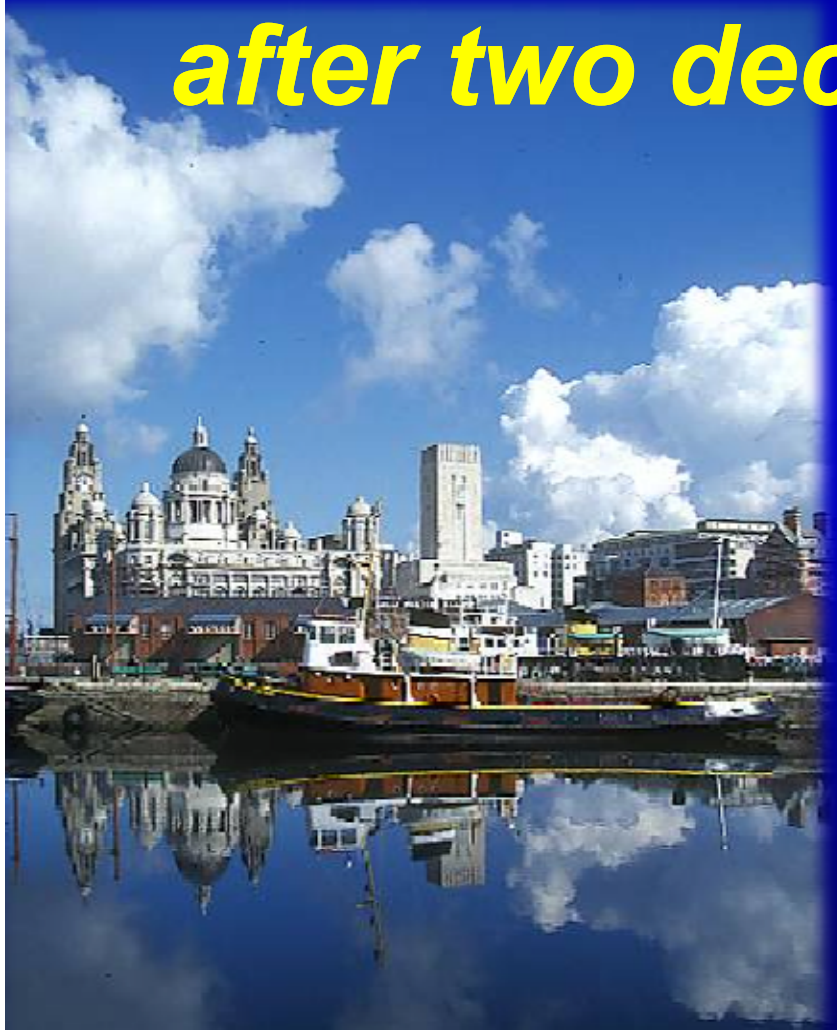
The Party is over:
increase in CVD mortality
after two decades of good news



Simon Capewell

Professor of Clinical Epidemiology

LIVERPOOL UNIVERSITY UK

EuroPrevent 2009

Thanks: *Martin O'Flaherty, Julia Critchley, Fiona Young, Earl Ford, Ann Capewell*

UNIVERSITY OF LIVERPOOL

The Party is over: ↑*CVD mortality after two decades of good news*

THIS TALK

CVD trends: up or **down**

Recent flattening in young people

Adverse trends in **risk factors**

Demographic ageing

1' prevention: tablets or **populations?**

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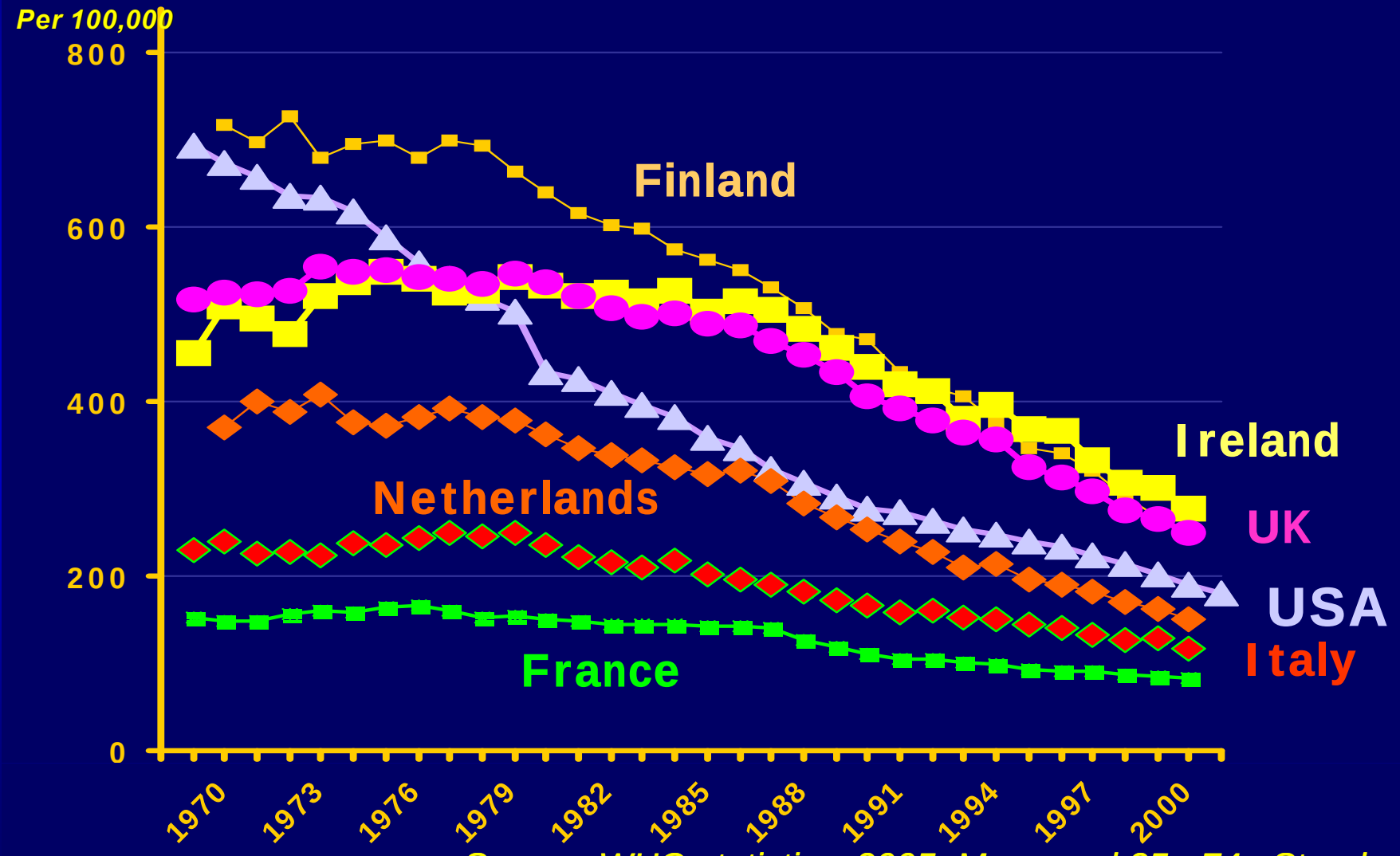
Western Europe

