 provinces: HN and HT.</li><li>- <i>Extracted for meta-analysis: 5,210 people (89.0% in rural area)</i></li></ul>

# CVD Risk Factors Assessments

## Mortality

16 million

7.8 million

4.3 million

2.3 million

## Burden of Disease

128 million

59 million

39 million

30 million

- Population
- All cardiovascular
  - High blood pressure
  - High cholesterol
  - Overweight and obesity

# Physical Measurements



*Anthropometric measurements* (height, weight, waist and hip circumference) were performed at least twice while participants wear light clothing, no footwear.

# Physical Measurements

*Blood pressure* was measured at least twice in a resting, sitting position using an automatic digital or mercury sphygmomanometer with an appropriate sized cuff. Third measurement was required if the difference between first two measurements  $\geq 10$  mmHg.



# Roles of cardiovascular disease risk factors

Major cardiovascular disease risk factors	Population-attributable risk	
	Acute myocardial infarction	Stroke (thrombotic or haemorrhagic)
Hypertension	17.9 (15.7-20.4)	34.6 (30.4-39.1)*
Current smoking	35.7 (32.5-39.1)	18.9 (15.3-23.1)*
Apo-lipoprotein B/A1 ratio	49.2 (43.8-54.5)	24.9 (15.7-37.1)
Diabetes	9.9 (8.5-11.5)	5.0 (2.6-9.5)
Abdominal obesity (WHR)	20.1 (15.3-26.0)	26.5 (18.8-36.0)*
Lack of vegetables/fruits diet	13.7 (9.9-18.6)	18.8 (11.2-29.7)*
No regular physical activity	12.2 (5.5-25.1)	28.5 (14.5-48.5)
Alcohol intake	6.7 (2.0-20.2)	3.8 (0.9-14.4)*
Psychosocial stress	32.5 (25.1-40.8)	9.8 (4.8-19.4)
Cardiac causes	-	6.7 (4.8-9.1)
<b>All combined</b>	<b>90.4 (88.1-92.4)</b>	<b>88.1 (82.3-92.2)</b>

# Survey Settings



1. Hanoi (city)
2. Thai-Binh (lowland)

National settings for epidemiological sur

No	Population-based cross-sectional surveys	Sample size, area and time
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4	NCDS - Survey on non-communicable disease risk factors in FilaBavi	2,362 people in 1 provinces 2005
5	HIMPS - Surveys of Hypertension management programme in rural communes	5,855 people in 2 provinces 2004-2009



# Sampling Strategy

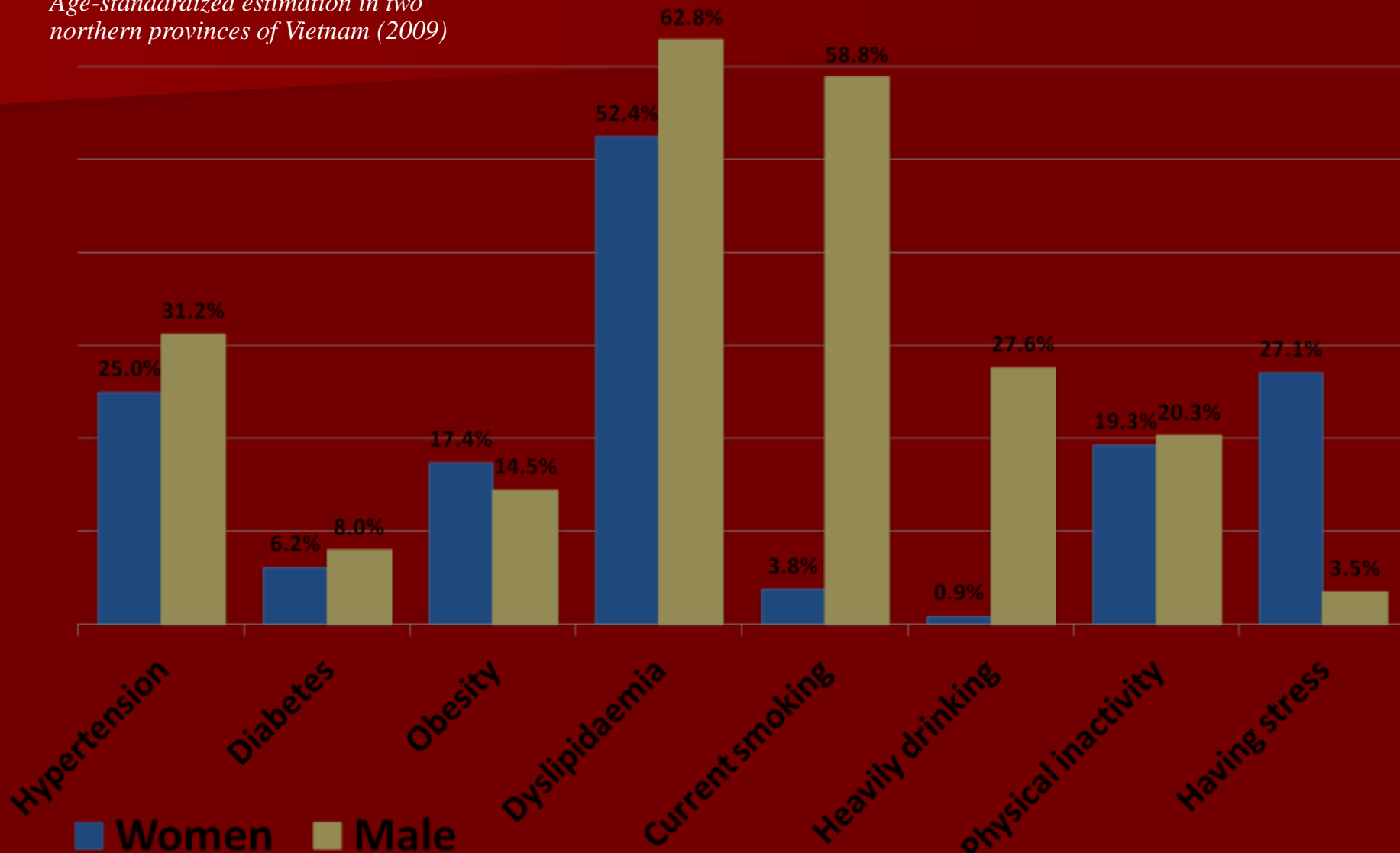
**Target population:** non-pregnant adults aged 25-74 years

**Total of 2,130 people**

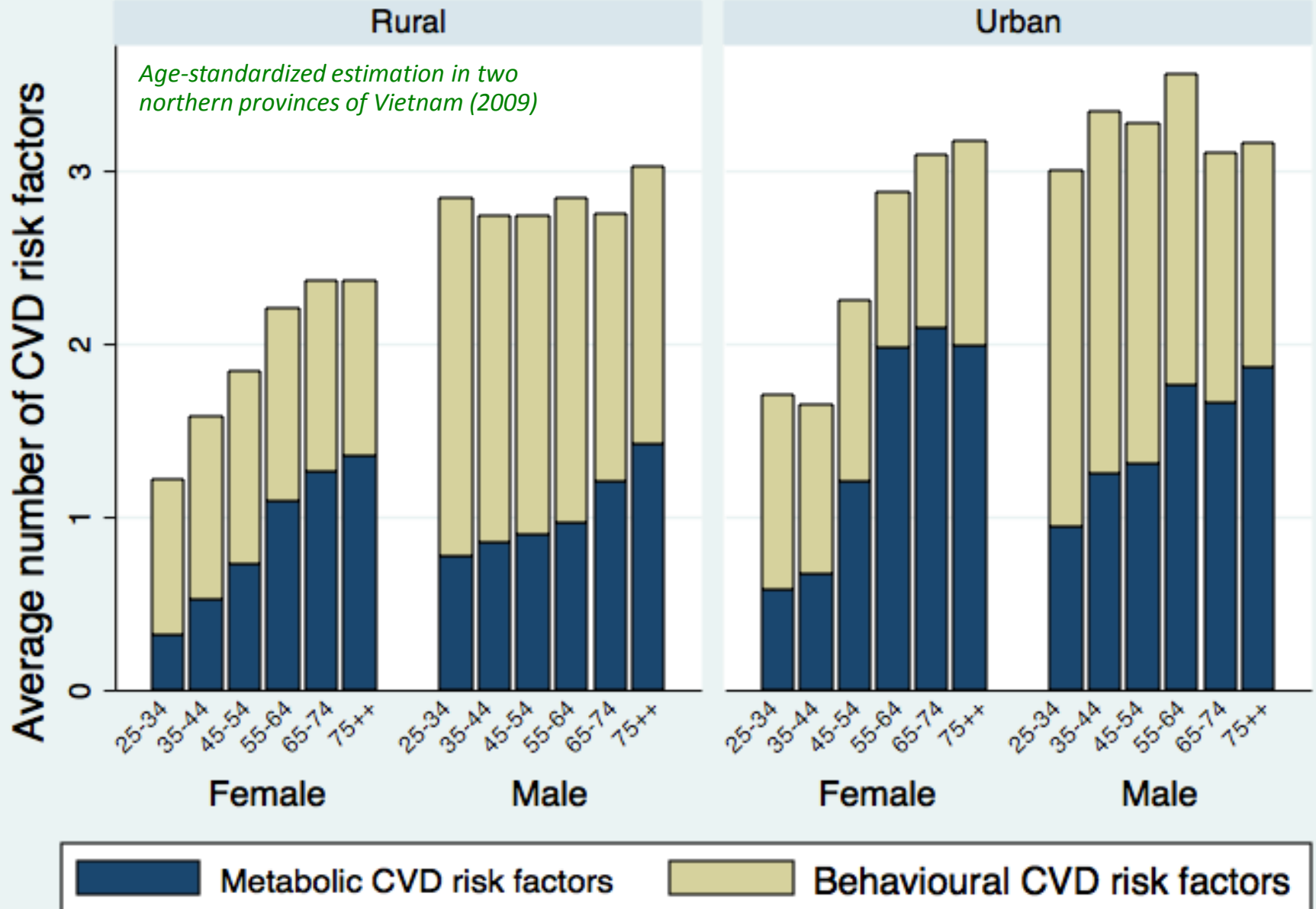
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3	<b>DM-S (2008-2009)</b>	<ul style="list-style-type: none"><li>- Multi-stage: similar to NESH in 2 provinces: HN and TB.</li><li>- <i>Extracted for meta-analysis: 2,098 people (43.1% in rural area)</i></li></ul>
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# Prevalence of major CVDRFs in adults

