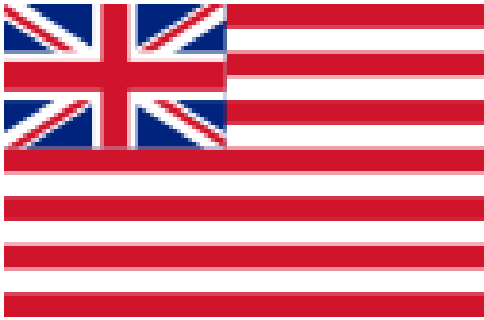
[redacted]

Risk factors for Cardiovascular Diseases in South Asians

Prof. Dr. HAM Nazmul Ahasan

WHO ARE WE?

- The region has been an important source of spices and this was one of the reasons European explorers were attracted to the Far East.
- During the colonization period, states of the region became important assets to the British, the Dutch and the French.
- British Malaya for instance was the world's largest producer of tin and rubber while the Dutch East Indies was the source of Holland's wealth.



“South Asians”

- **South Asians are individuals whose ethnic roots originate from the Indian subcontinent, a large geographic area that includes India, Pakistan, Sri Lanka, Nepal, and Bangladesh.**
- **One fifth of global population**
- **“South Asian” refers to a heterogeneous population, with important differences in diet, culture, and lifestyle among different South Asian populations and religions.**

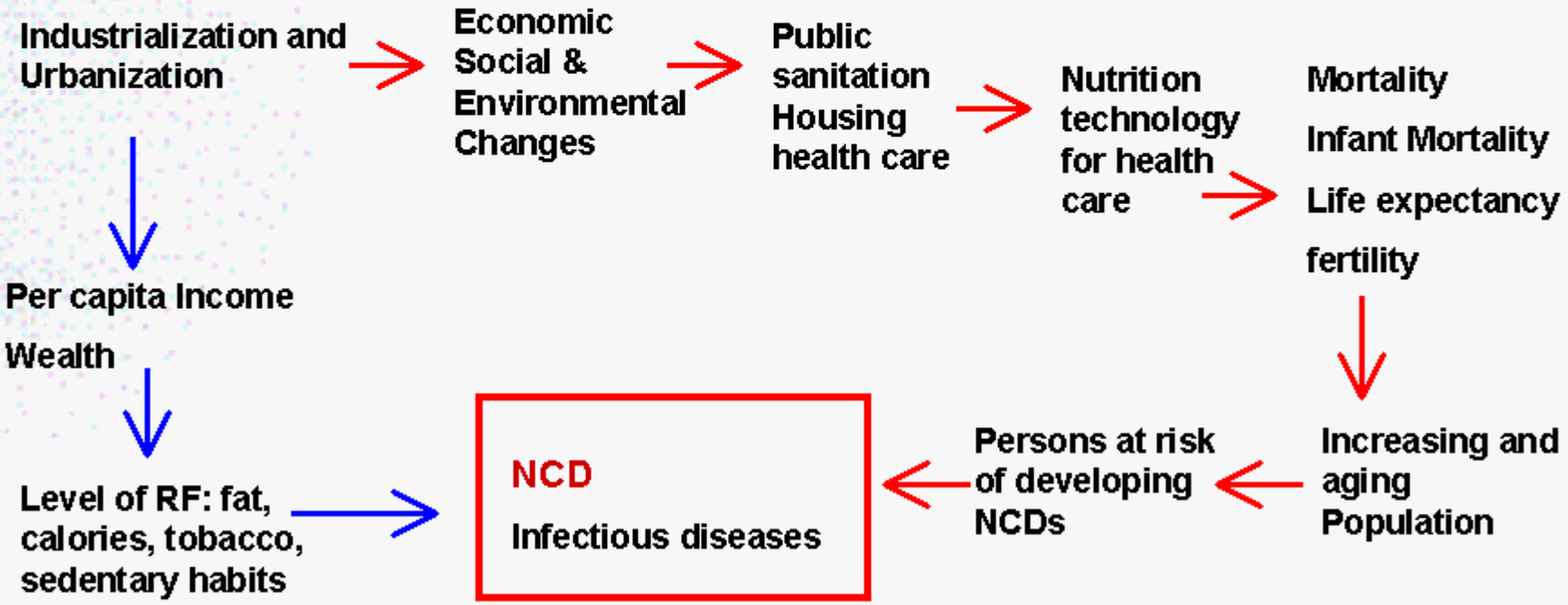
Cardiovascular Diseases

- Myocardial Infarction
- Stroke
- Peripheral Vascular Disease

Epidemiologic transition

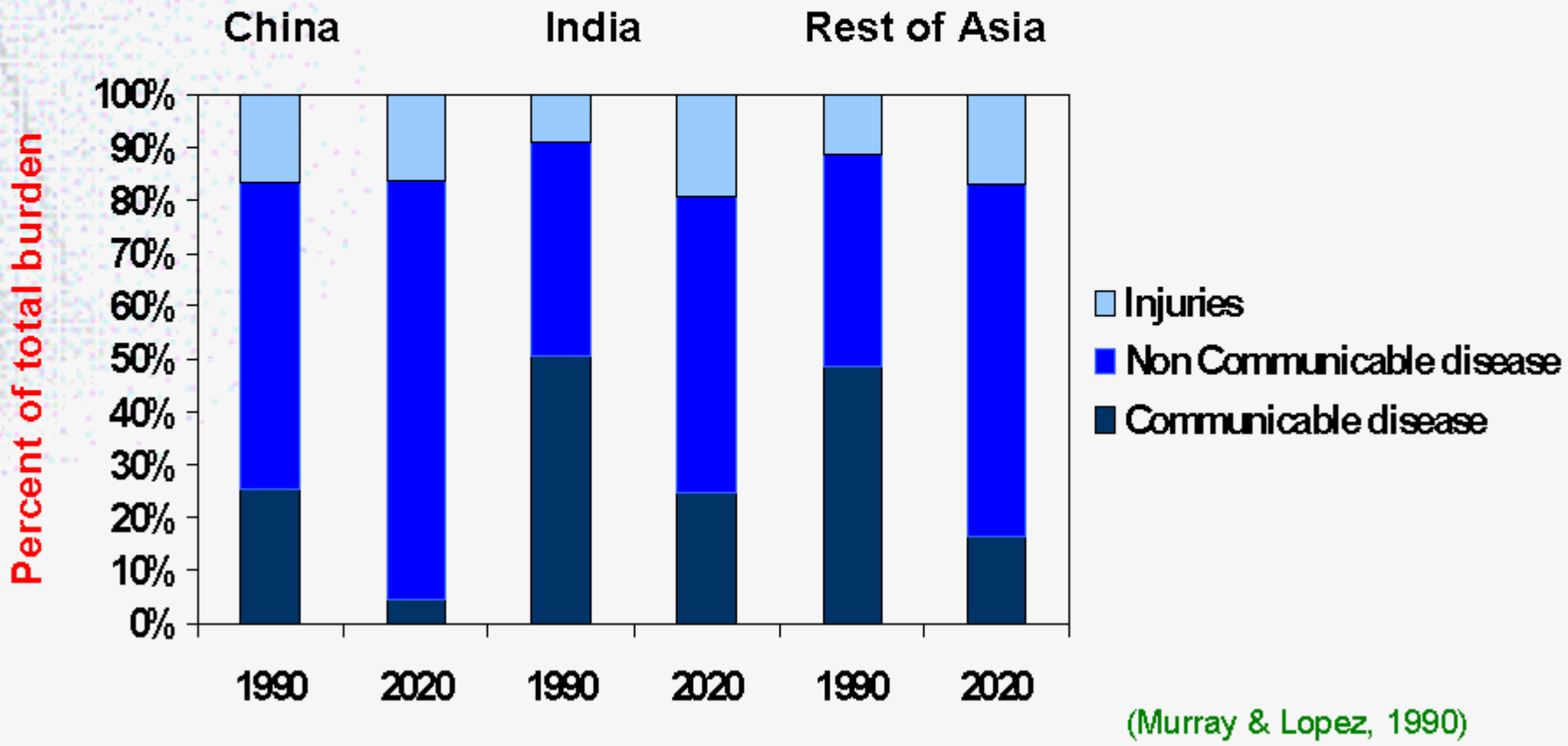
Determinants and dynamics of the CVD Epidemic in the developing Countries