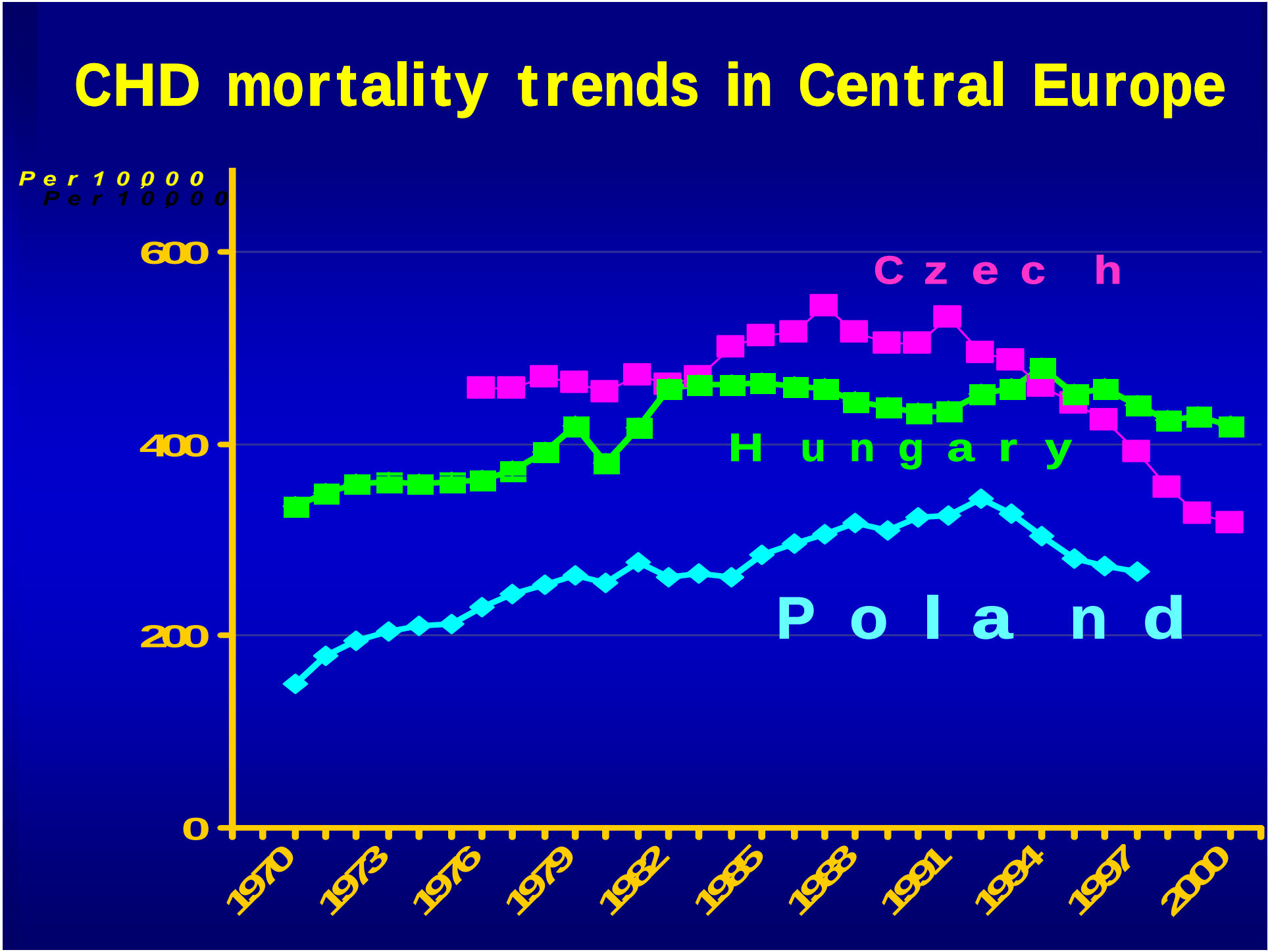
CHD mortality trends
in men, 1968-2003



Source: WHO statistics 2005 Men aged 35 - 74, Standardised

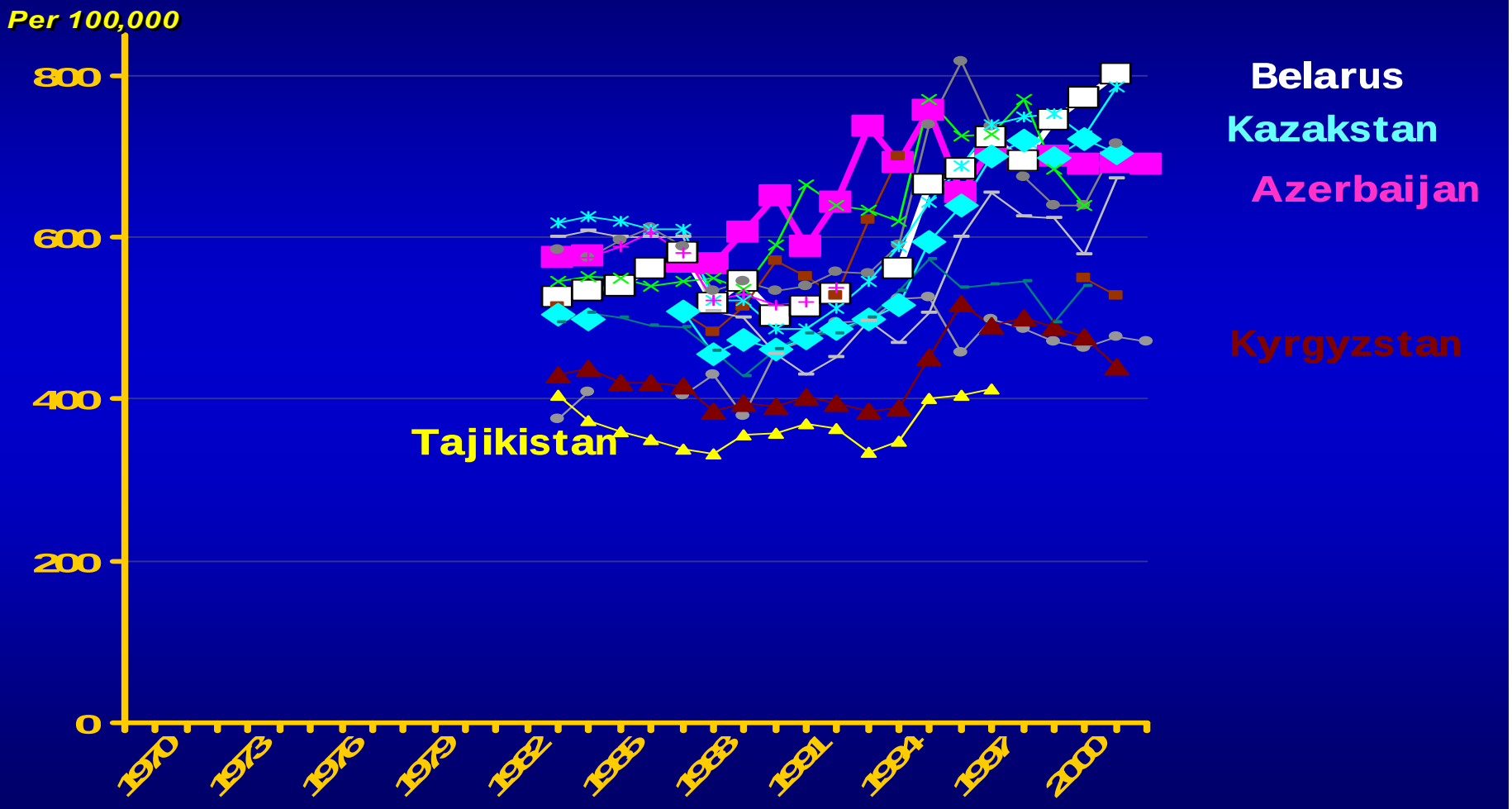
Central Europe

CHD mortality trends in Central Europe



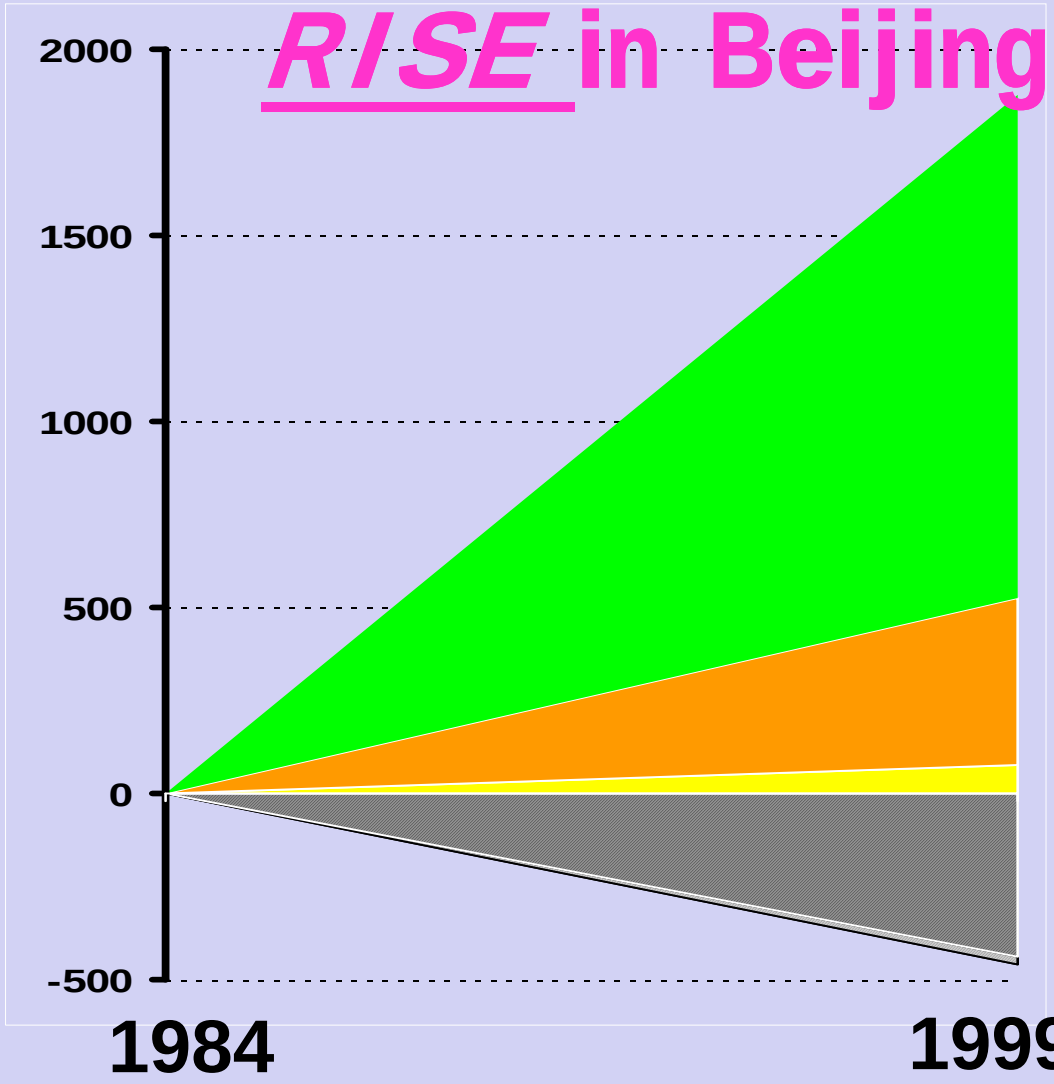
Eastern Europe

Eastern Europe & Former USSR