Age-standardized estimation in two northern provinces of Vietnam (2009)

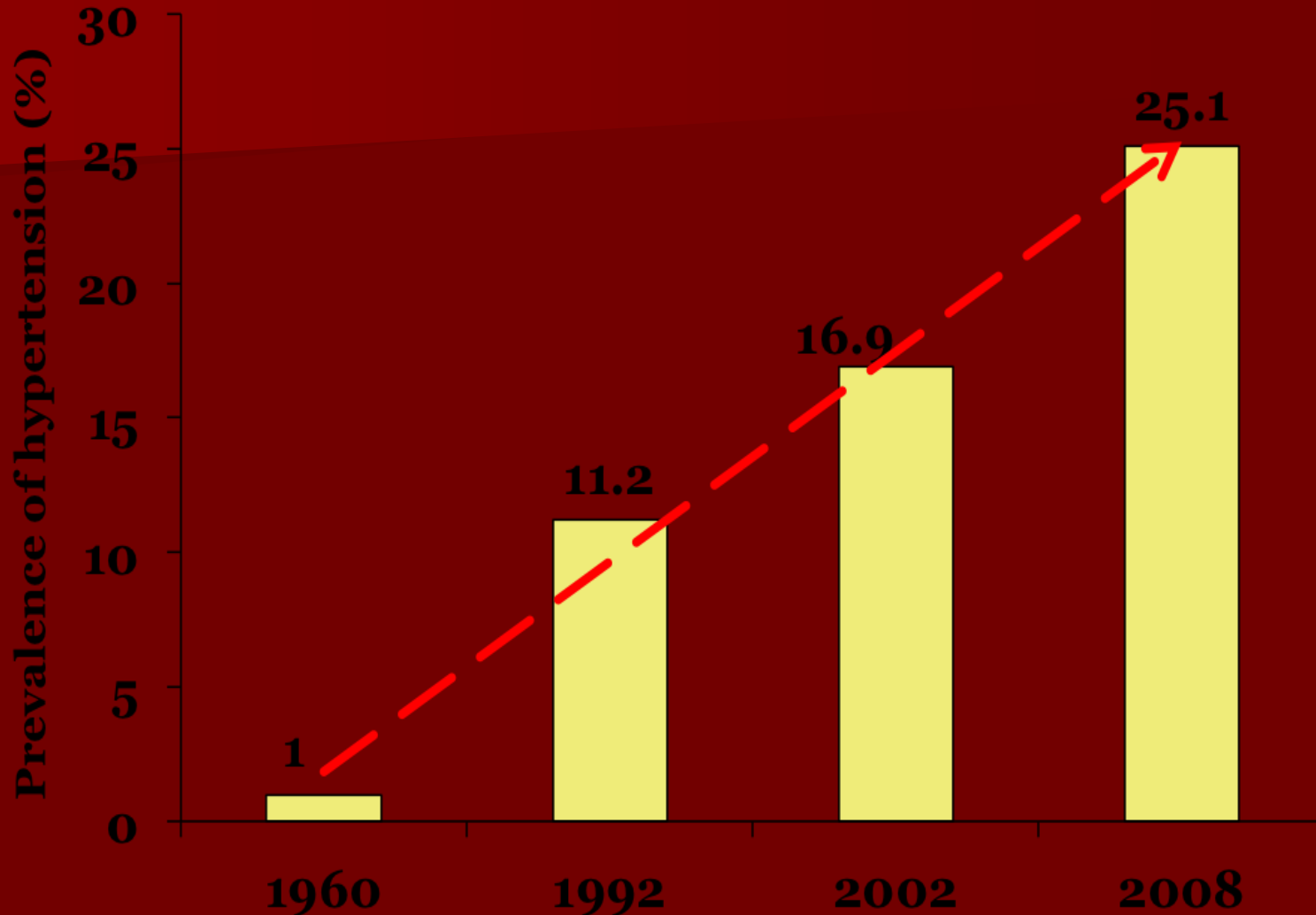


# Clusters of CVDRFs in adult population



*How is the progression of  
cardiovascular disease risk factors  
in Vietnam from 2000 to 2010?*

# Trends of hypertension in Vietnam



- 1960: Dang Van Chung et al.: Hypertension among adult population in Northern Vietnam.
- 1992: Tran Do Trinh et al.: Hypertension among Vietnamese people aged 18 years and over.
- 2002: Truong Viet Dung et al.: Hypertension among Vietnamese adults aged 25 to 64 years old. National Health Survey 2001 – 2002.
- 2008: Our survey.: Hypertension and its risk factors among Vietnamese adults aged 25 years and over.

# Materials & Methods

- *Individual participant-level meta-analysis* on the collated dataset of total 23,563 non-pregnant adults aged 25-74 years from five epidemiological population-based cross-sectional surveys with similar designs and protocols from 2001 to 2009.
- All studies used the same WHO-STEPS standardized protocol and were carried out by the Vietnam National Heart Institute with involved partners to identify the burden of CVDRFs in adult population of Vietnam.

# Survey Settings



1. Hanoi (city)
2. Thai-Binh (lowland)
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# Sampling Strategy

*Target population:* non-pregnant adults aged 25-74 years

**Total of 23,564 people**

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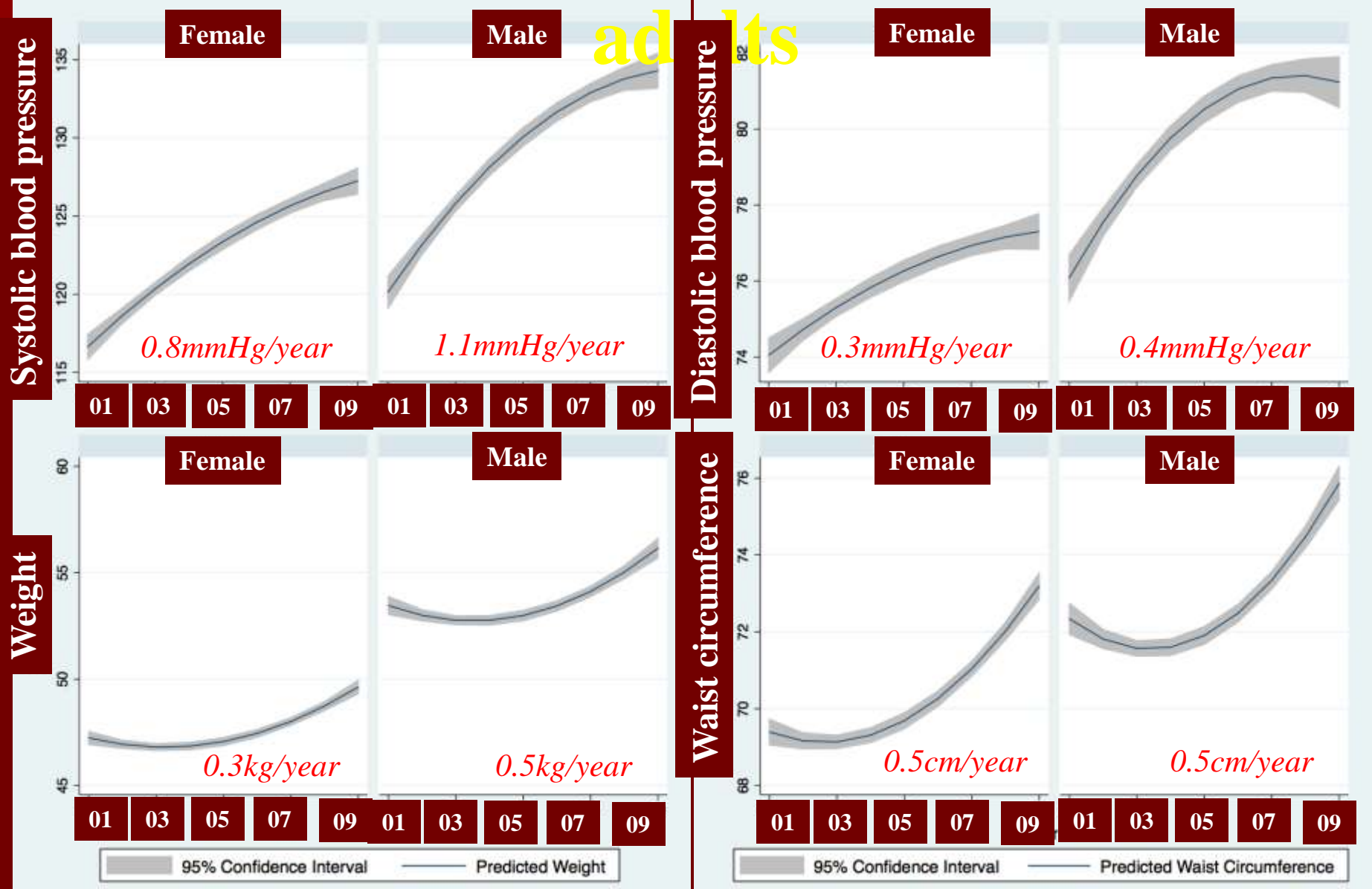
# Main findings