Health transitions: demographic transitions and epidemiologic transitions



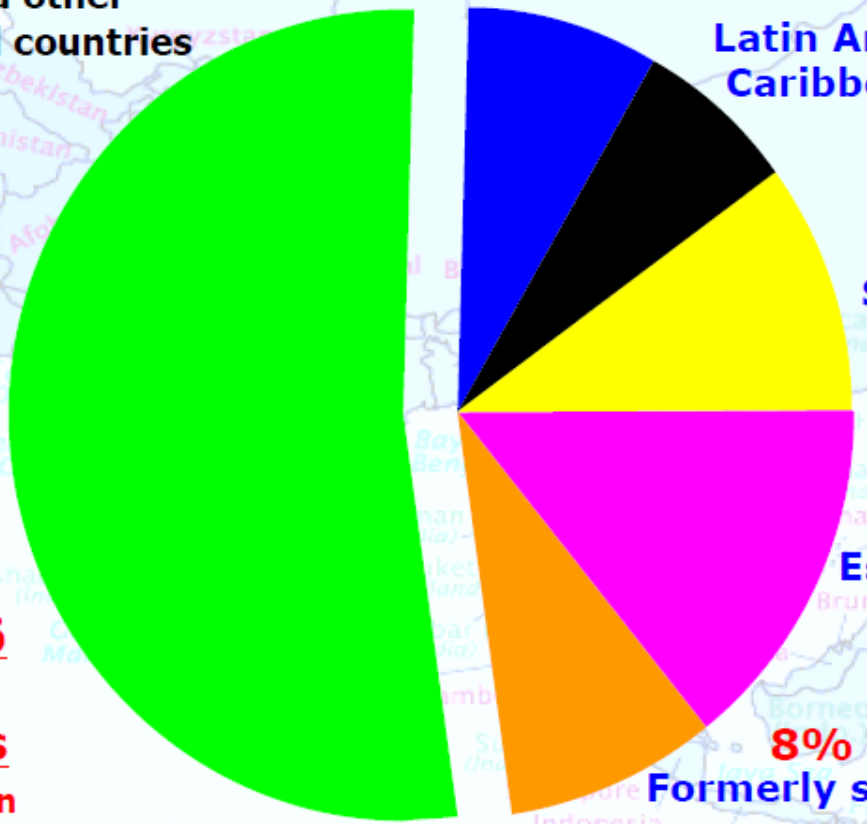
Epidemiologic transition

Current & Projected Burden of Diseases



(Murray & Lopez, 1990)

Asian Contribution for Global Burden of CVD

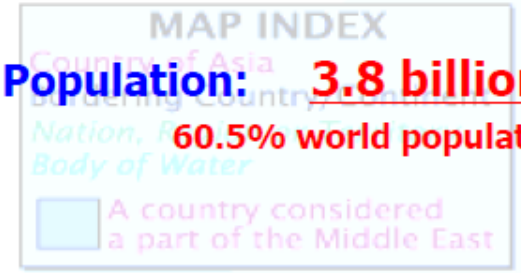


Asia

Countries: 46

Population: 3.8 billions

60.5% world population



Murray C J L and Lopez D The Lancet 1997; 349:1269

What Are the Traditional Beliefs?

- We are poor
- We are hard working
- We do not have access to foods rich in cholesterol content
- We are lean and thin
- We don’t consume that much alcohol

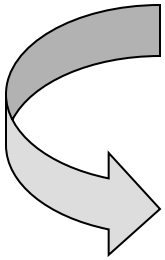
In Bangladesh

- A population survey by Malik *et al* in 1974-75 revealed the prevalence of IHD is 0.34%

Distribution of Acute Myocardial Infarction Cases

Region	Overall (Mean Age)	Men (Mean Age)	Women (Mean Age)
World wide	58.1	56.3	63.7
South Asia	53.1	53	58.6
India	53.1	51	57.3
Pakistan	53.3	52.4	58.3
Sri Lanka	57.7	56.4	65.1
Bangladesh	51.9	51.6	55.2
Nepal	58.9	58.9	58.7
Other Countries	58.8	57	64.2

Prashant Joshi; Shofiqul Islam; Prem Pais; et al. *JAMA*. 2007;297(3): 286-294



- Inhabitants of Bangladesh have the earliest incidence AMI, with a mean age of 51.9 years
- While those from Nepal have the latest, with a mean age at first AMI of 58.9 years.

CVD mortality in South Asians

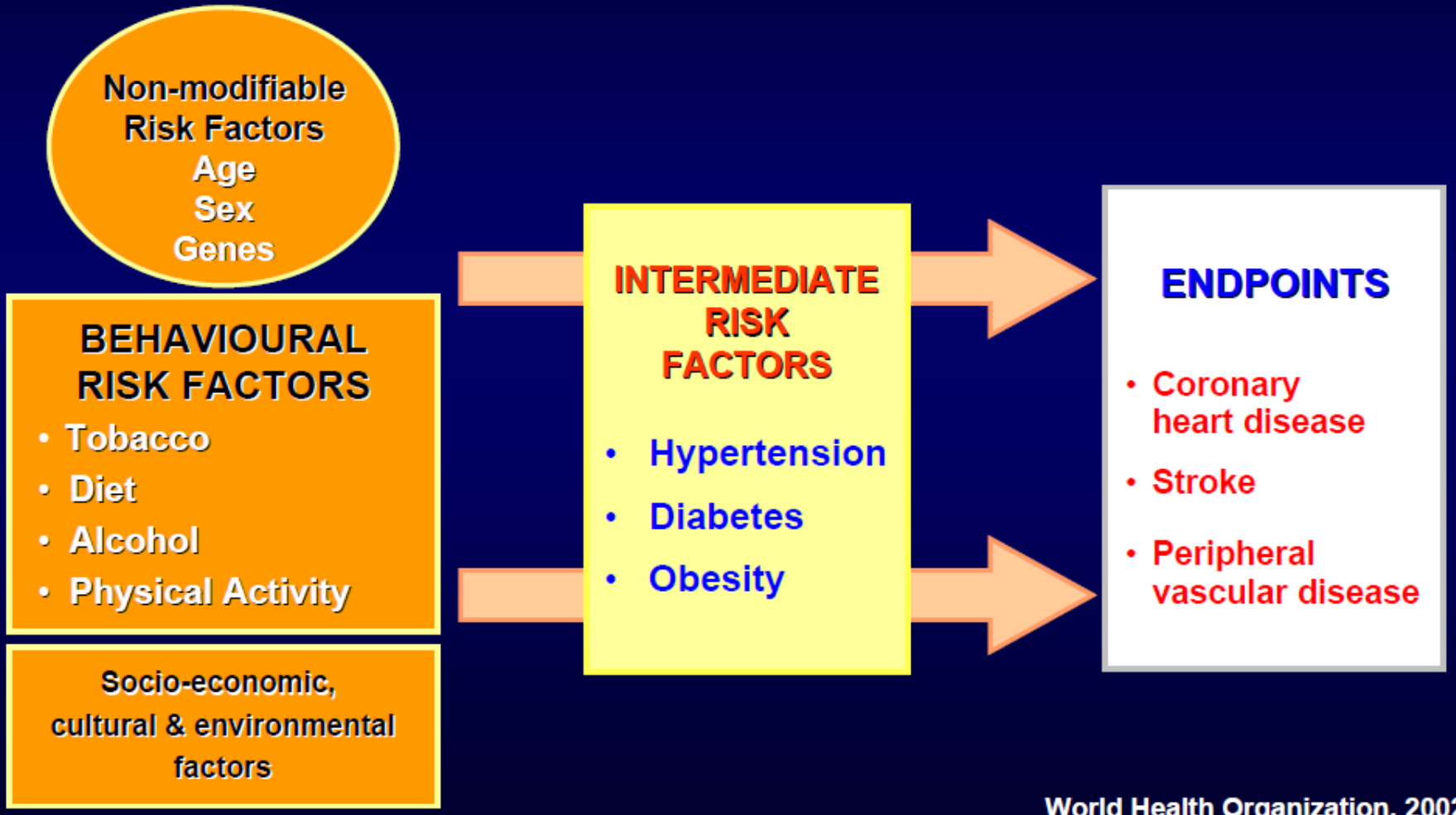
- Most of the studies are done in immigrant South Asian populations
- South Asian populations have a 3- to 5-fold increase in the risk for myocardial infarction and cardiovascular death as compared with other ethnic groups
  - Age-standardized coronary heart disease (CHD) mortality in Canada over a 15-year period, South Asians had the highest CHD mortality compared with individuals of Chinese and European descent

Question is -

Why is it Happening?