China: Beijing

IMPACT model: CHD mortality *RISE* in Beijing 1984 – 1999



In 1999: 1820 EXTRA DEATHS ATTRIBUTABLE TO RISK FACTOR CHANGES

370 FEWER DEATHS BY TREATMENTS

Critchley, Capewell et al
Circulation 2004 110: 1236-1244

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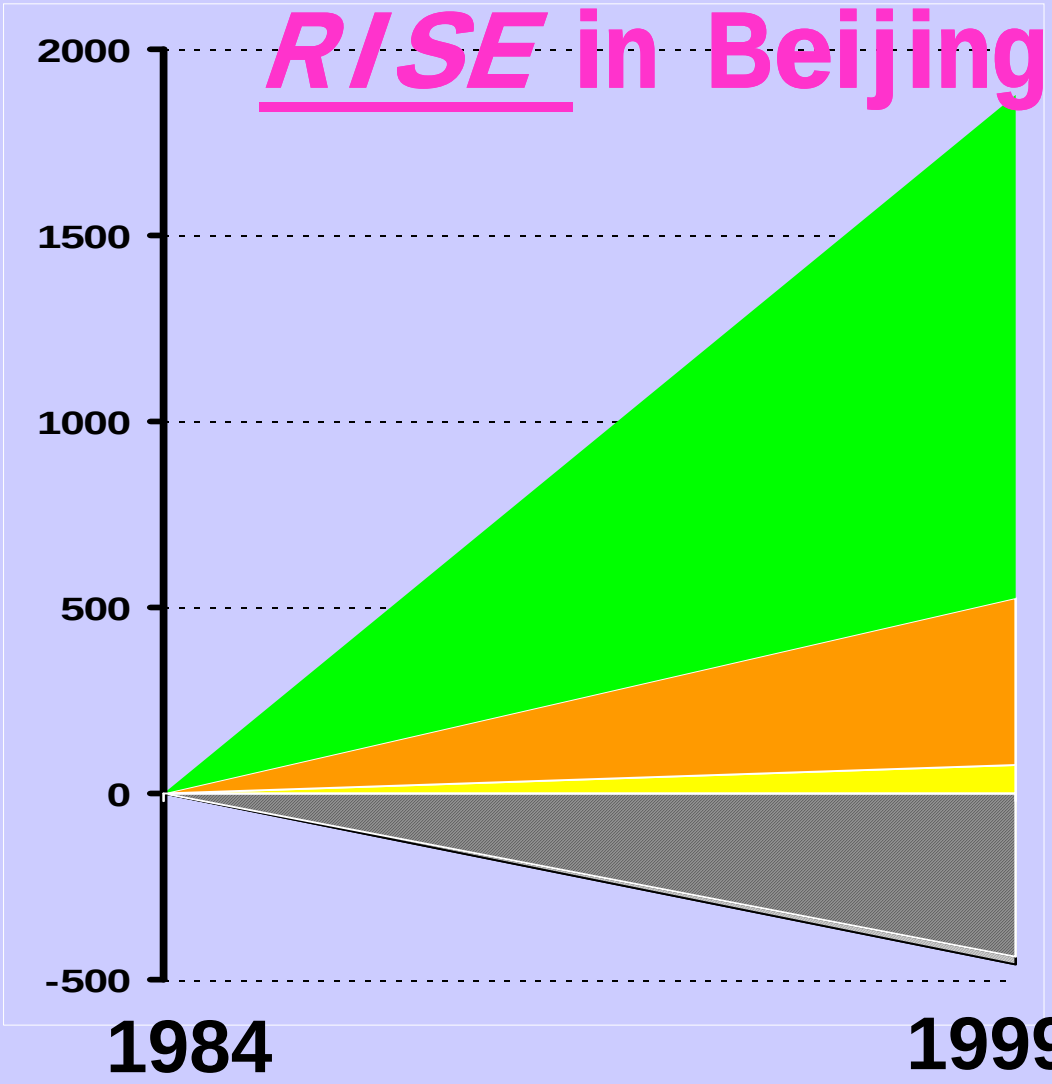