Year	Surveys	n	Rural area			Urban area		
			Women	Men	Total	Women	Men	Total
<b>2001</b>	NESH	<b>2,386</b>	667	426	<b>1,093</b>	843	450	<b>1,293</b>
<b>2002</b>	NESH	<b>2,594</b>	1,187	809	<b>1,996</b>	345	253	<b>598</b>
<b>2003</b>	NESH, HF-S	<b>4,342</b>	1,401	1,111	<b>2,512</b>	1,109	721	<b>1,830</b>
<b>2004</b>	HF-S, HMP	<b>3,316</b>	525	364	<b>889</b>	1,457	970	<b>2,427</b>
<b>2005</b>	NCDF	<b>2,357</b>	1,221	1,136	<b>2,357</b>	-	-	<b>-</b>
<b>2006</b>	NESH, HMP	<b>2,160</b>	1,132	791	<b>1,923</b>	147	90	<b>237</b>
<b>2007</b>	NESH, HMP	<b>2,115</b>	1,093	738	<b>1,831</b>	174	110	<b>284</b>
<b>2008</b>	NESH, DM-S	<b>2,058</b>	-	-	<b>-</b>	1,406	652	<b>2,058</b>
<b>2009</b>	DM-S, HMP	<b>2,234</b>	1,229	717	<b>1,946</b>	187	101	<b>288</b>

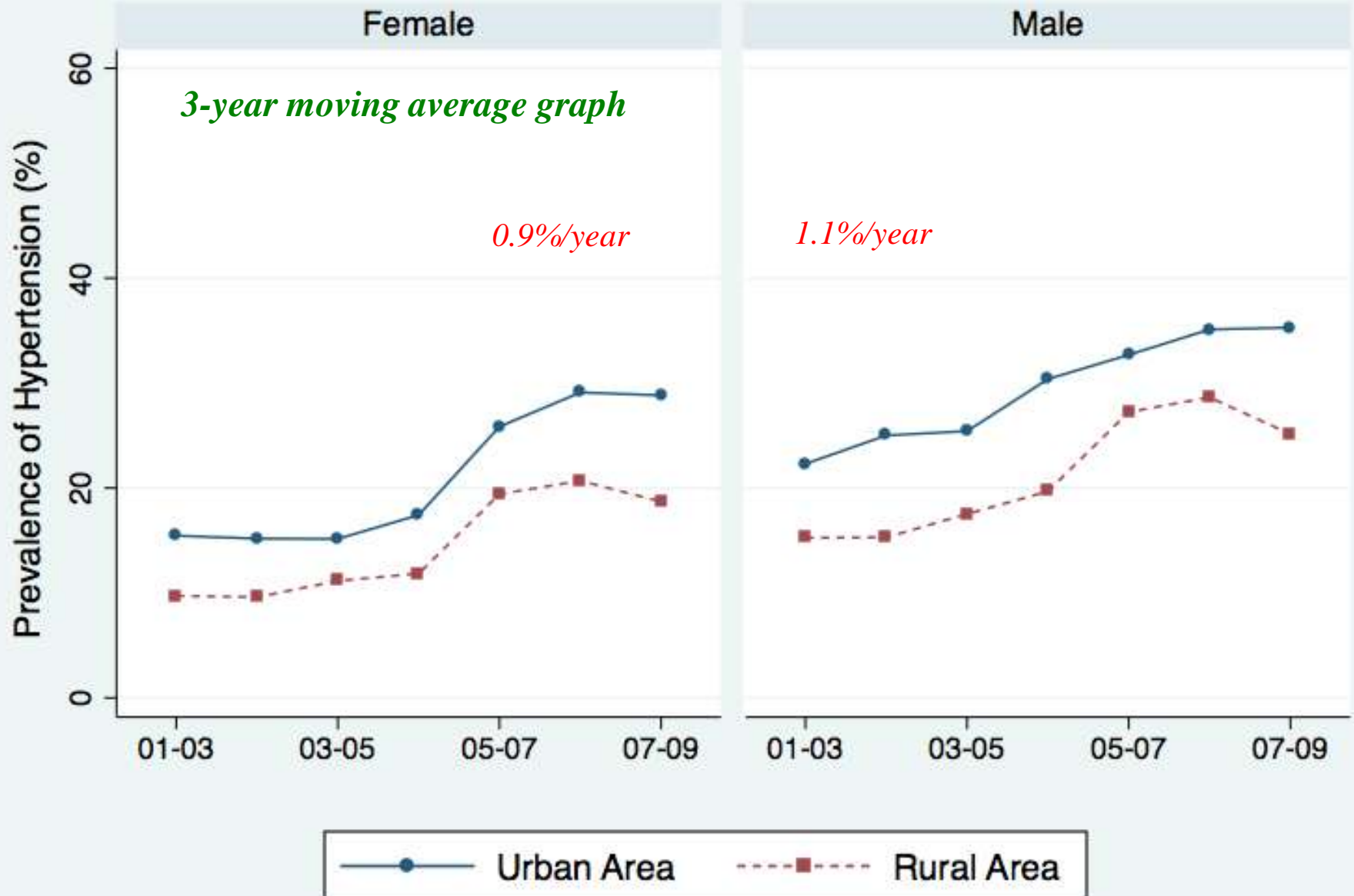
# Blood pressure and body size changes from 2001-2009 in Vietnamese adults

Annual changes during 2001-2009 (95%CI)	Rural area		Urban area	
	Women	Men	Women	Men
<b>Mean systolic BP (mmHg)</b>	0.7 (0.5-0.9)	1.0 (0.8-1.3)	0.9 (0.6-1.1)	1.1 (0.8-1.5)
<b>Mean diastolic BP (mmHg)</b>	0.4 (0.3-0.5)	0.6 (0.4-0.7)	0.2 (0.1-0.3)	0.3 (0.1-0.5)
<b>Mean weight (kg)</b>	0.3 (0.3-0.4)	0.6 (0.5-0.7)	0.2 (0.1-0.3)	0.4 (0.3-0.6)
<b>Mean waist circumference (cm)</b>	0.6 (0.5-0.7)	0.6 (0.5-0.7)	0.3 (0.2-0.4)	0.4 (0.2-0.5)
<b>Mean body mass index (kg/cm<sup>2</sup>)</b>	0.09 (0.06-0.12)	0.18 (0.15-0.22)	0.06 (0.02-0.1)	0.13 (0.08-0.17)