Causes For the Rising Burden of CVD

Cardiovascular Risk Factors



World Health Organization, 2002

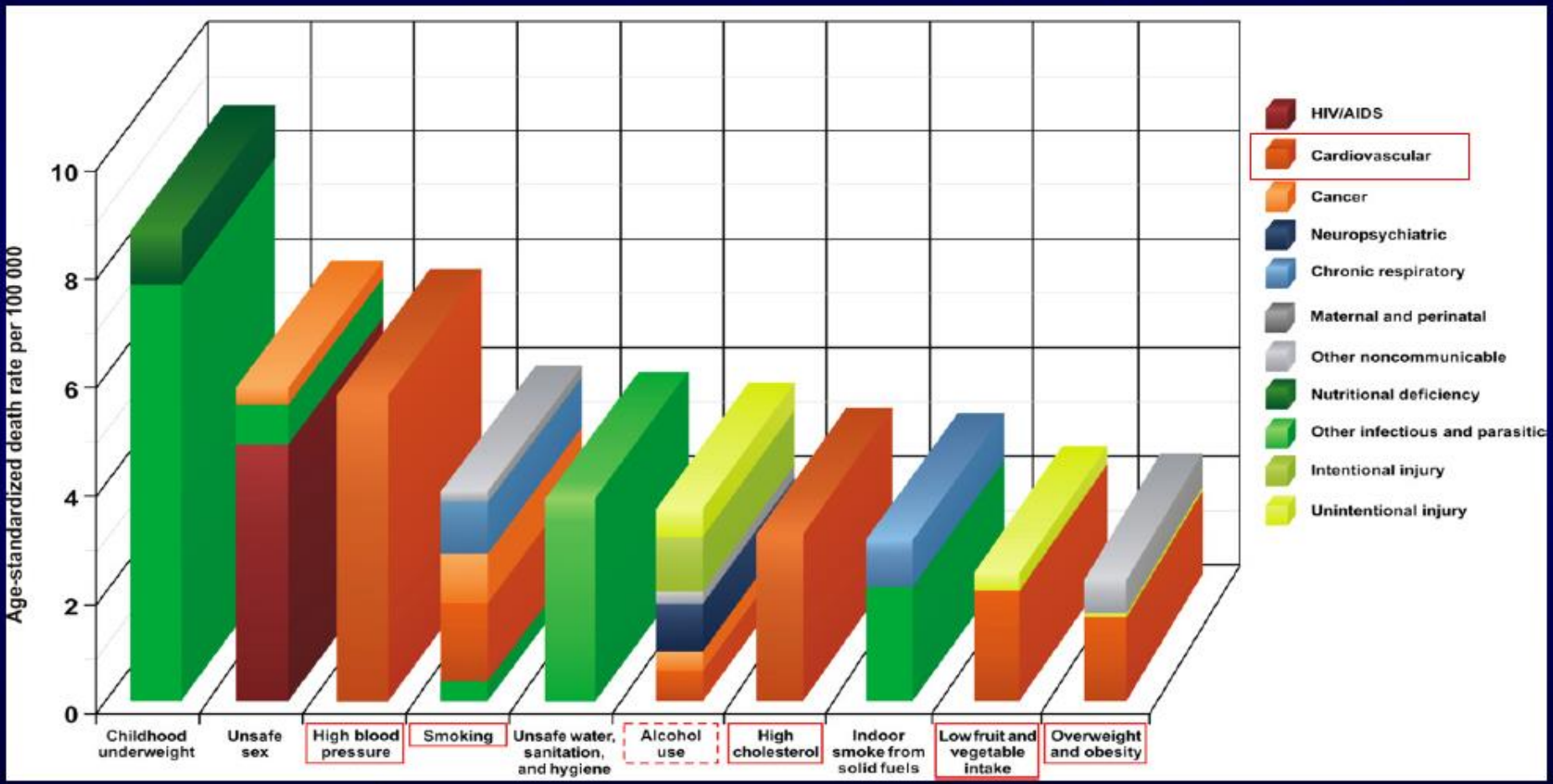
3FOUR50

FACTORS - TOBACCO USE, POOR DIET AND LACK OF PHYSICAL ACTIVITY

R MAJOR CHRONIC DISEASE - HEART DISEASE, DIABETES, LUNG DISEASE AND CANCER

RCENT OF DEATHS IN THE WORLD

6 of top 10 risk factors in low- and middle- income countries lead to CVD



Risk factor for CVD

Source : "Global Burden of Disease and Risk Factors", Lopez and others, Oxford University Press, 2006

Distribution of established CVD risk factors in Bangladesh

	Bangladesh			
	Matlab	Mirsarai	Abhoynagar	WATCH
Current daily smoker	24.1 (22.2–26)	29.4 (27.4–31.4)	22.4 (20.5–24.2)	30.2 (28–32.3)
Less than five servings of fruit and vegetables/ day	89.4 (88–90.9)	96 (95.1–96.9)	92.8 (91.7–94)	100 (100–100)
Low level of physical activity	50.8 (48.4–53.1)	45.9 (43.6–48.2)	29.4 (27.3–31.5)	16.6 (14.8–18.4)
Overweight (BMI ≥ 25 kg/m^2)	12.3 (10.7–13.8)	11.4 (10–12.9)	11.6 (10.2–13.1)	6.7 (5.5–8)
Raised blood pressure	17.1 (15.5–18.8)	24.1 (22.2–26)	16.8 (15.2–18.5)	9.3 (8–10.6)

Ali Asraf et al. Global Health in Action 2009

HYPOTHESES

- *Excess exposure to risk factors—The explanation that*

  South Asians are more exposed to the causal risk factors is not readily evident. Except for smoking, which is lower in Indian (but not Pakistani and Bangladeshi) men and all South Asian women, the pattern is complex.
- *The explanation that South* Asians are more susceptible to established risk factors for coronary heart disease risk has not been systematically studied. Proposed mechanisms include genetic differences (unidentified) or a mismatch between fetal and early life metabolism and that in middle age.
- A third possibility is that rapid change in some risk Factors may itself confer a risk.

What Are The Risk Factors?

Conventional

- Diabetes Mellitus
- Hypertension
- Insulin Resistance
- High risk lipid profile

Contd.

- Abdominal Obesity
- Smoking
- Psychosocial factors (stress or depression)
- Physical exercise
- Alcohol consumption once/wk
- Less consumption of fruits and vegetables

(1 serving /day)

Diabetes Mellitus in South Asians

- **Prevalence of T2DM is uniformly higher in South Asians than in other ethnic populations**
- **Blood glucose concentrations within the higher side of the normal range increases the risk of CVD in South Asians.**
- **Prevalence of insulin resistance in healthy, young, lean Asian Indian men is three- to fourfold greater than lean men of other ethnic groups.**
- **Significantly higher risk of diabetes mellitus among South Asians could be due to the ‘‘thrifty gene’’ hypothesis, which suggests an interaction between genetic predisposition and environmental factors**

Contd.