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↑Cholesterol 77%

↑Diabetes 19%
↑BMI 4%
↑Smoking 1%

370 FEWER DEATHS BY TREATMENTS

Critchley, Capewell et al
Circulation 2004 110: 1236-1244

Beijing 1984 – 1999

Cholesterol ⇑ 1.03 mmol/l

Popkin et al Public Health Nutrition 2002 5 169

Beijing 1984 – 1999

Cholesterol ⇑ 1.03 mmol/l

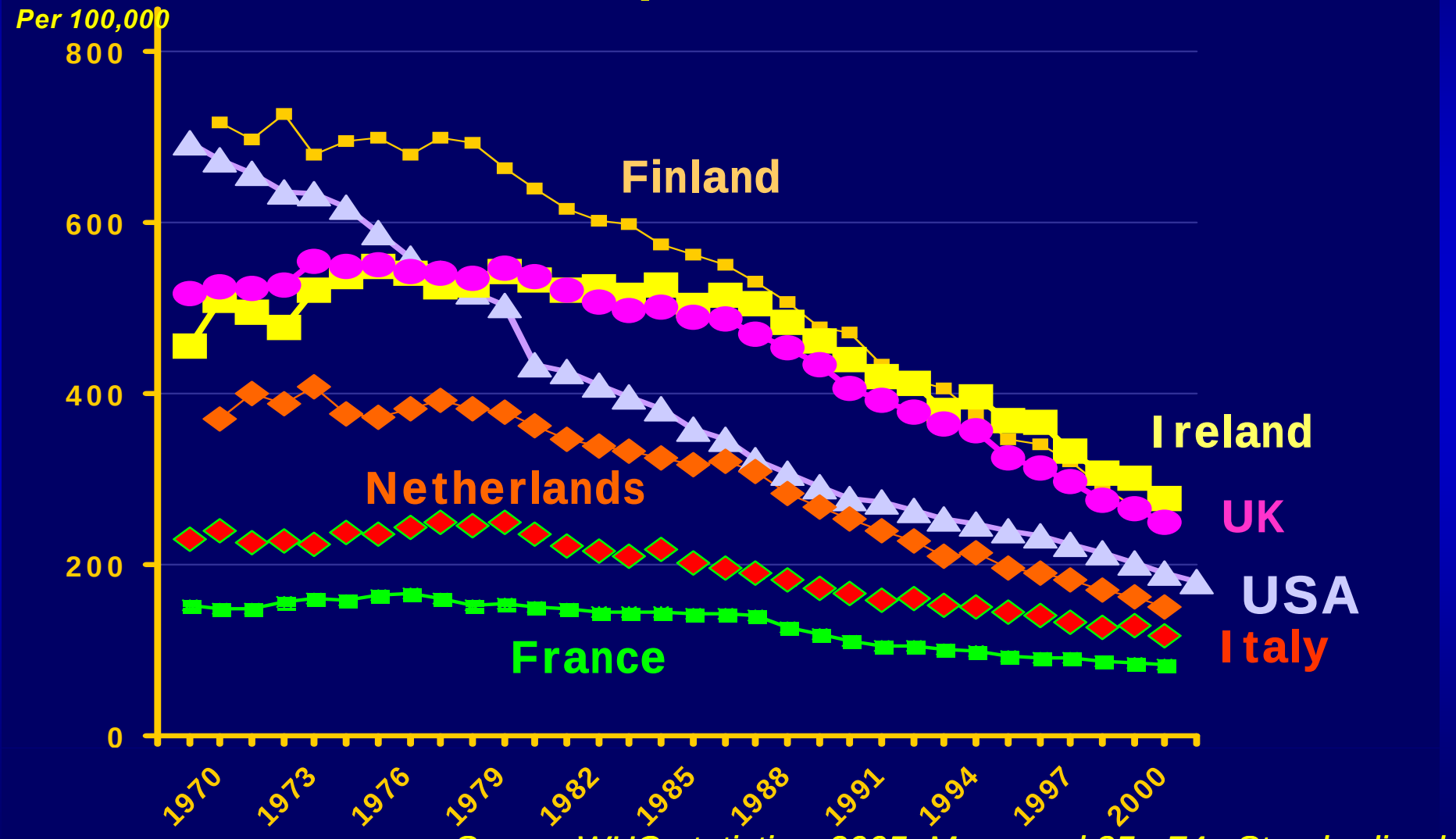
Reflects Westernisation of diet

Popkin et al Public Health Nutrition 2002 5 169

From Traditional to Modern..... Marketing of (Globalised) Food

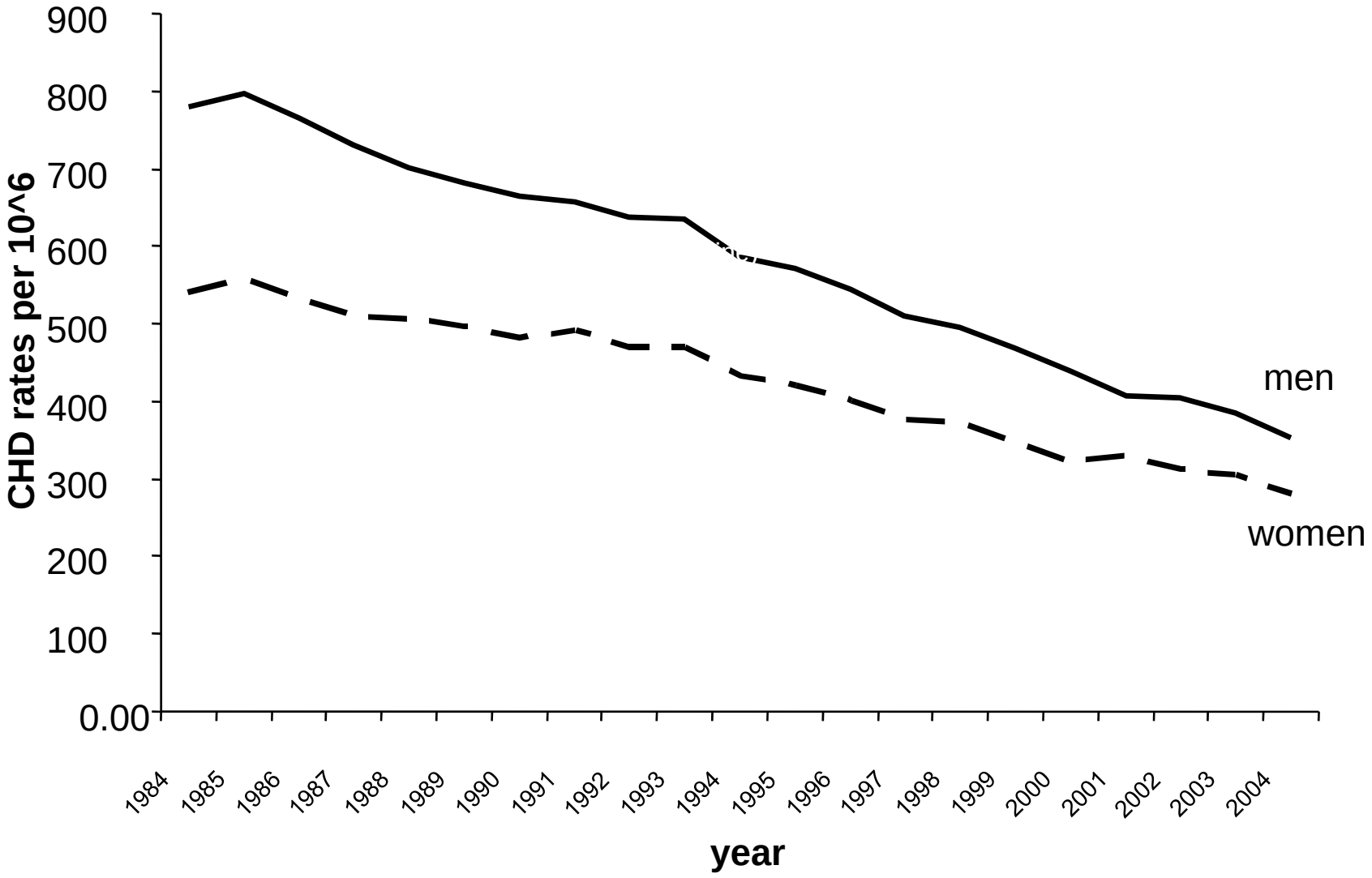