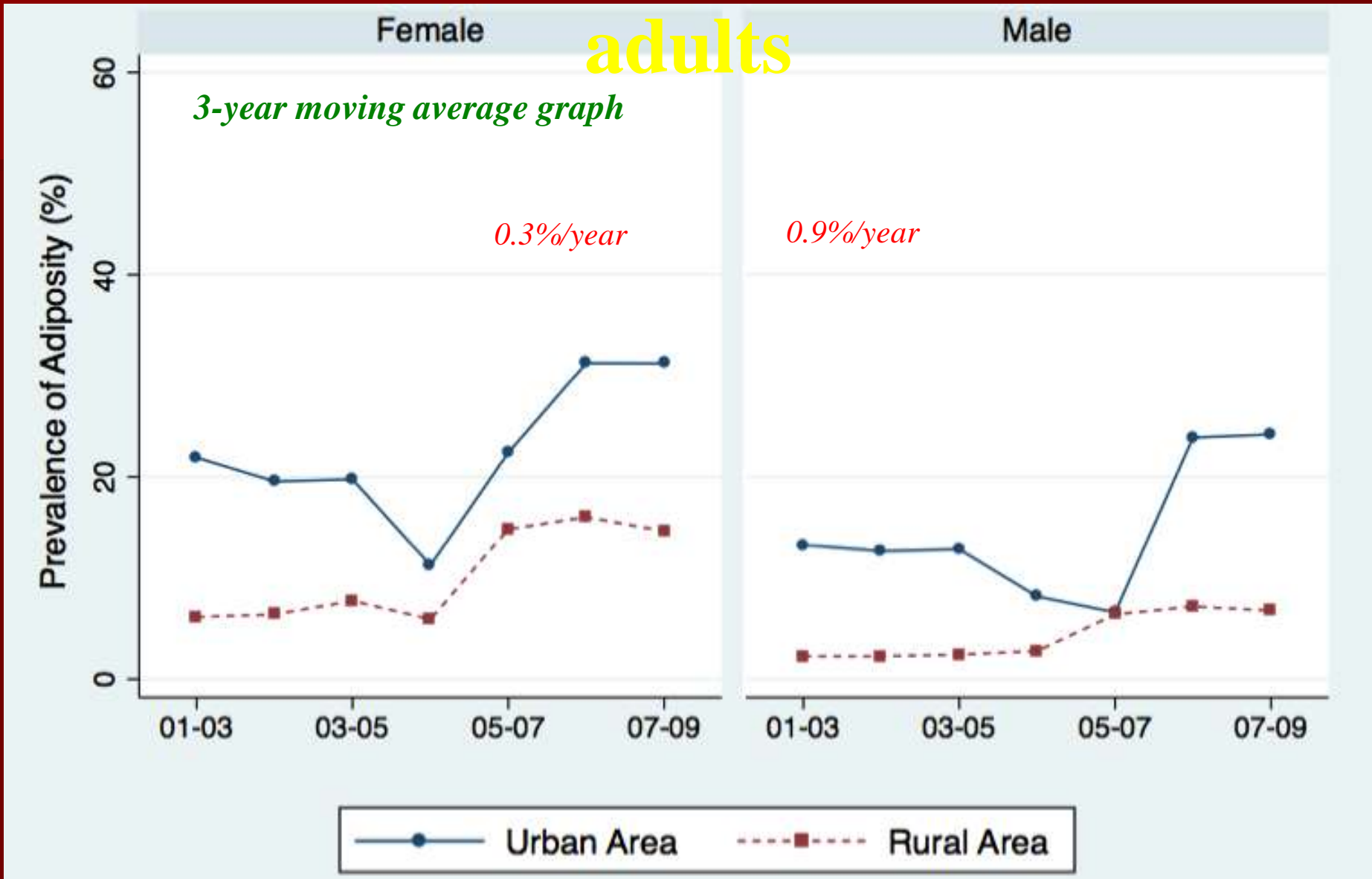
# Time trends of major CVDREs in adults



# Time trends of major CVDRFs in



# Time trends of major CVDRFs in adults



# Time trends of major CVDRFs in adults

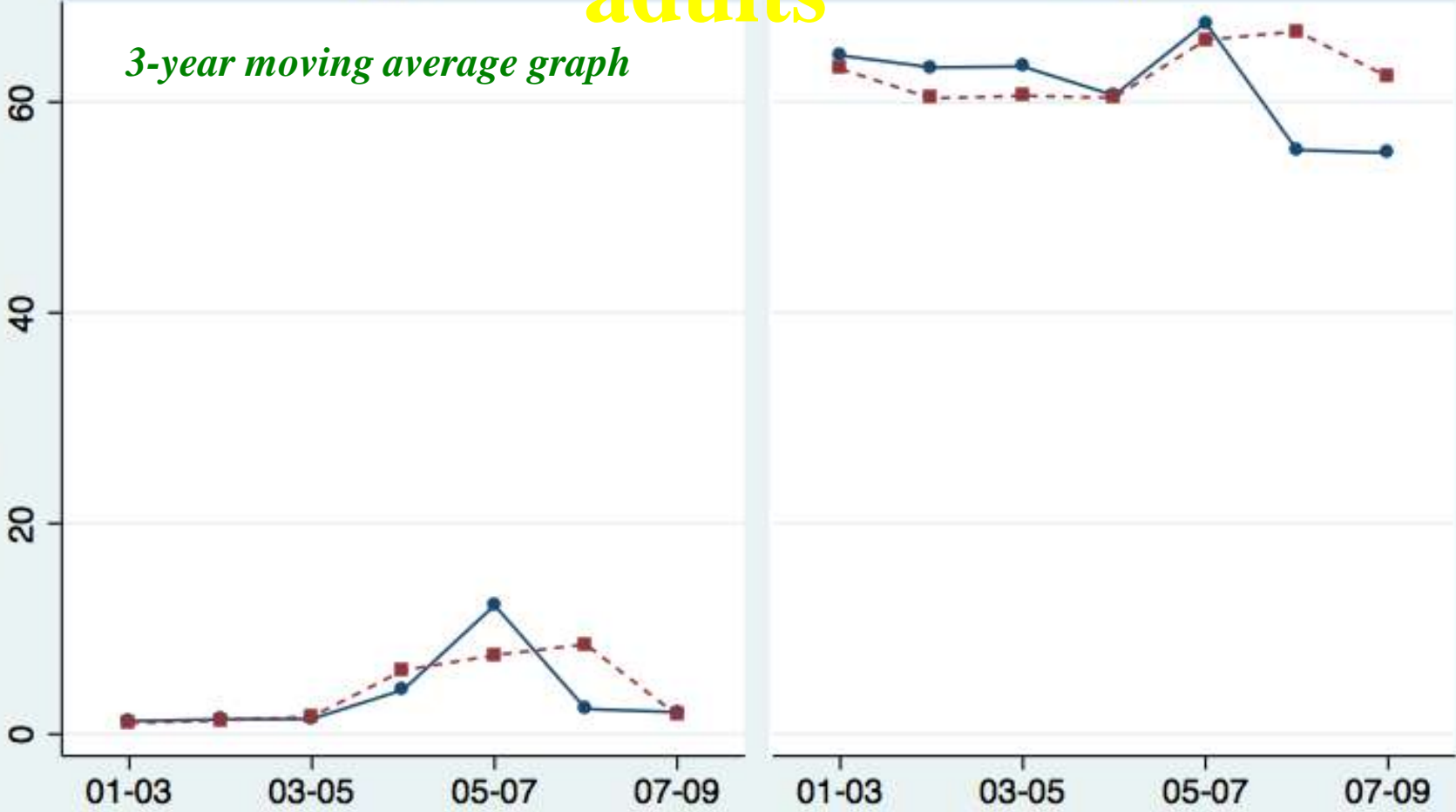
Female

adults

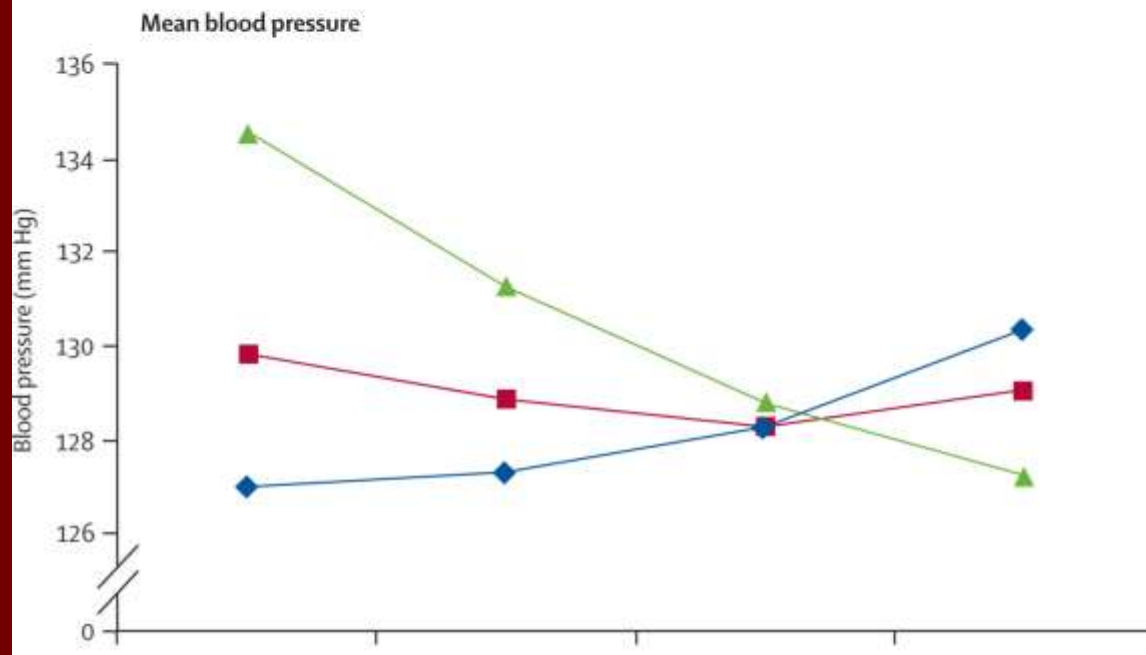
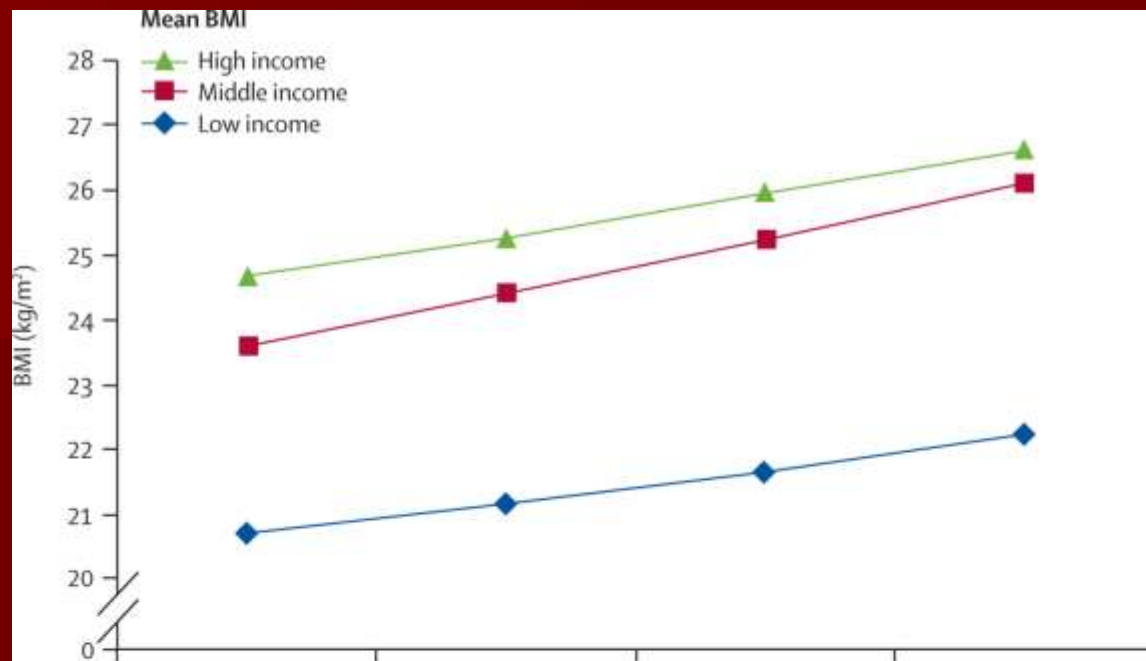
Male