A national noncommunicable disease risk factor surveillance study conducted in India from 2003 to 2005, examining 44,523 individuals, showed that

- The highest prevalence of self-reported physician diagnosed diabetes mellitus was seen in urban residents with abdominal obesity and sedentary lifestyle (11.3%),
- Peri-urban/slum residents (3.2%),
- Residents of rural areas (3.1%),
- Active rural residents without abdominal obesity had the lowest (o.7%).
- Followed by active urban residents without abdominal obesity (7.3%),

Mohan V, Mathur P, Deepa R, et al. Urban rural differences inprevalence of self-reported diabetes in India – the WHO-ICMR Indian NCD risk factor surveillance. *Diabetes Res Clin Pract*.2008;80(1):159–168

What about Us?

- In 2000,BD had 3.2 million Diabetics
- Currently, the population may be 10 million
- By 2030,it will go up to 11.1 million(7th position world wide)

Global prevalence Of Diabetes

Diabetes Care-2004

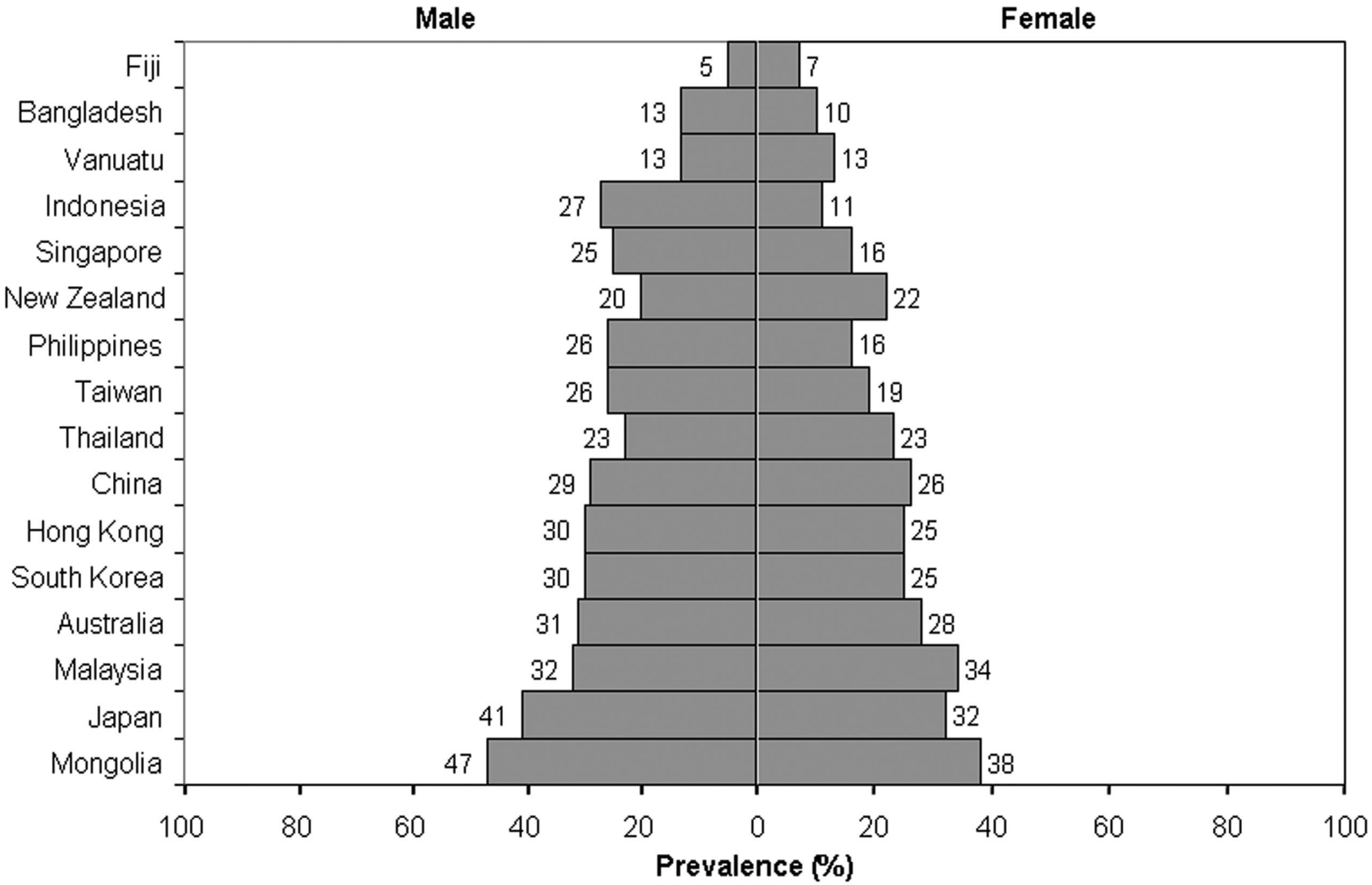
Insulin Resistance

- **Insulin resistance is especially prevalent in South Asians, who have been shown to have impaired markers of insulin sensitivity, such as higher fasting and post-glucose serum concentrations of insulin, when compared to whites and other ethnic groups.**

- **The disproportionately high prevalence of insulin resistance, in addition to central obesity, in these populations may explain the higher prevalence of diabetes and CVD in South Asians.**

Wang CC, Goalstone ML, Draznin B. Molecular mechanisms of insulin resistance that impact cardiovascular biology. *Diabetes*. 2004;53(11):2735–2740.

Hypertension



Frequency of Hypertension in People Aged 20 Years and Older by World Region and Sex in 2000 (Upper) and 2025 (Lower)

Kearney et al. Lancet 2005;365:217-23

High risk lipid profile

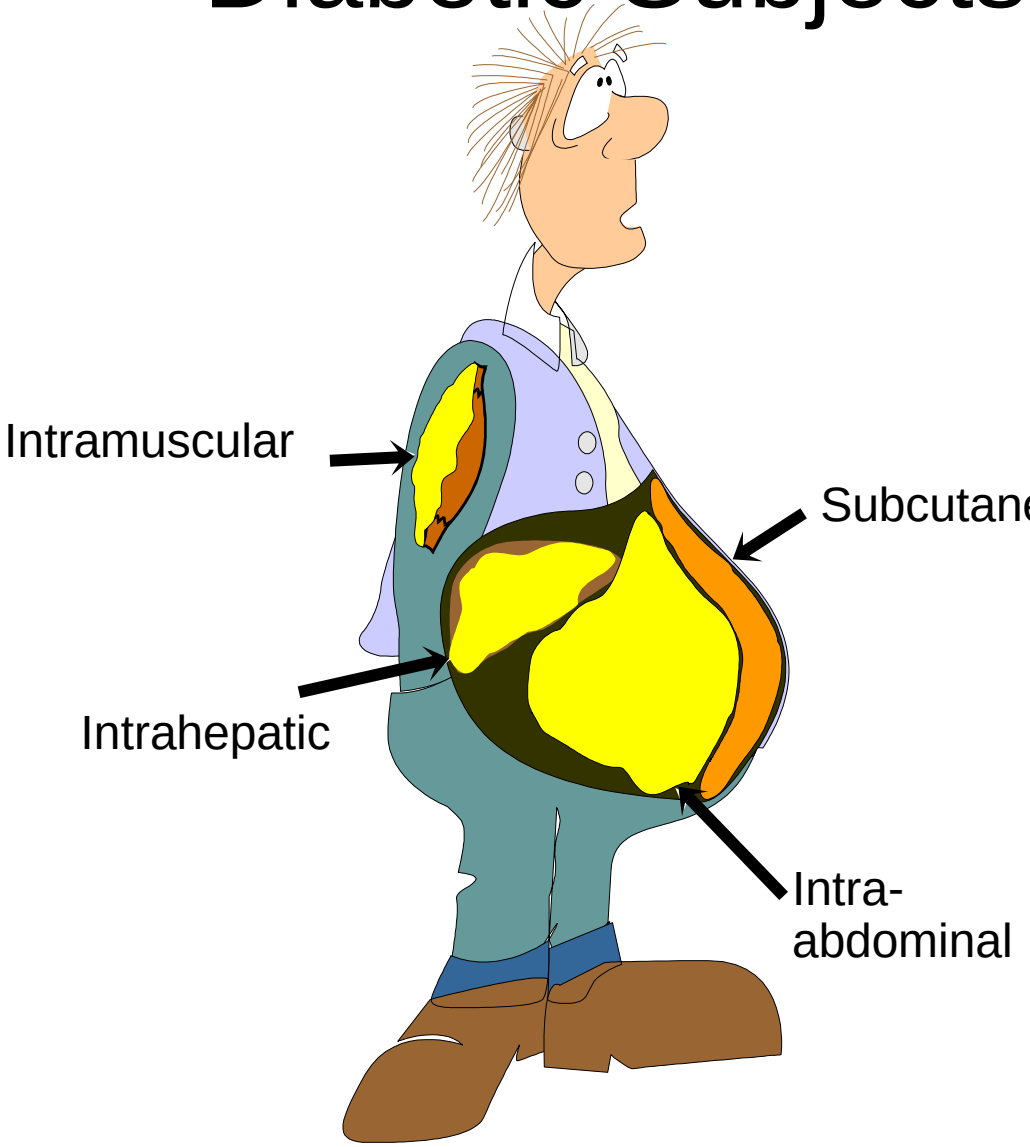
- Pattern of lipid profile in South Asians is different from other populations.
  - High triglyceride (TGL) concentration,
  - Low concentrations of high density lipoprotein (HDL)
- Particle size is an important predictor of CVD risk
  - In South Asians, the LDL particle size tends to be smaller.
  - The small particle size increases the susceptibility to oxidation
  - South Asians have lower values of HDL with a higher concentration of small HDL particles that are less protective.