Flattening CVD mortality trends

Western CHD mortality trends
in men, 1968-2003



Source:WHO statistics 2005 Men aged 35 - 74, Standardised

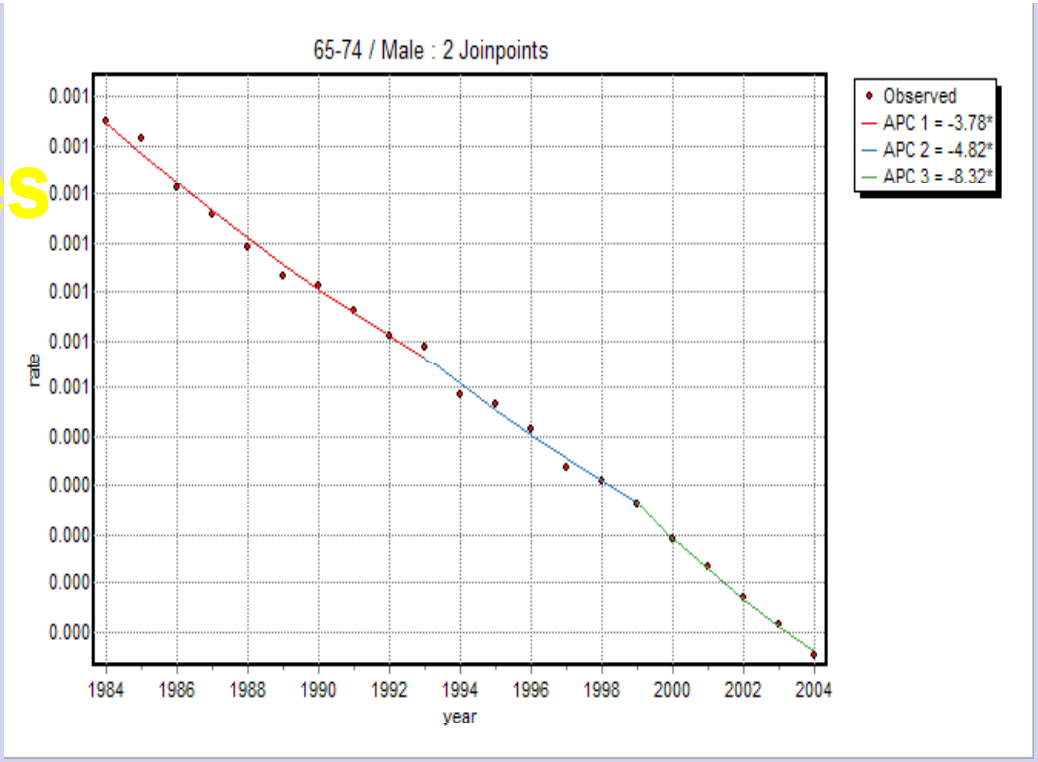
UK 1984-2004
Overall age-adjusted CHD mortality rates



UK Age-specific CHD mortality rates 1984-2004

Men 54 - 65

- **JoinPoint Analysis**
- **3 periods identified**
- **annual percent change increased**



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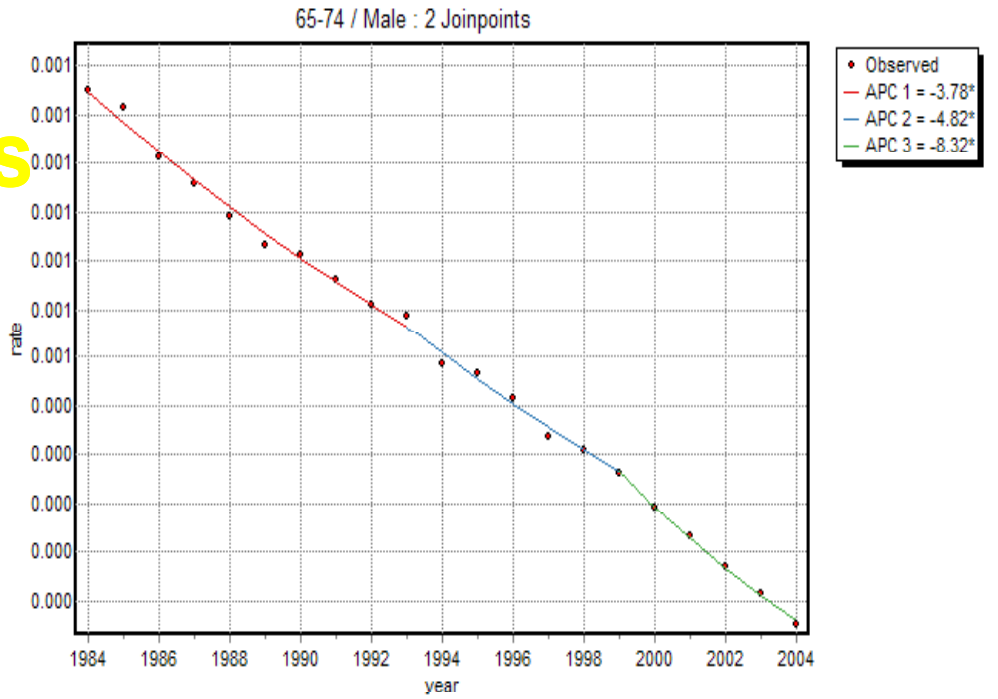
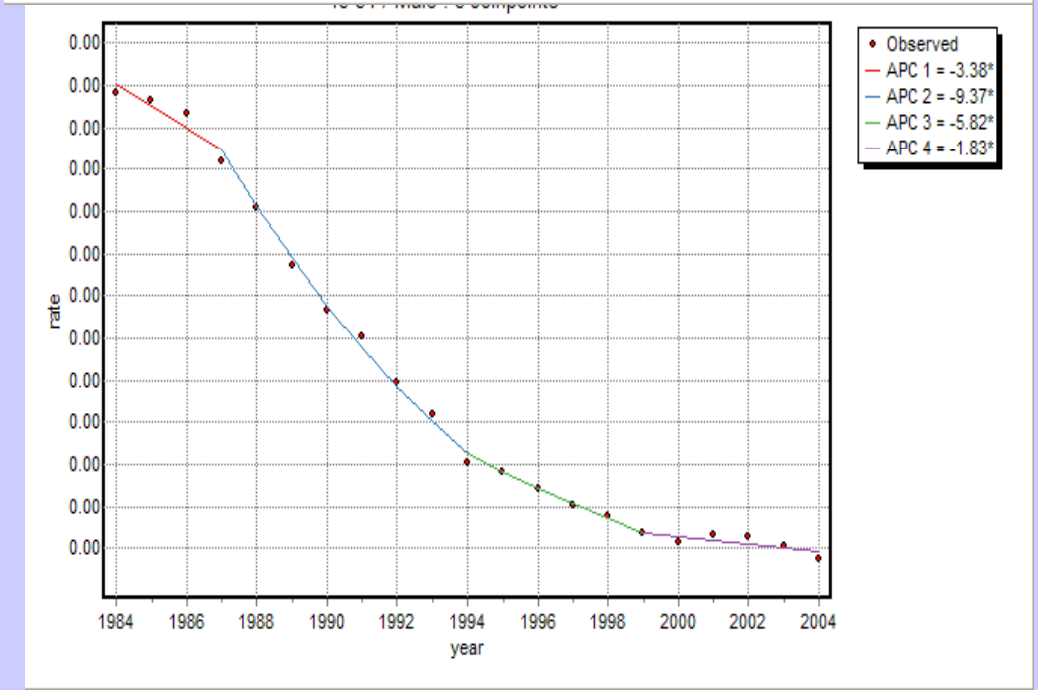