*3-year moving average graph*

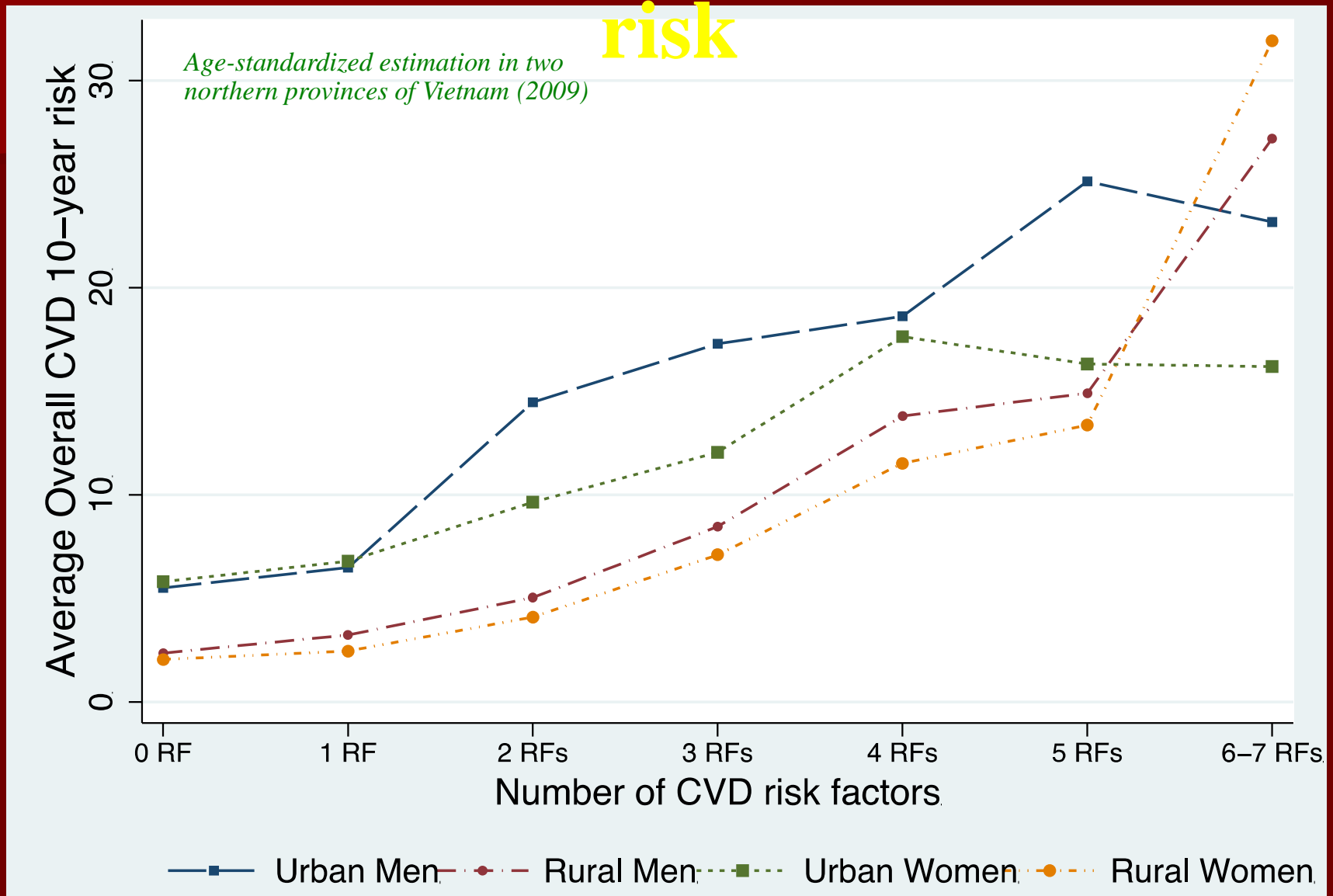
Prevalence of Smoking (%)