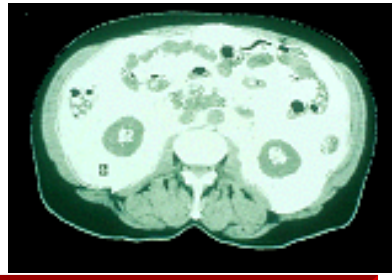
Contd.

- Hypertriglyceridemia is more common in migrant Indians and native Indians of higher socioeconomic class when compared to the rural Indian population.
- , South Asians are demonstrating higher levels of the more atherogenic small-dense LDL.
- South Asians of both sexes have low levels of high-density lipoprotein (HDL), with the lowest levels in native, urban dwelling Indians as well as in migrant Indians. Those living in rural areas have shown comparatively higher levels of HDL. Nevertheless, all segments of the Indian demographic have lower HDL levels when compared to native Caucasians.

Misra A, Luthra K, Vikram NK. Dyslipidemia in Asian Indians:determinants and significance. *J Assoc Physicians India*. 2004;52:137–142

Fat Topography In Type 2 Diabetic Subjects





FFA*
TNF-alpha*
Leptin*
IL-6 (CRP)*
Tissue Factor*
PAI-1*
Angiotensinogen*

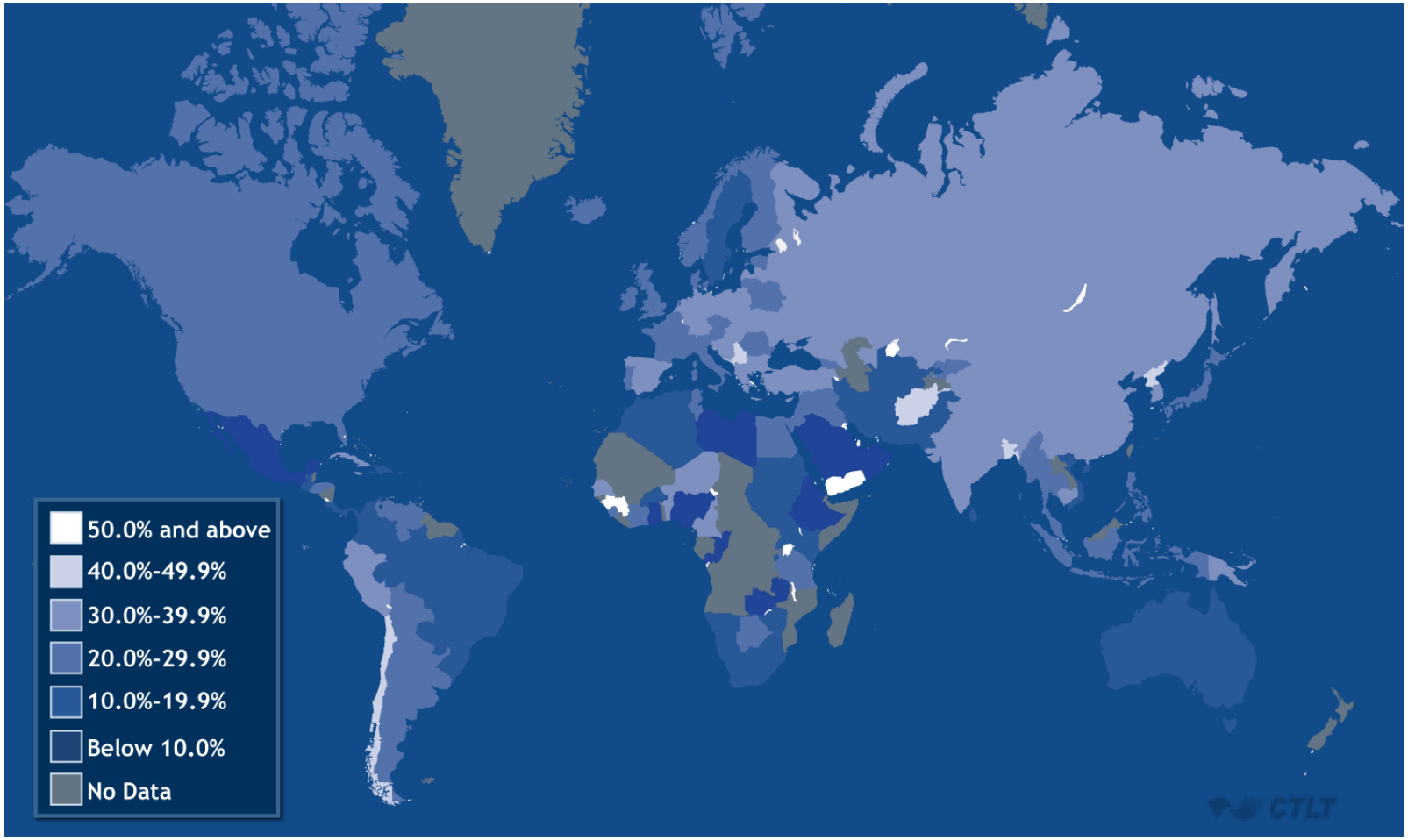
Abdominal obesity (contd.)

- As a result of these observations,

  the WHO has recommended different

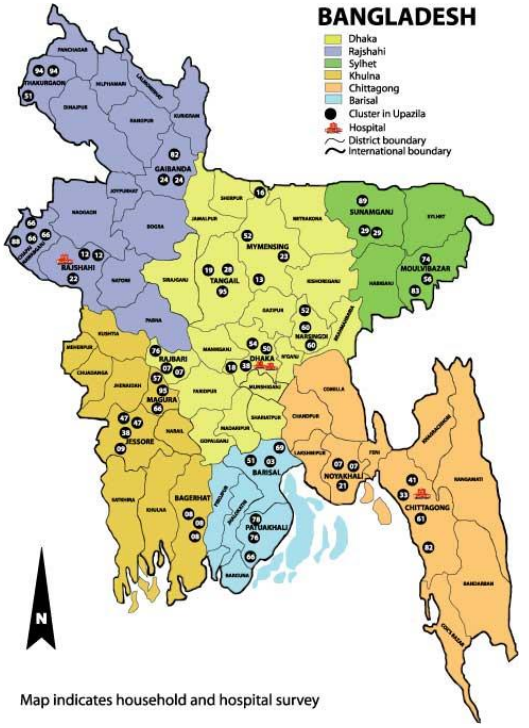
  BMI cutoff points for overweight (23 kg/m2) and obesity (25 kg/m2) in all subjects of Asian origin (45).
- Accordingly, the cutoff for abnormal waist circumference in Asian subjects has also been lowered, to 80 cm in Asian women and 90 cm in Asian men