Rates Flattening in Men 45-54

- **4 periods identified**
- **annual percent change decreased**

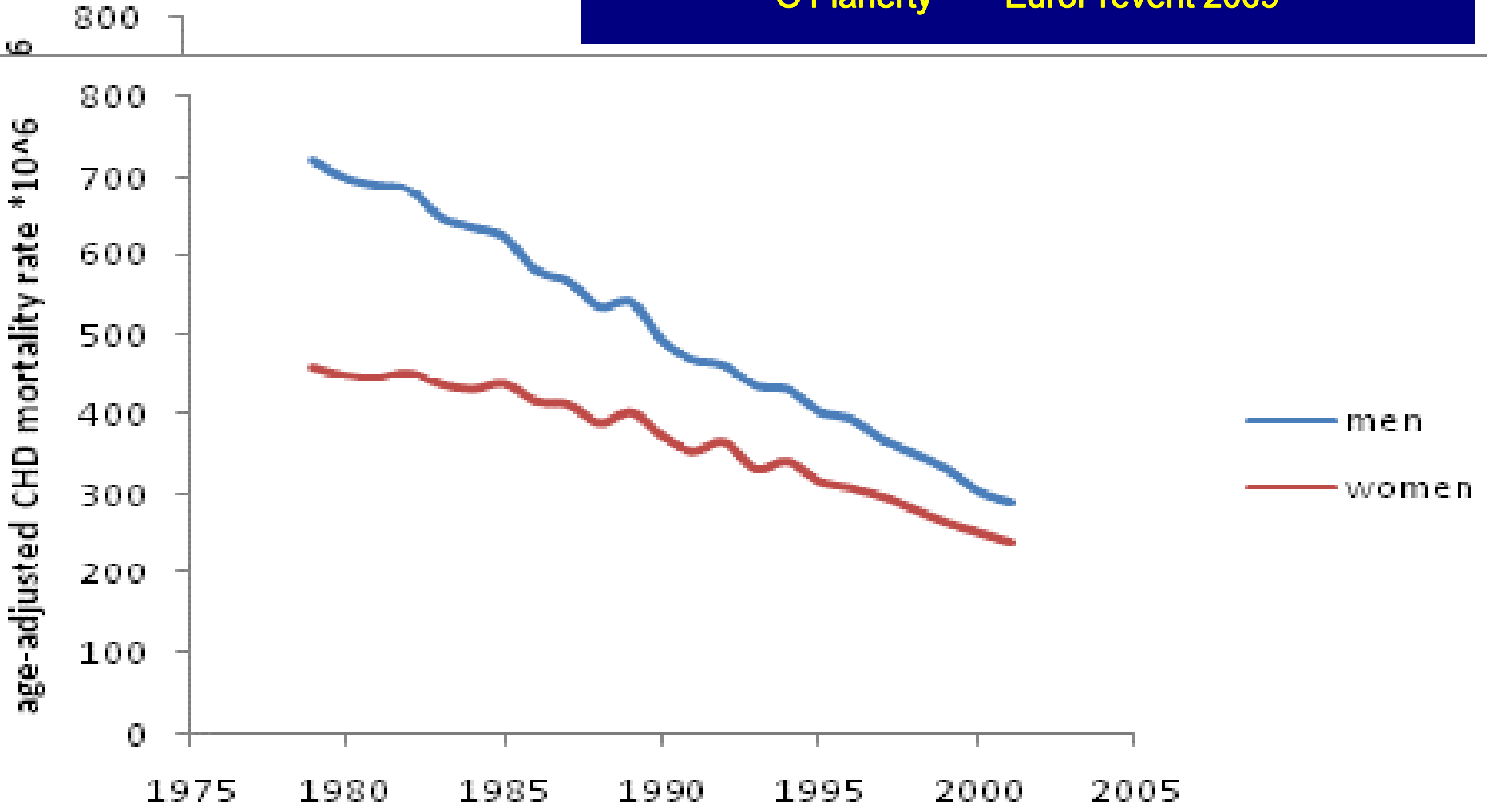


AUSTRALIA
Age-specific CHD mortality rates 1979-2001

O'Flaherty et al EuroPrevent 2009

Australia 1979 – 2001 Age-adjusted rates

O'Flaherty et al EuroPrevent 2009



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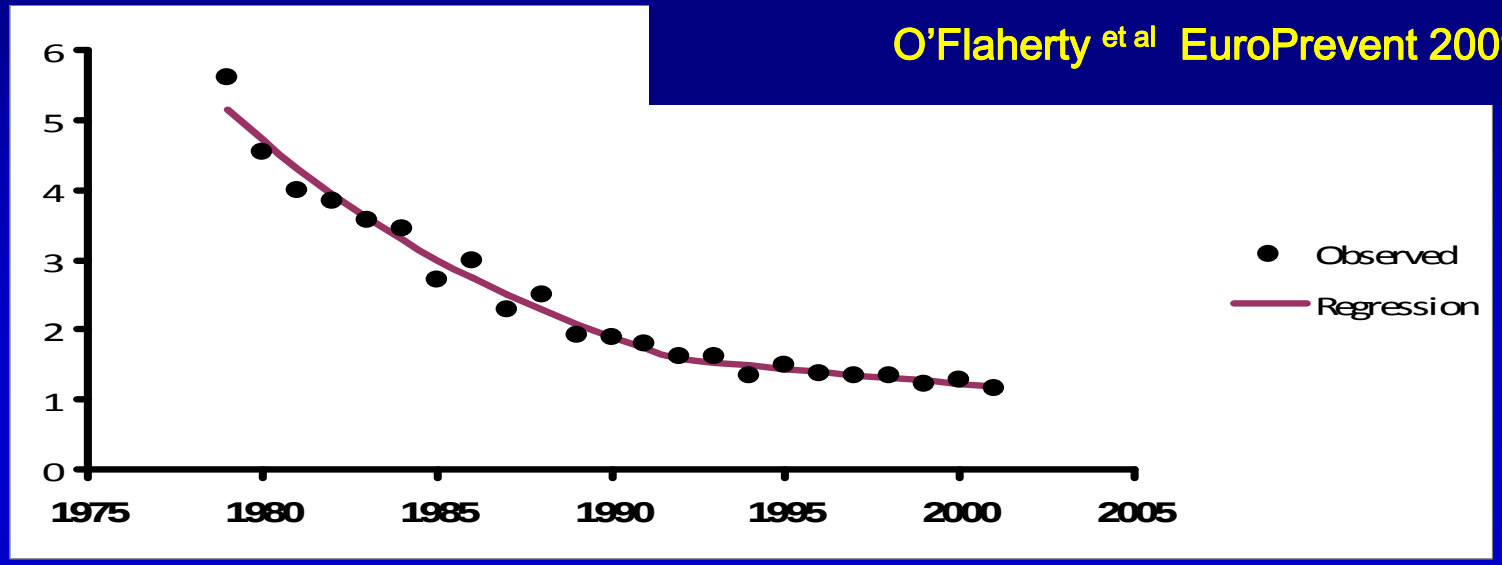
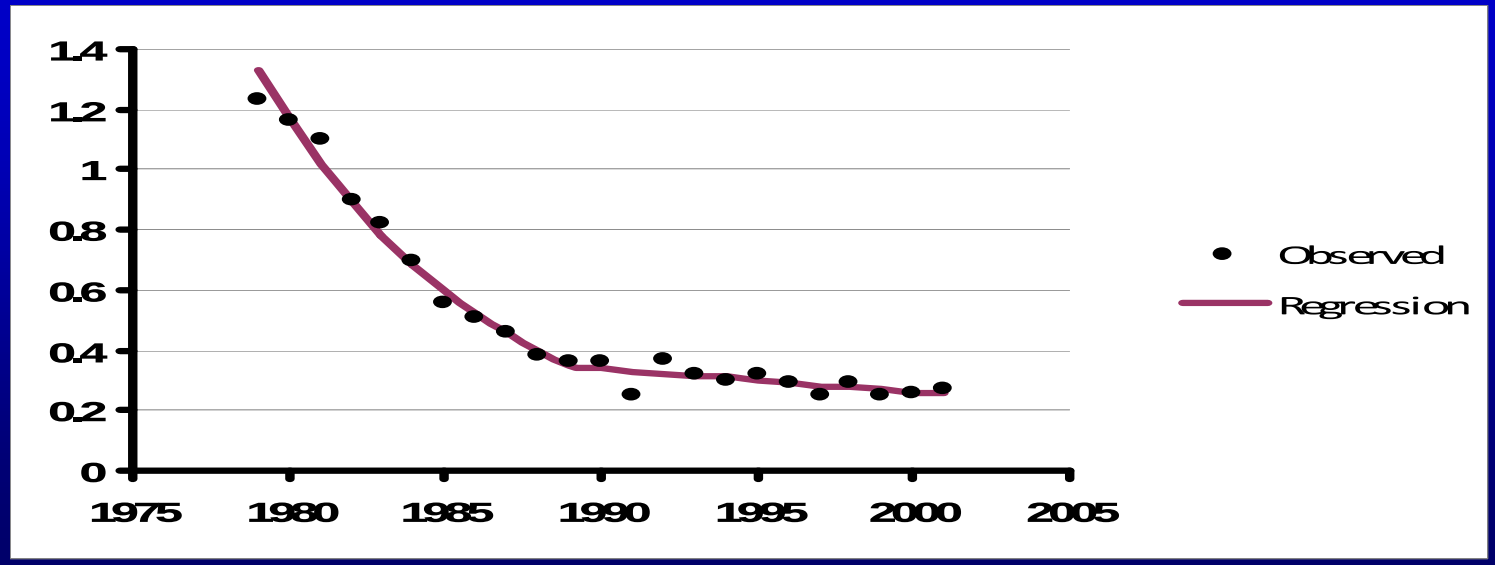
Age-specific CHD mortality rates 1979-2001