# Global time trends in CVDRFs



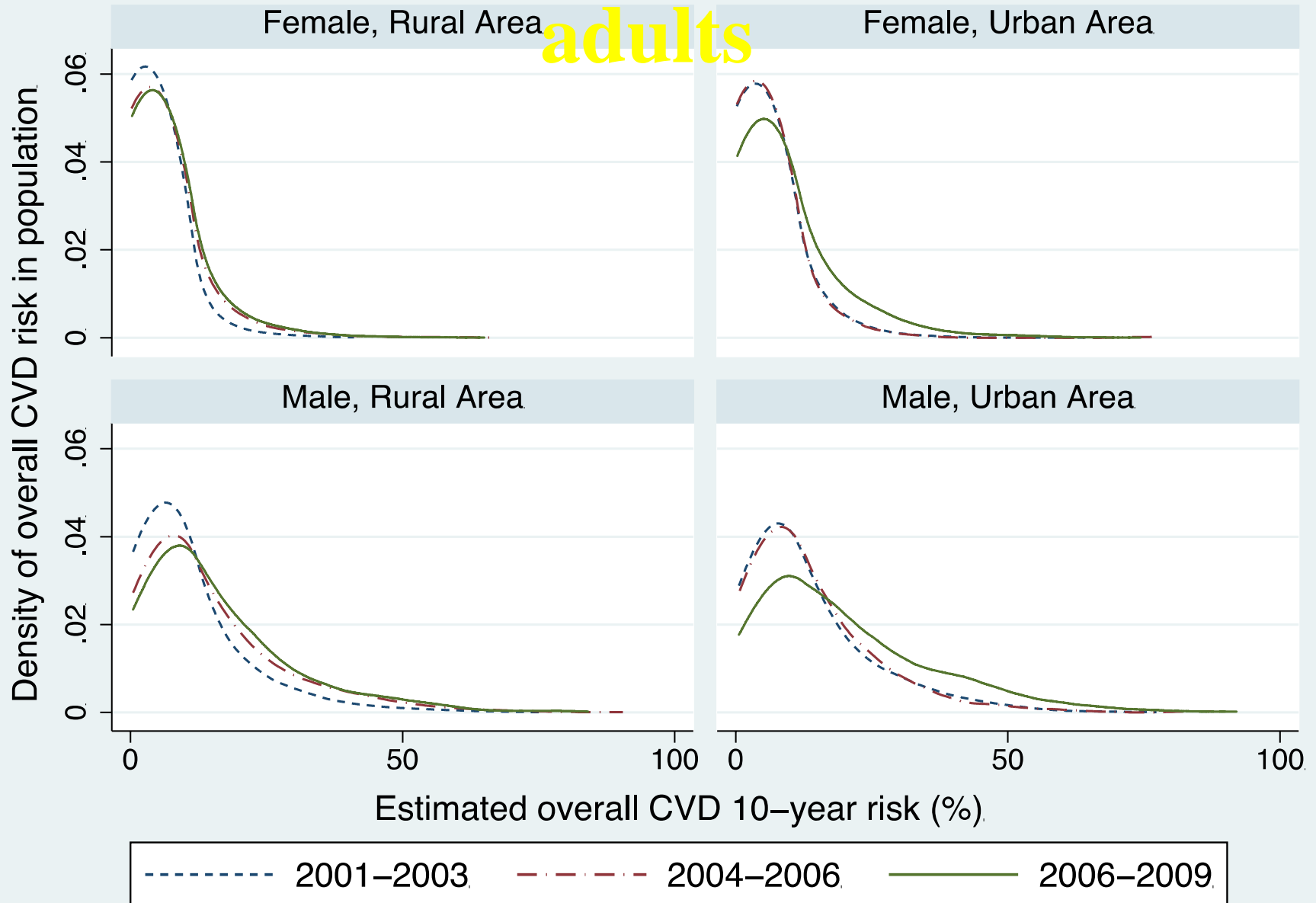
# Number of CVDRFs vs. Overall CVD risk



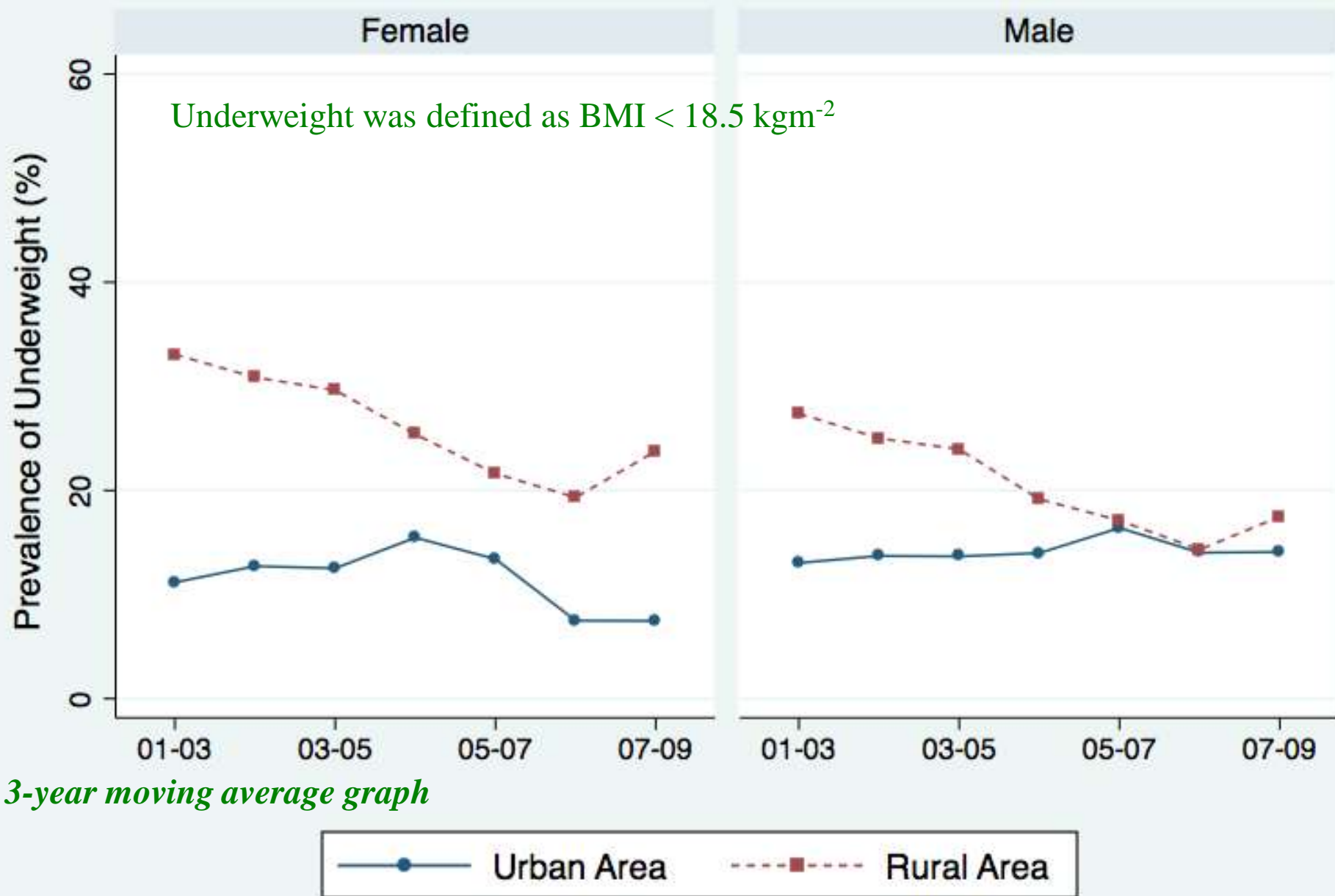


# Time trends of overall CVD risk in

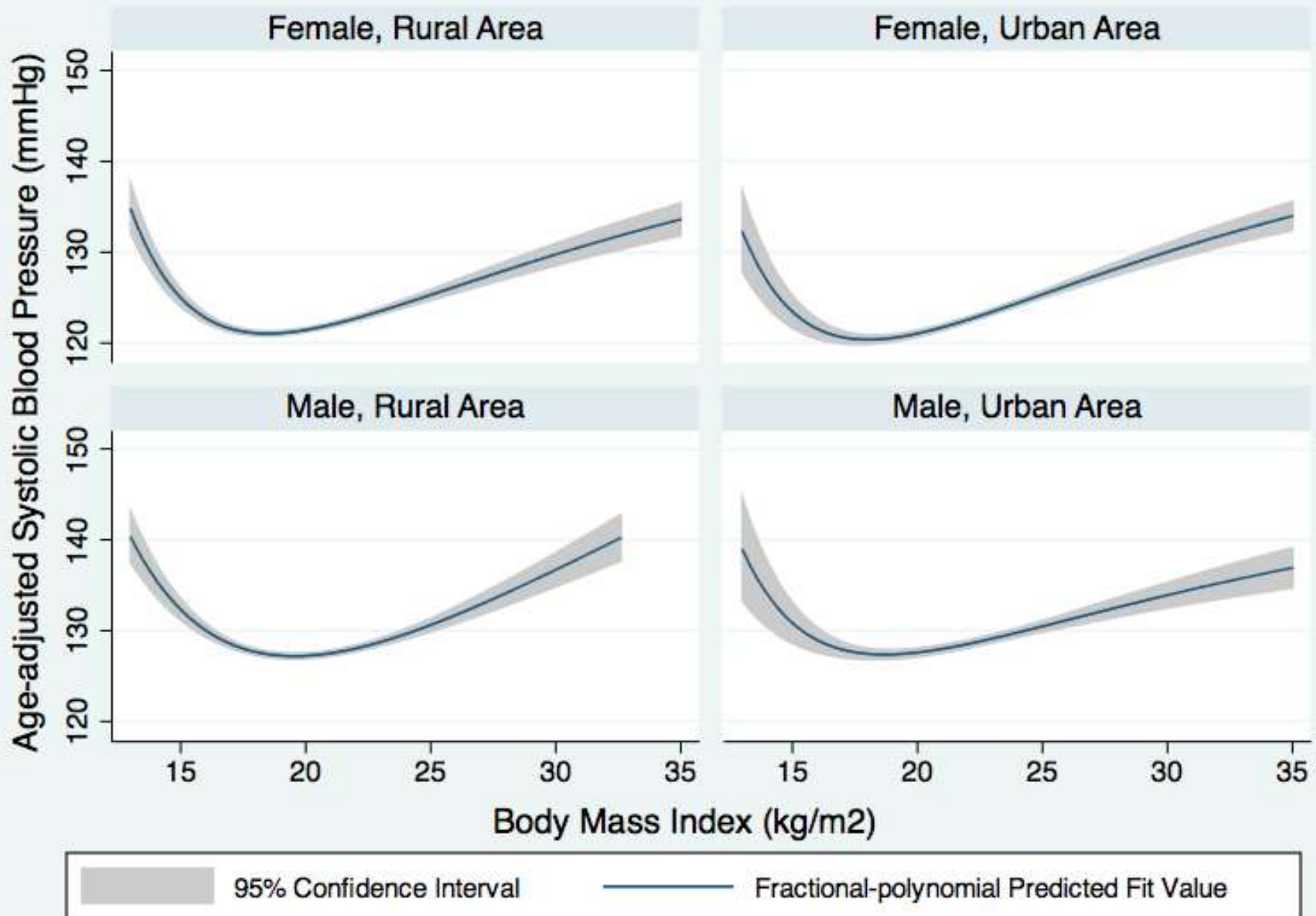
adults



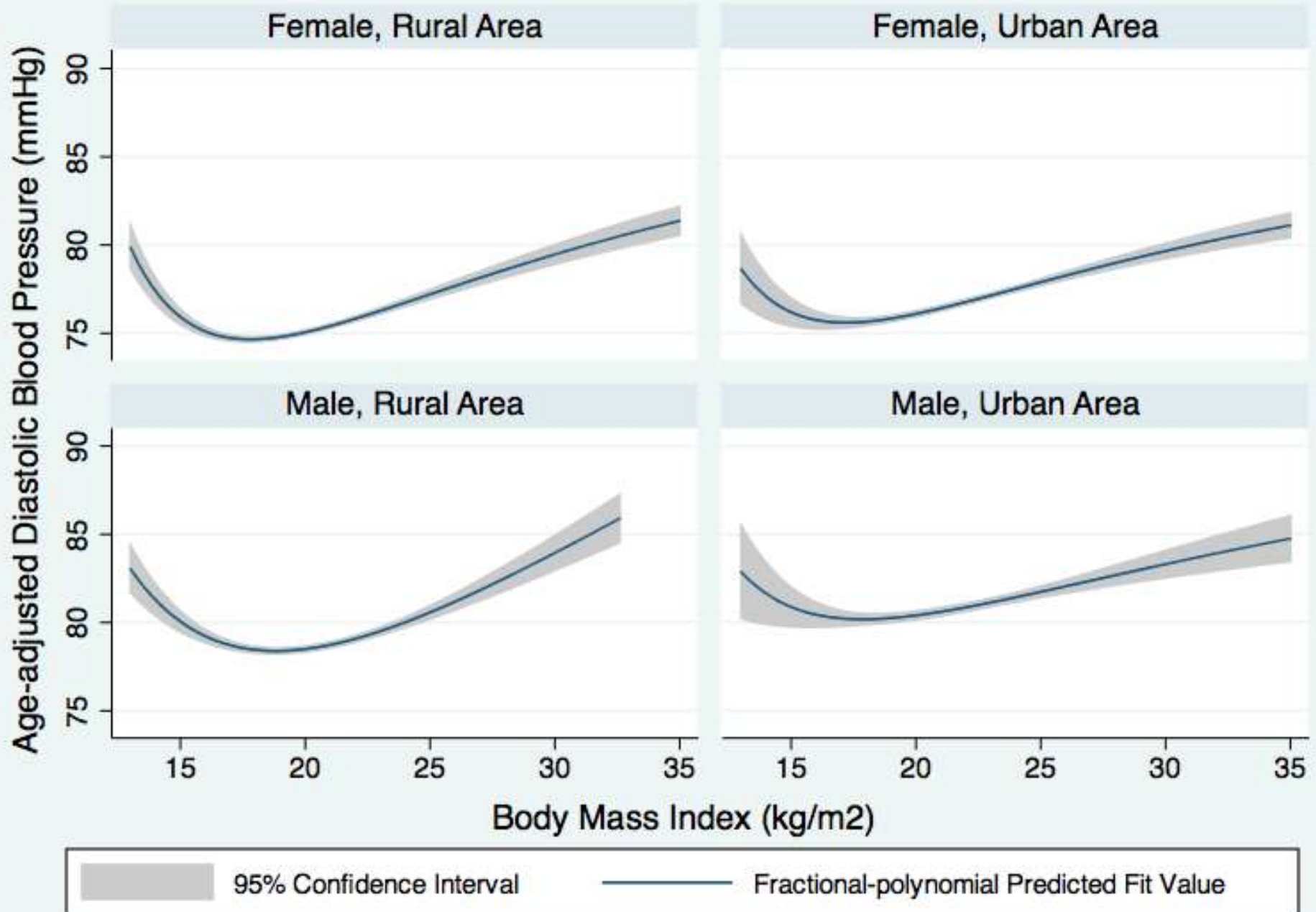
# Time trend of underweight in adults



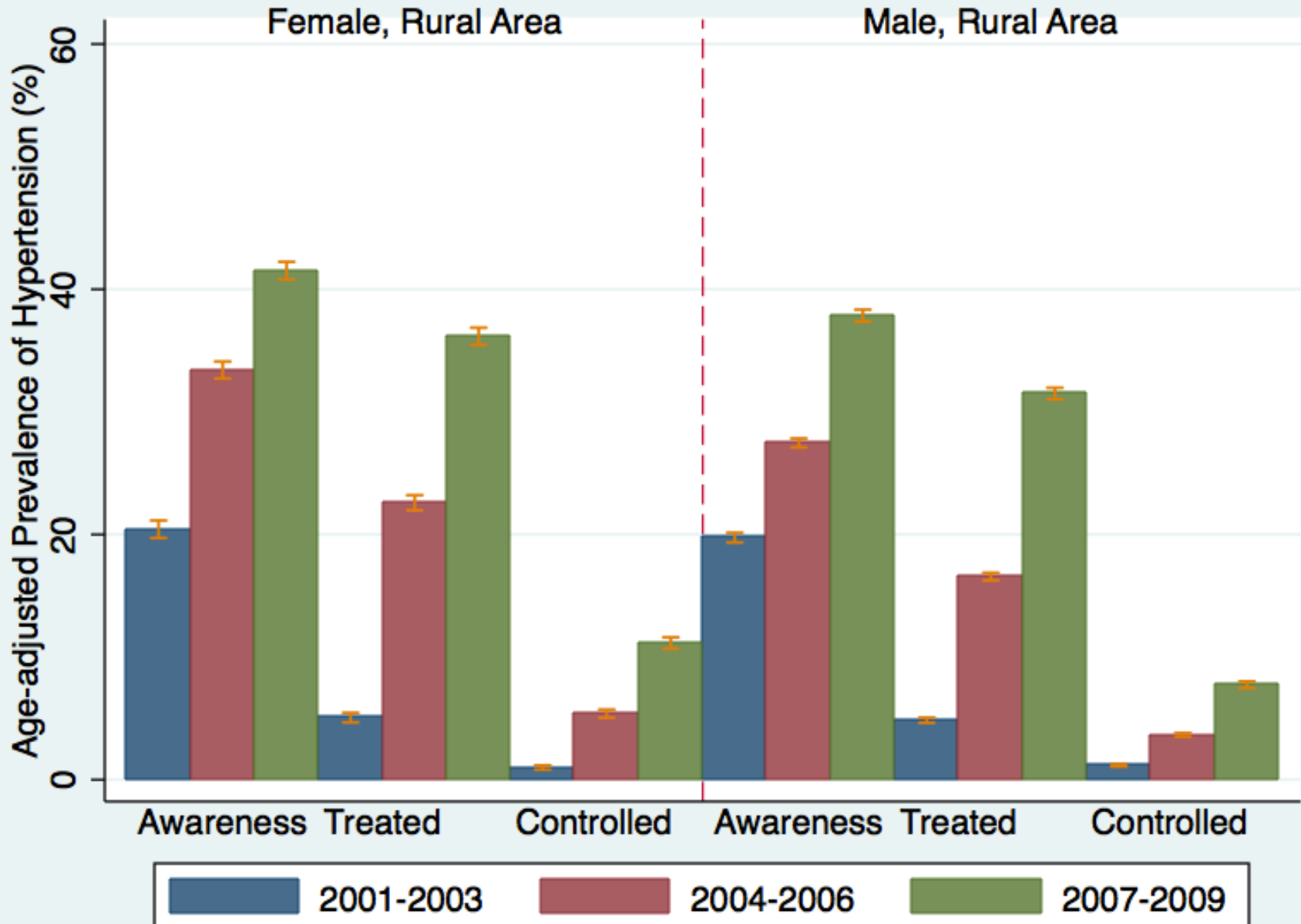
# SBP-BMI relationship in adults



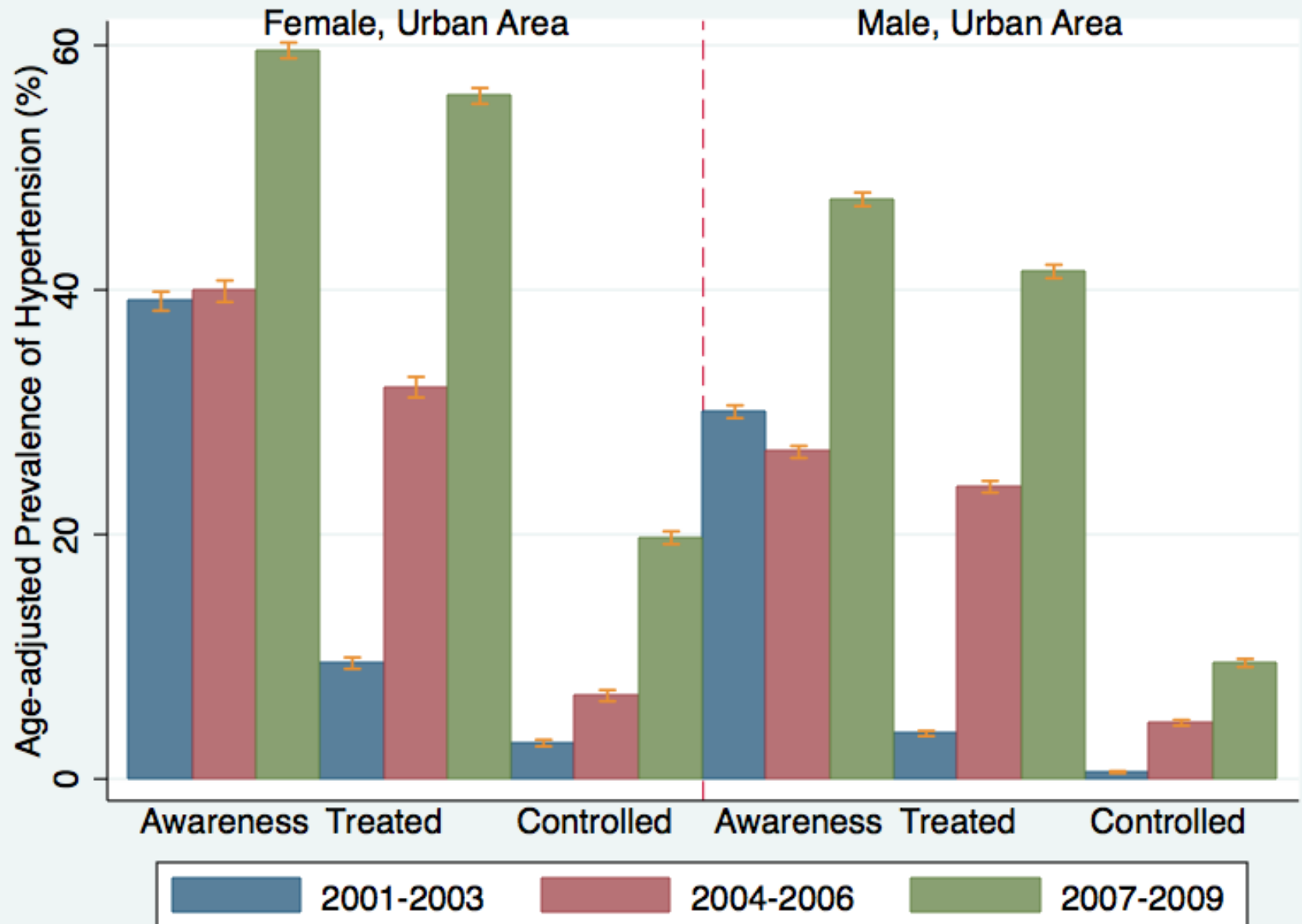
# DBP-BMI relationship in adults



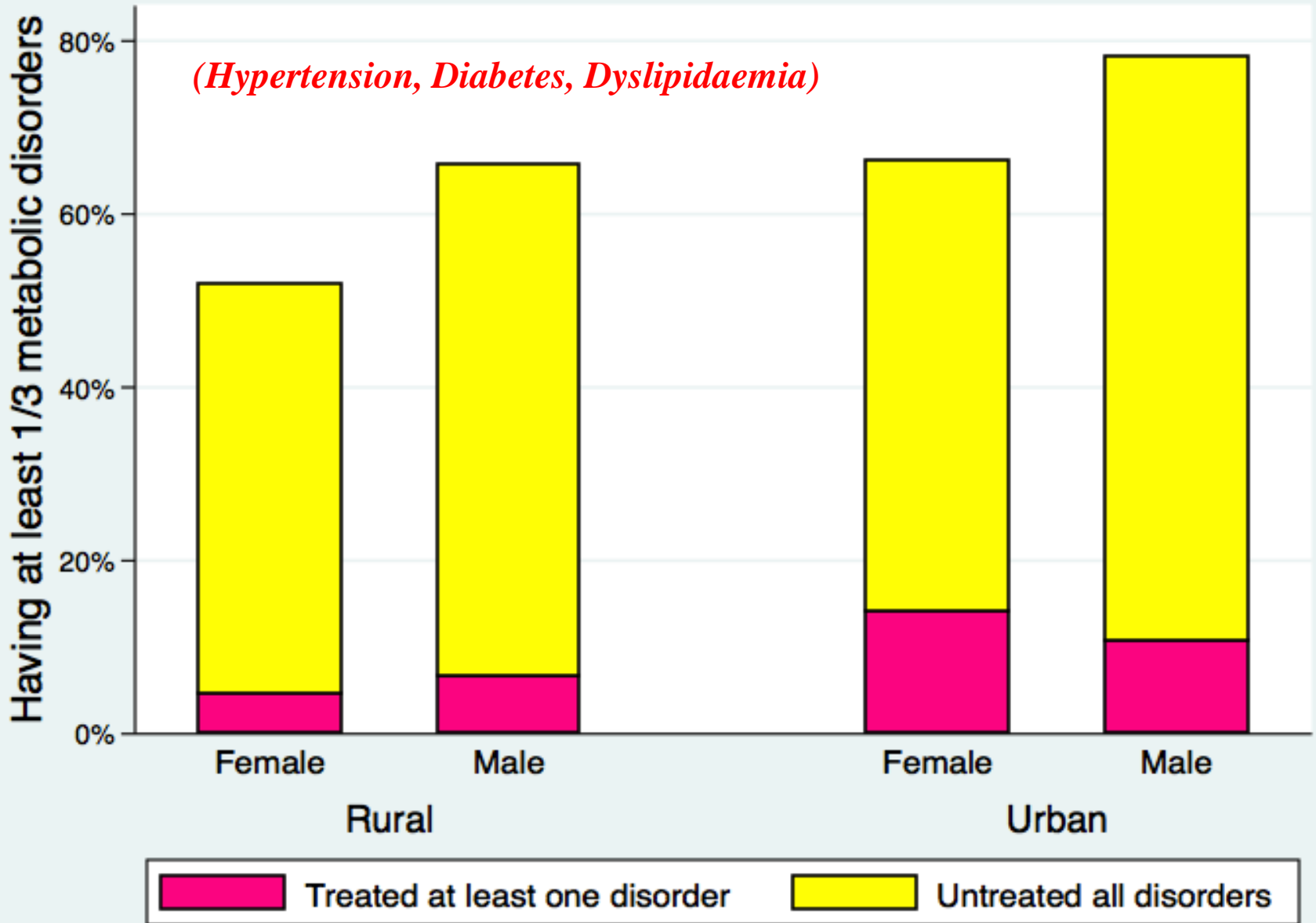
# Hypertension management in adults



# Hypertension management in adults



# Chronic care capacity in 2009



# CONCLUSIONS

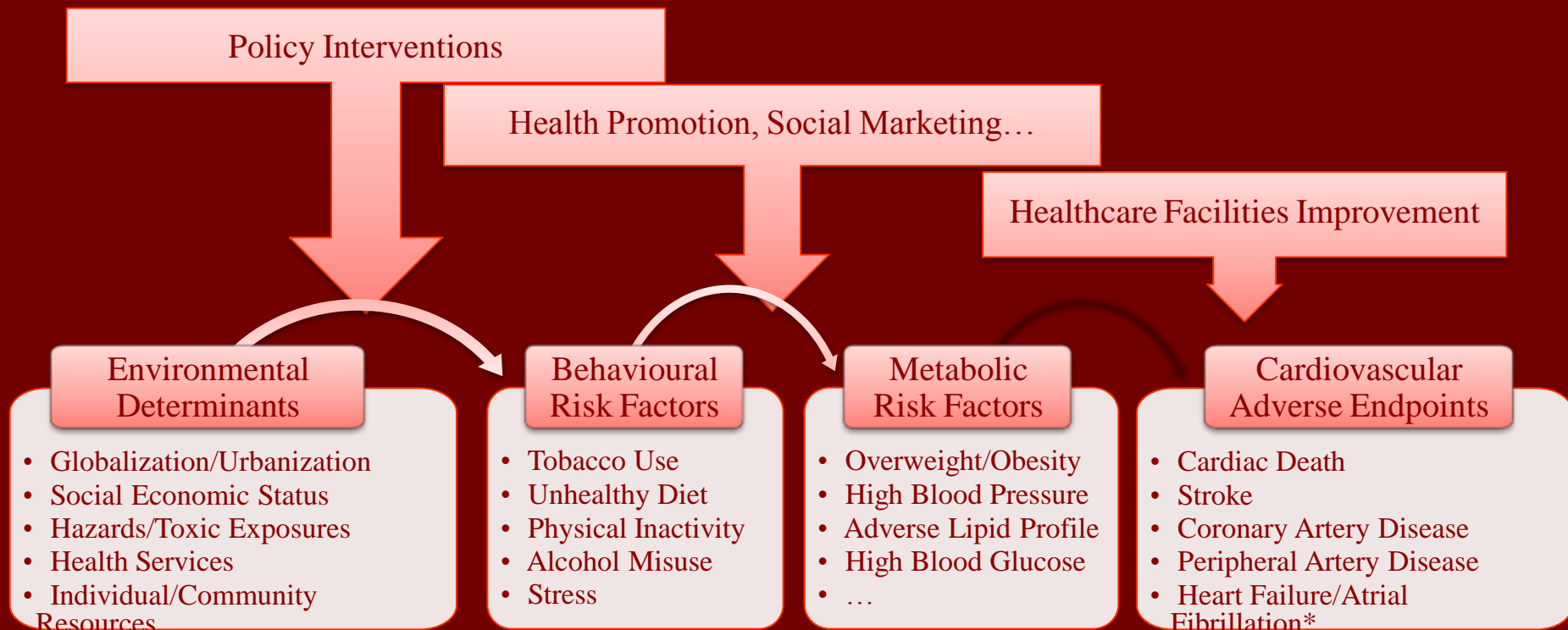