Global smoking prevalence



Prevalence of tobacco usage in general population aged 15 years or older, 2004

	Smoking (%)	Smokeless (%)	Any form (%)
Men	41	15	49
Women	2	24	25
Both	21	20	37



- 31.8 million adult use tobacco
- 18.4 m men and 0.75 m women smoker
- 6.6 m men and 10.1m women smokeless tobacco user

*Source: Zaman M, Nargis N, Perucic A, Rahman K (ed).
Impact of Tobacco Related Illness in Bangladesh. World Health Organization. Regional Office for South-East Asia. 2007

Deaths and disabilities due to tobacco related diseases*, 2004

	Eight tobacco related diseases*	Attributable to tobacco use
Deaths	102,117	57,583
Disabilities	896,037	382,949

*IHD, Stroke/TIA, Buerger's disease, oral cancer, lung cancer, laryngeal cancer, COPD, tuberculosis of lung

*Source: Zaman M, Nargis N, Perucic A, Rahman K (ed). Impact of Tobacco Related Illness in Bangladesh. World Health Organization. Regional Office for South-East Asia. 2007

HARD WORKING

- Physical activity was among the lowest for South Asians when compared to other groups studied in INTERHEART (6.1% vs 21.6%).
- Furthermore, amongst the protective factors, Bangladeshi has the Lowest prevalence for regular physical activity(1.3%).

Vegetable Intake

- In a region where vegetarianism predominates, the intake of fruits and vegetables (1 serving/day) in South Asia is surprisingly low as seen in INTERHEART STUDY.
- Among those who do regularly eat vegetables, the amount of cardiovascular benefit conferred remains questionable.

SURPRISE !!

Interestingly, although regular alcohol consumption (once per week) was protective in other populations studied , it was not protective among native South Asians *and* it was associated with increased harm in the Indian subgroup .This may be attributable to differences in drinking prevalence or patterns of drinking in South Asian countries.

STILL …….

Published literature has consistently demonstrated that intake of fresh fruits and green leafy vegetables lowers the risk of CHD, with significant direct correlations observed between number of servings and cardiovascular risk reduction.

Emerging risk factors

- ApoB100/ApoA-I ratio
- Lipoprotein(a) [Lp(a)]
- C-reactive protein (CRP)

AND SOME OTHERS

Emerging risk factors that may also contribute to the pathogenesis of premature CHD in South Asians include -

- Inflammatory biomarkers such as Fibrinogen and plasminogen Activator inhibitor-1 (PAI-1)
- Interleukin 6 (IL-6),97 and other adipokines
- Vascular cell adhesion molecule 1 (VCAM-1)
- Elevated homocysteine levels
- Impaired endothelium dependent dilatation

Overall ……

- Combined, these nine risk factors found by INTERHEART study accounted for 85.8% of the population-attributable risk (PAR) for AMI among native South Asians and 88.2% of the PAR among individuals from other parts of the world, suggesting that traditional risk factors for CVD should not be overlooked in South Asians.

Contd.

- Compared to whites, individuals of South Asian descent demonstrate CHD onset at a younger age and are often diagnosed with CHD before the age of 40.
- South Asians, compared to white Caucasians, are also younger at the time of first cardiac catheterization, and they are more likely to have significant left main, multivessel, and distal coronary artery disease.
- South Asians are also diagnosed with congestive heart failure at a younger age.

Contd.

- The CREATE study prospectively analyzed over 20,000 patients with acute coronary syndrome (ST segment elevation myocardial infarction [STEMI], non-ST segment elevation myocardial infarction [NSTEMI], or unstable angina [UA]) at over 89 centers across India.
- Mean patient age was 57.5 years, and 60.6% of the patients presented with STEMI.
- A large proportion of the patients belonged to lower middle (52.5%) and poor (19.6%) socioeconomic classes

Contd.

- A British observational study revealed that South Asians had a higher six-month mortality rate after hospital presentation with AMI when compared to their white counterparts.
- *Adjustments for diabetes, however,* mitigated much of the increased risk among South Asians.
- *This* suggests diabetes may be contributing to South Asians' increased risk of death from CVD.

McKeigue PM, Marmot MG. Mortality from coronary heart disease in Asian communities in London. *BMJ*. 1988;297(6653):903

METABOLIC SYNDROME

According to the new IDF definition, for a person to be defined as having the metabolic syndrome they must have:

Central obesity *(defined as waist circumference* ≥ 94 cm for Europid men and ≥ 80 cm for Europid women, *with ethnicity specific values for other groups)*

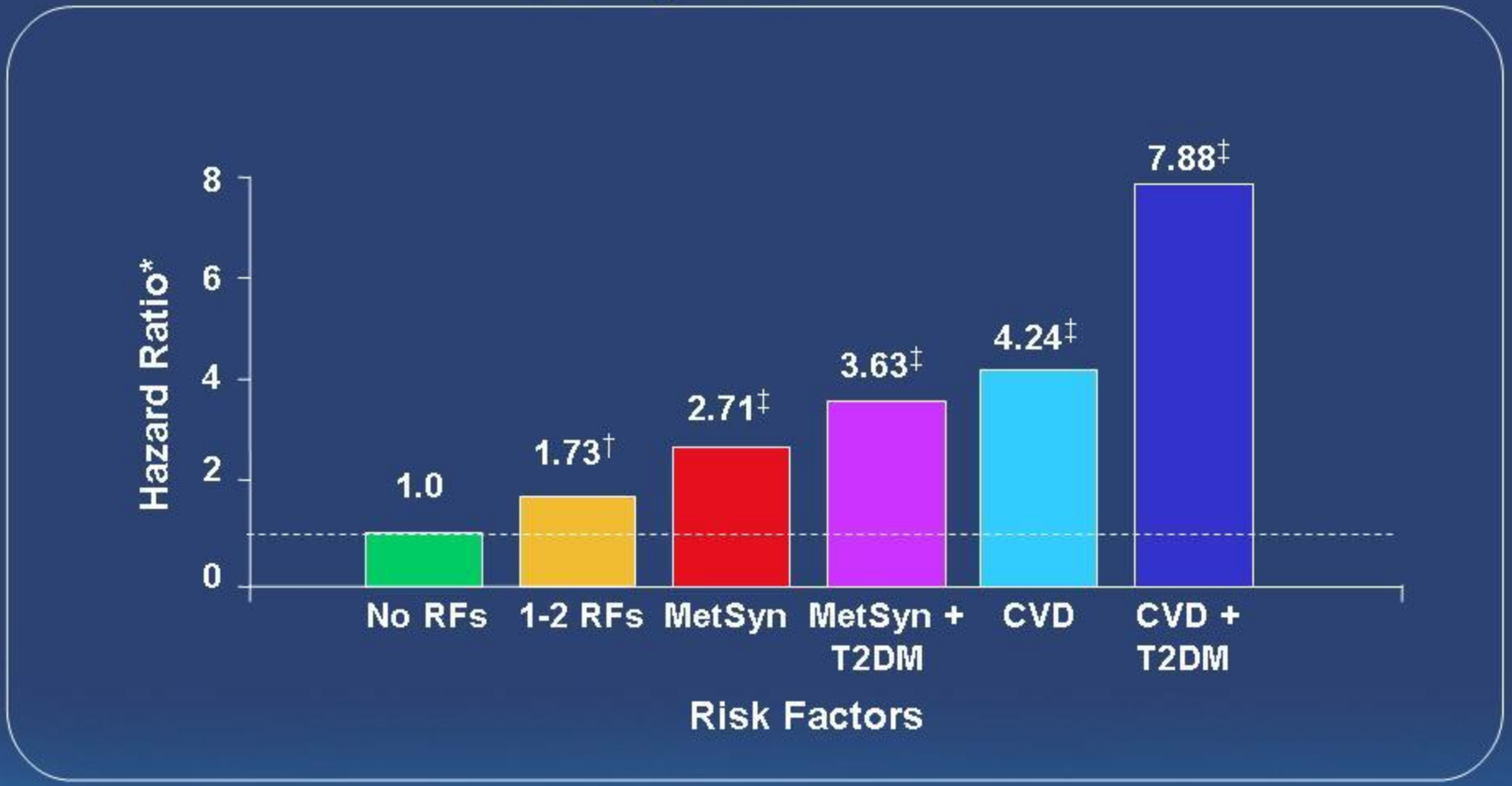
plus any two of the following four factors:

- ***raised TG level:*** ≥ 150 mg/dL (1.7 mmol/L), or ***specific treatment for this lipid abnormality***
- ***reduced HDL cholesterol:*** < 40 mg/dL (1.03 mmol/L*) in males and < 50 mg/dL (1.29 mmol/L*) in females, ***or specific treatment for this lipid abnormality***
- ***raised blood pressure:*** systolic BP ≥ 130 or diastolic BP ≥ 85 mm Hg, ***or treatment of previously diagnosed hypertension***
- ***raised fasting plasma glucose*** (FPG) ≥ 100 mg/dL (5.6 mmol/L), ***or previously diagnosed type 2 diabetes***
  If above 5.6 mmol/L or 100 mg/dL, OGTT is strongly recommended but is not necessary to define presence of the syndrome.

Country/Ethnic group		Waist circumference† (as measure of central obesity)
Europids*	Male	≥ 94 cm
	Female	≥ 80 cm
South Asians**	Male	≥ 90 cm
	Female	≥ 80 cm

Cardiometabolic Risk

CVD Mortality Increases With Number of Metabolic Syndrome Risk Factors



*Hazard ratios weighted to US population; adjusted for gender, age, smoking, physical activity, total cholesterol
†*P*=.02; ‡*P*<.0001.

Malik S, et al. *Circulation*. 2004;110:1245-1250.

Being the champion!!

Among INTERHEART control subjects, it has the highest prevalence of most risk factors studied-

- Lowest mean age at incidence of AMI among us(51.9 years),
- Lowest Physical activity(1.3%)
- Lowest amount of vegetable consumption(8.6%)

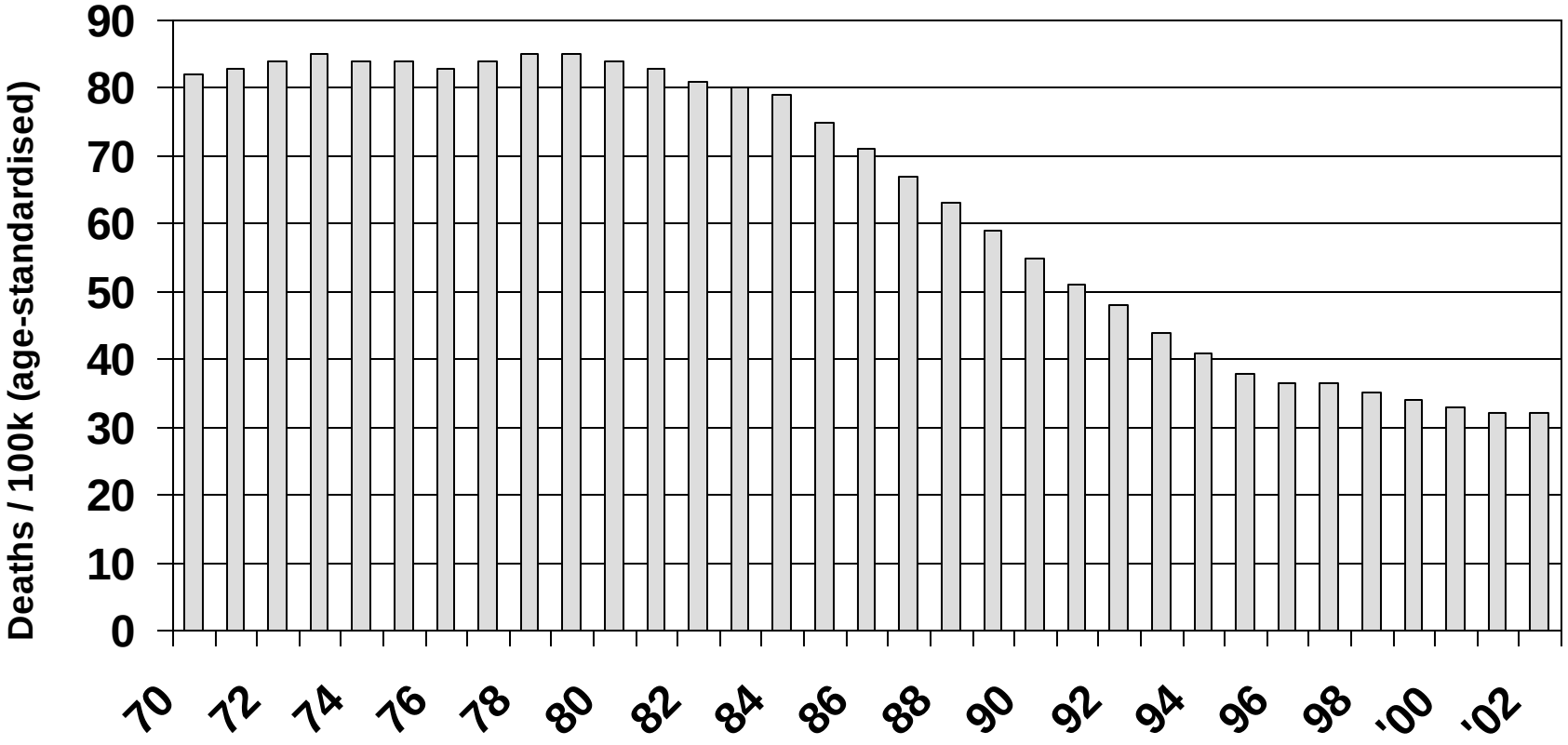
Contd.

- Current and former smoking (59.9%),
- Elevated apolipoprotein B100 (ApoB100)/apolipoprotein A-I (ApoA-I) ratio (59.7%),
- Abdominal obesity (43.3%),
- Self-reported history of hypertension (14.3%), and

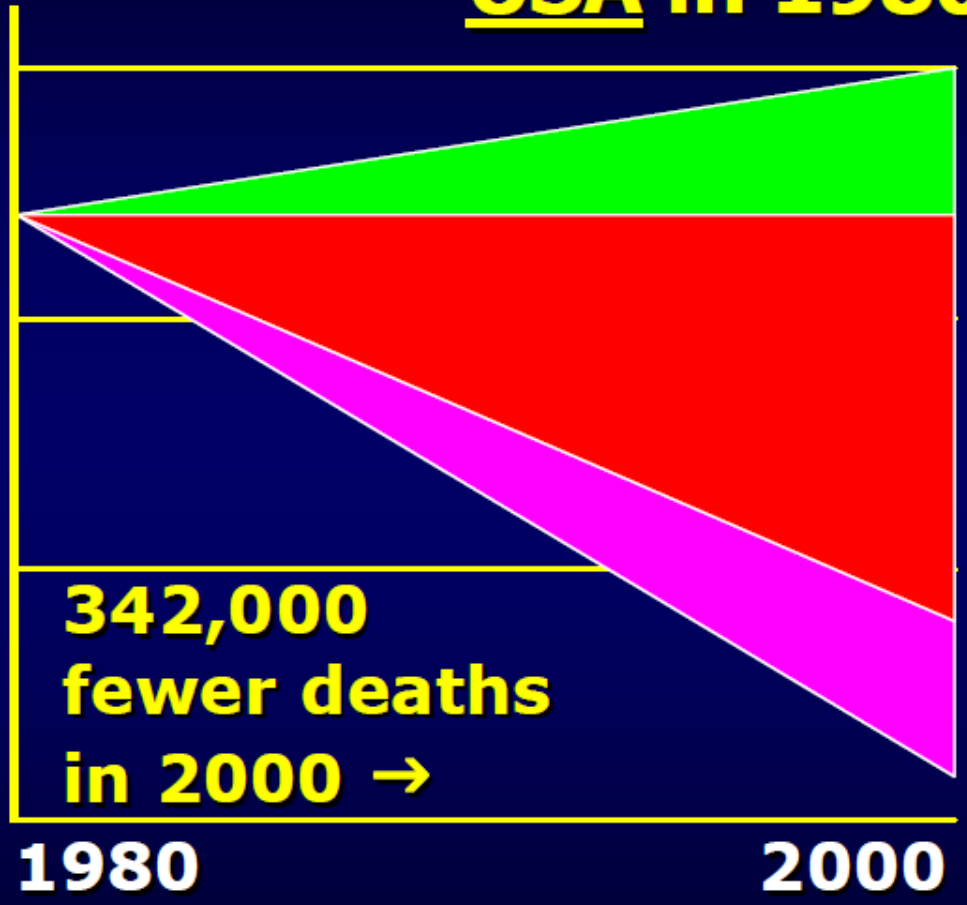
Future ?