O'Flaherty et al EuroPrevent 2009



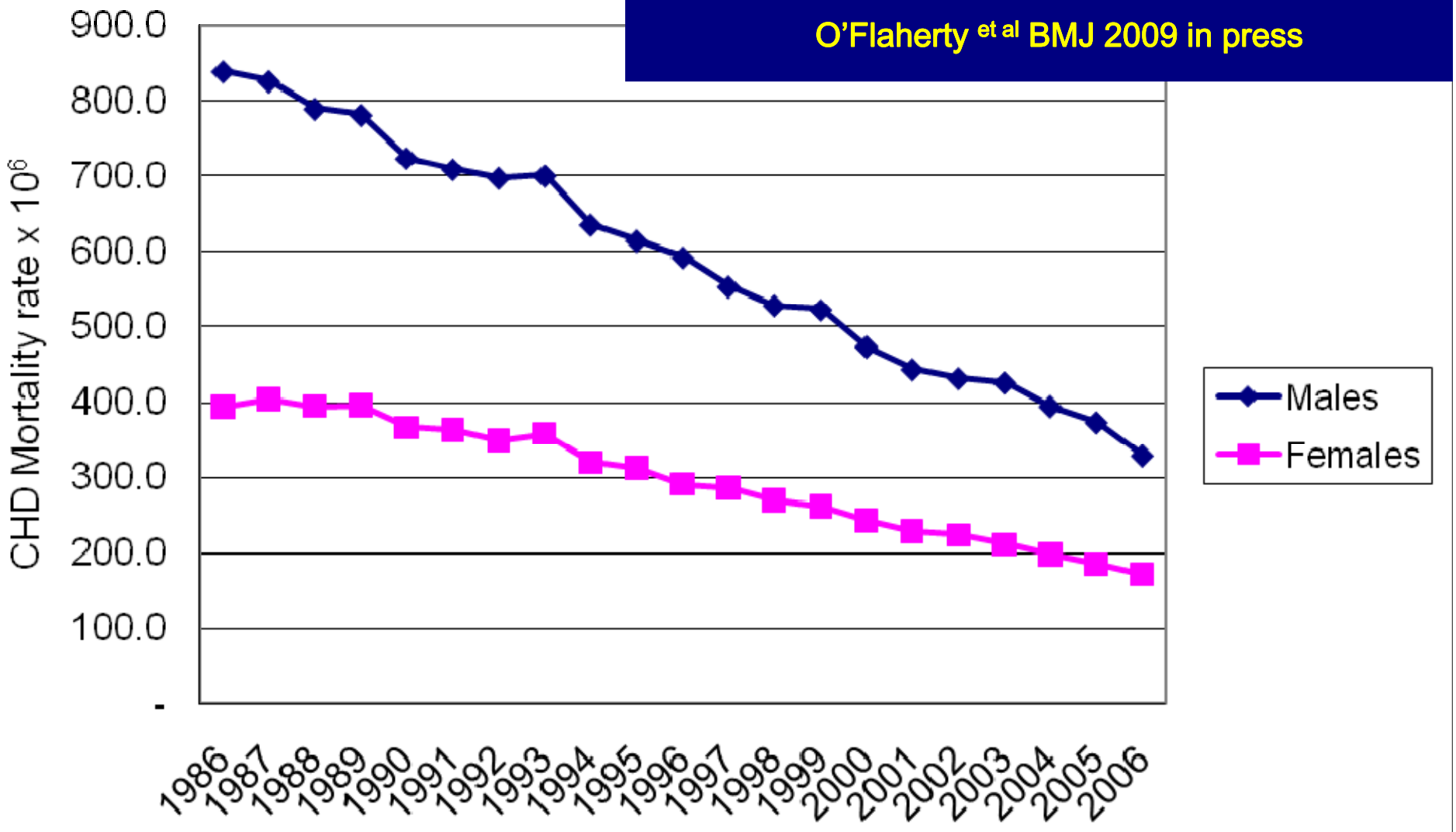
MEN 35-44



WOMEN 35-44

Scottish CHD mortality rates 1986-2006: age-standardised

O'Flaherty et al BMJ 2009 in press



Scottish CHD mortality rates 1986-2006: age & deprivation