- Hypertension in VN is steadily rising : 25.1% of the adult population (2008)
- In nationwide hospital-based statistics : 3<sup>rd</sup>/10 most encountered diseases : 317.6/100,000
- Death related to Hypertension : Nationwide :
  - Intracerebral haemorrhage : 6<sup>th</sup> rank (of 10)  
0.74/100,000
  - Acute myocardial infarction : 7<sup>th</sup> rank (of 10)  
0.69/100,000
- Valvular diseases still prevalent. Though not as an acute problem as in past decades

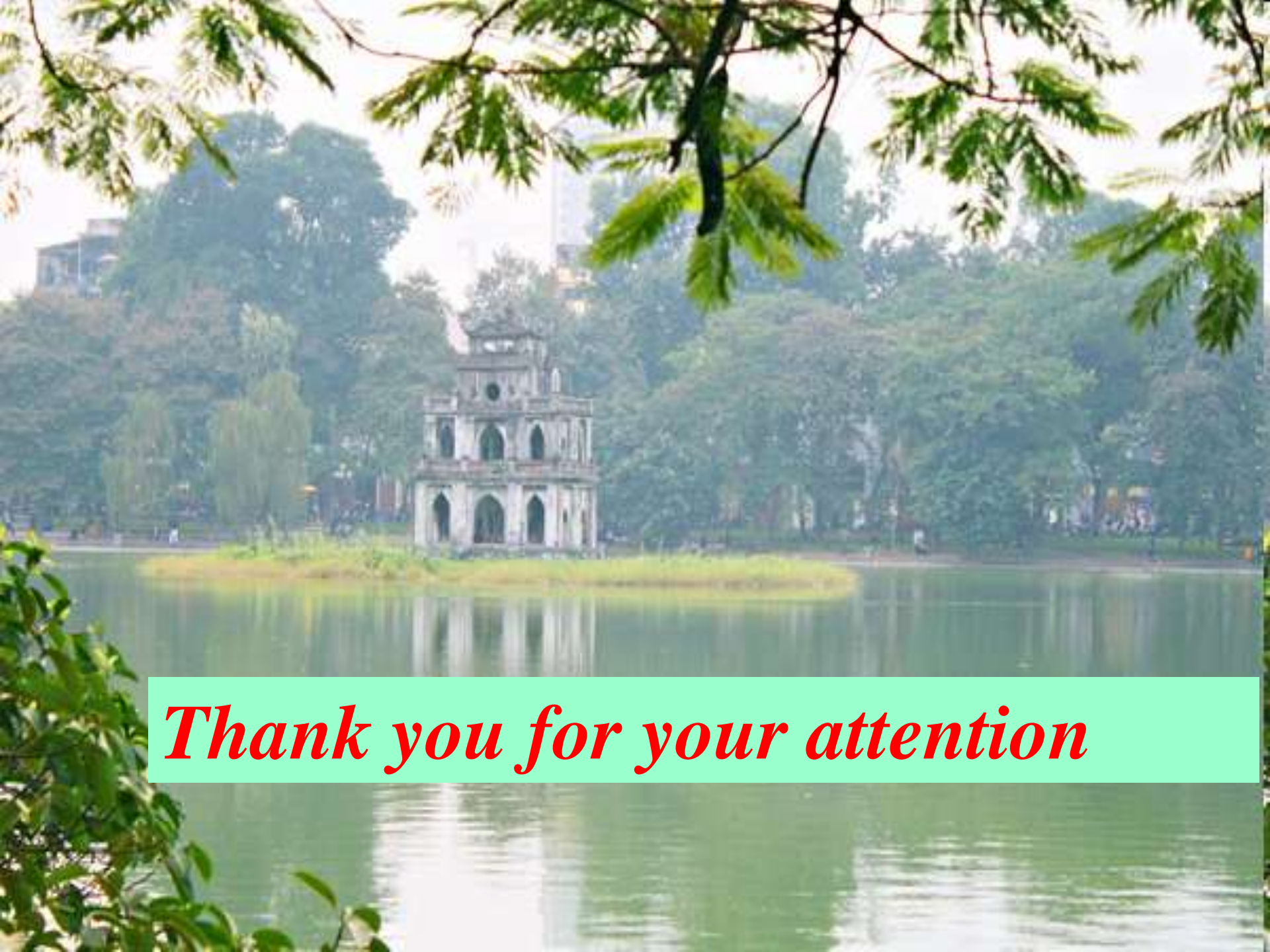


# Conclusions (cont.)

- From 2000 to 2010, mean BP, weight and WC significantly increased in the Vietnamese population, leading to an increased prevalence of hypertension and adiposity, suggesting the need for developing multi-sectoral cost-effective population-based interventions to improve CVD management and prevention.
- Major CVD risk factors, often clustered within individuals, were common in the adult population of Vietnam with differences noted between sex and age groups. Thus, tackling any single risk factor alone without considering other modifiable CVD risk factors is not an efficient or sustainable approach.
- The U-shaped relationship between BP and BMI highlighted the hypertension burden in the underweight population, which is usually neglected in CVD interventions.

# Intervention to improve management of hypertension and CVD risk factors





*Thank you for your attention*