Rates are Improving

- Death rates from coronary heart disease have been falling since 1970



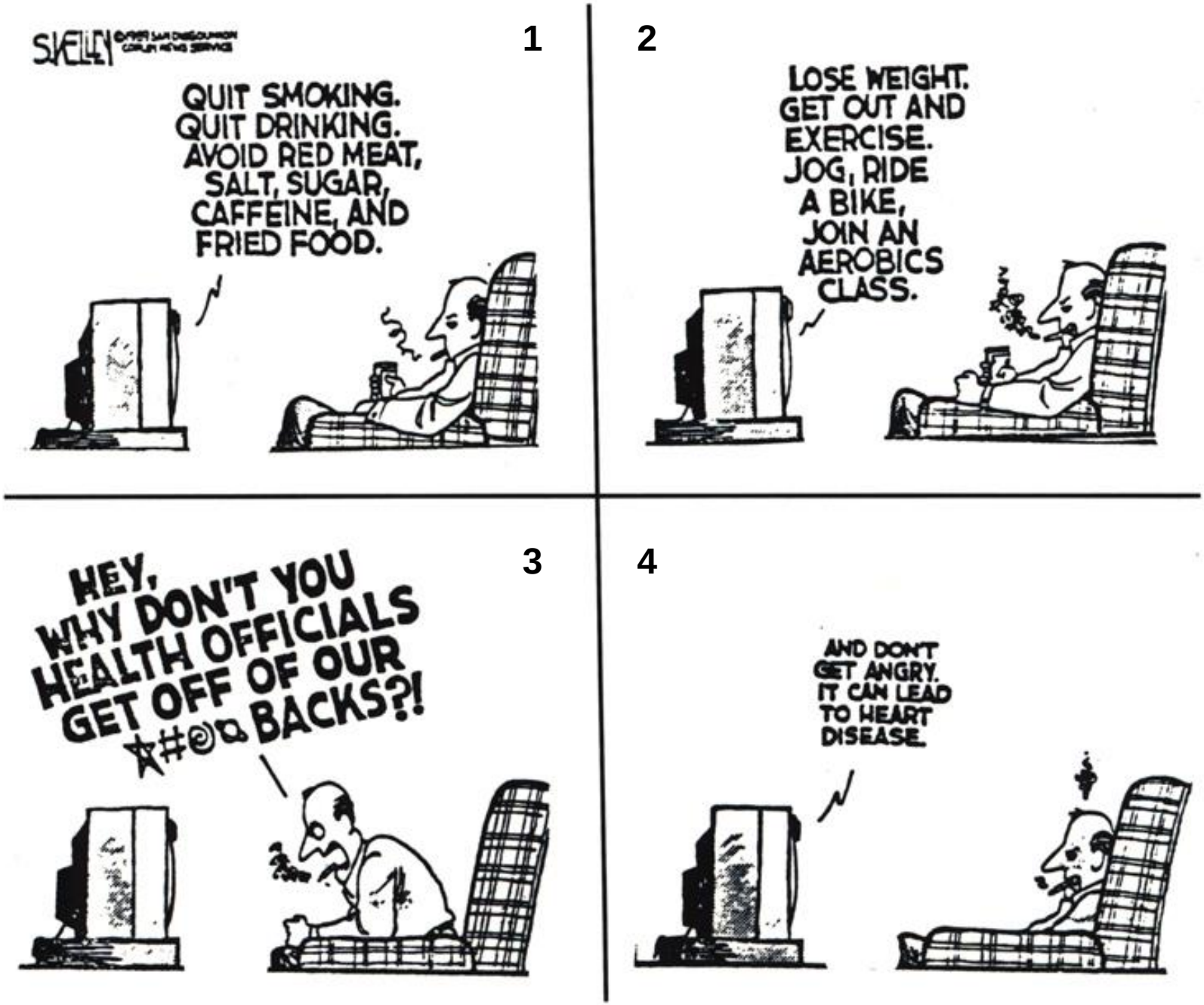
Exploring the fall in CHD deaths in USA in 1980-2000



Risk Factors Worse	**+17%**
Obesity (Increase)	+7%
Diabetes (Increase)	+10%
Risk Factors Better	**-65%**
Population BP fall	-20%
Smoking	-12%
Cholesterol (diet)	-24%
Physical Activity	-5%
Treatments	**-47%**
AMI Treatments	-10%
Secondary Prevention	-11%
Heart Failure	-9%
Angina: CABG & PTCA	-5%
Hypertension Theropies	-7%
Statin (Primary Prevention)	-5%
Unexplained	**-9%**

NEJM 2007, 256, 2388

Possible Remedies


SHELLEY
1
QUIT SMOKING. QUIT DRINKING. AVOID RED MEAT, SALT, SUGAR, CAFFEINE, AND FRIED FOOD.
2
LOSE WEIGHT. GET OUT AND EXERCISE. JOG, RIDE A BIKE, JOIN AN AEROBICS CLASS.
3
HEY, WHY DON'T YOU HEALTH OFFICIALS GET OFF OF OUR ☆#@¤ BACKS?!
4
AND DON'T GET ANGRY. IT CAN LEAD TO HEART DISEASE.

United Kingdom Stroke Association – Stroke Awareness Week 2003

Conclusion

- Important problem
- Important to modify risk factors
- Simple interventions can work
- And also, we need to look into the emerging risk factors.

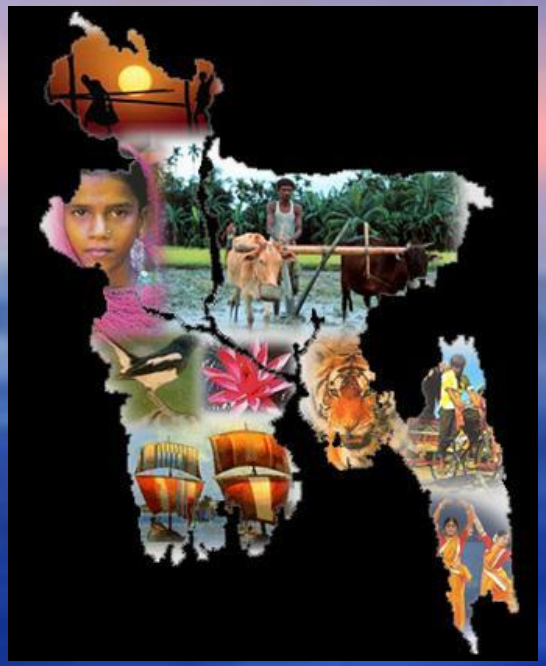
PUBLIC AWARENESS
MEDIA
Working together
for
WAR ON HEART DISEASE
INTERNATIONAL SUPPORT
POLITICAL WILL
SCIENTIFIC EVIDENCE

Knowing is not enough; we must apply.
Willing is not enough; we must do.

Johann Wolfgang von Goethe
(1749–1832)

ACKNOWLEDGEMENT

- BANGLADESH SOCIETY OF MEDICINE
- ORGANIZERS
- DR. ASHIQ, HMO, MU-I,DMC

Good luck!

THANK YOU