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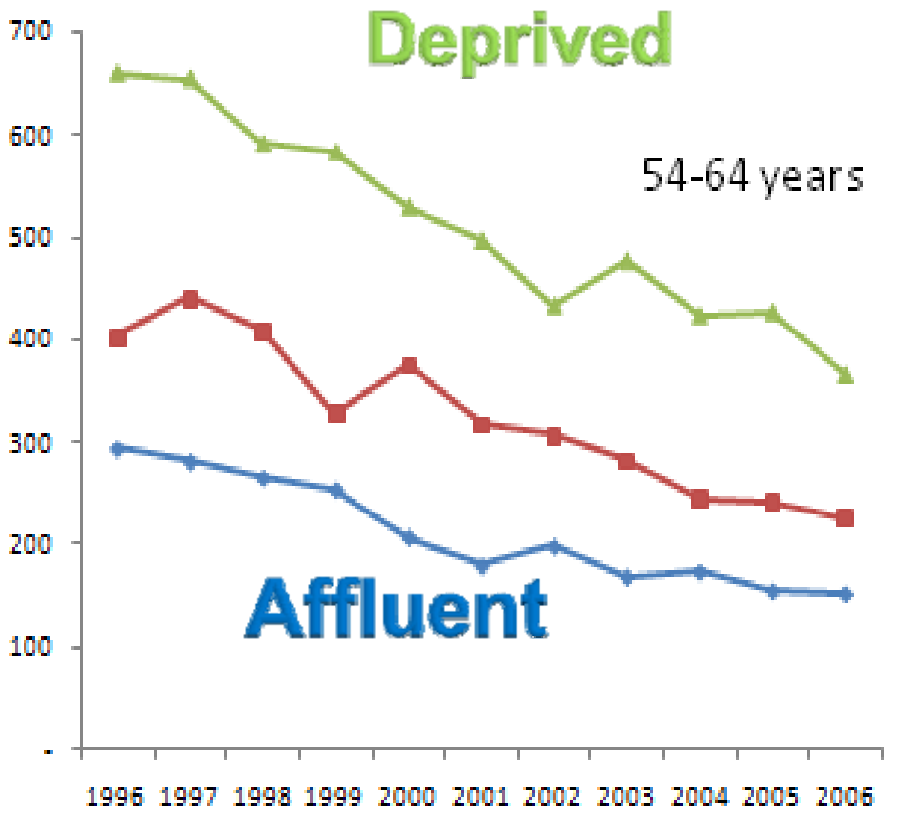

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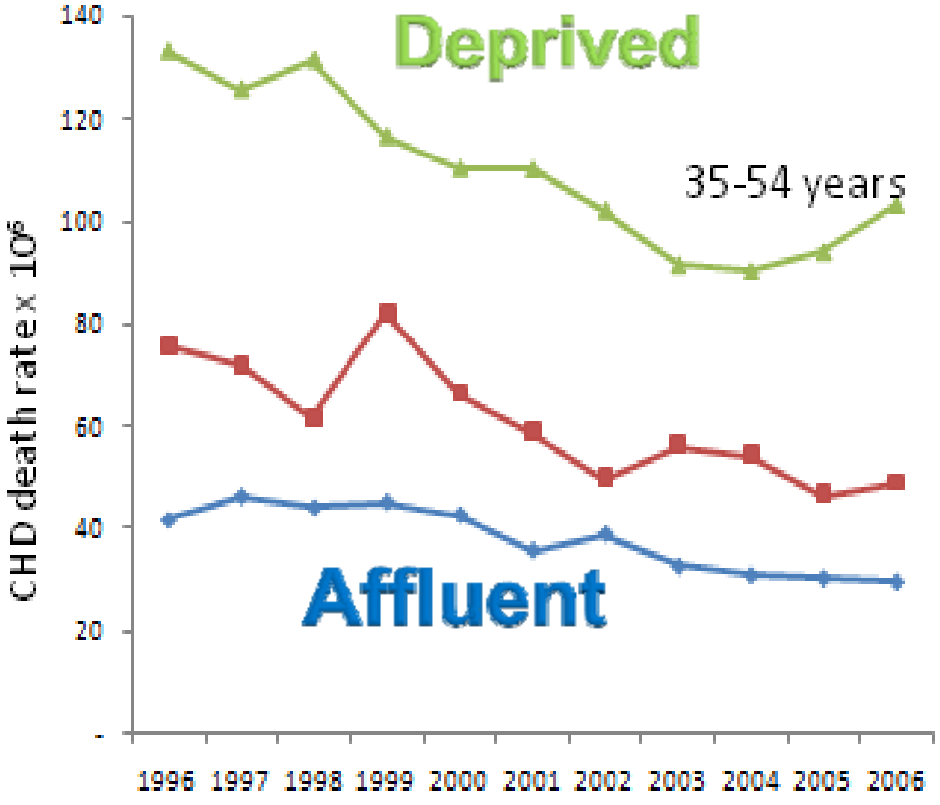
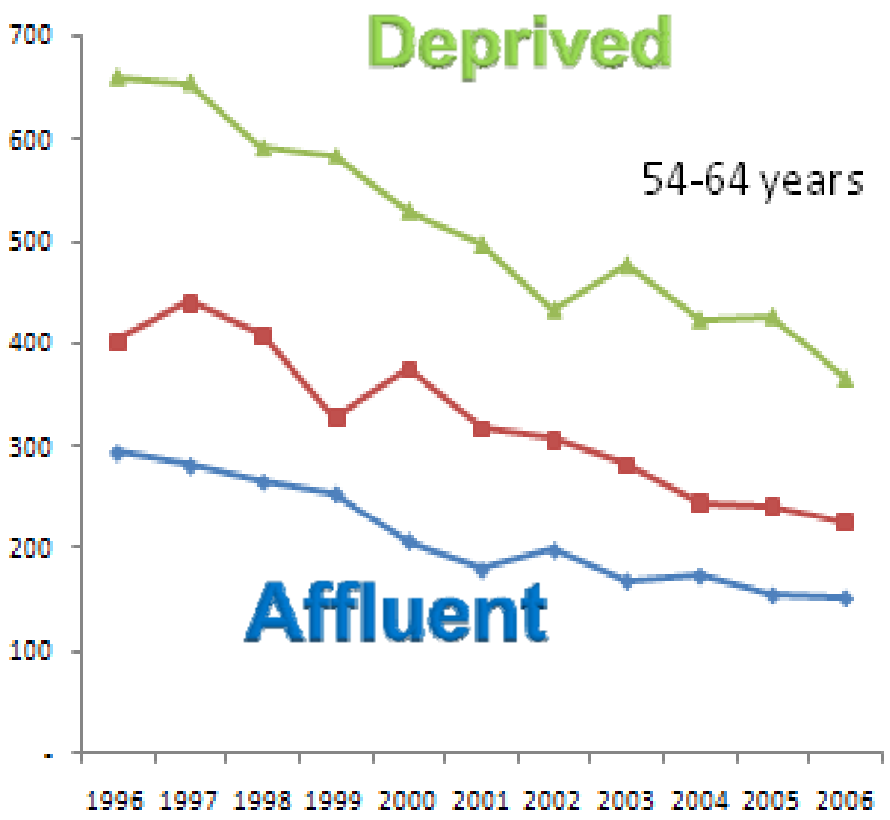
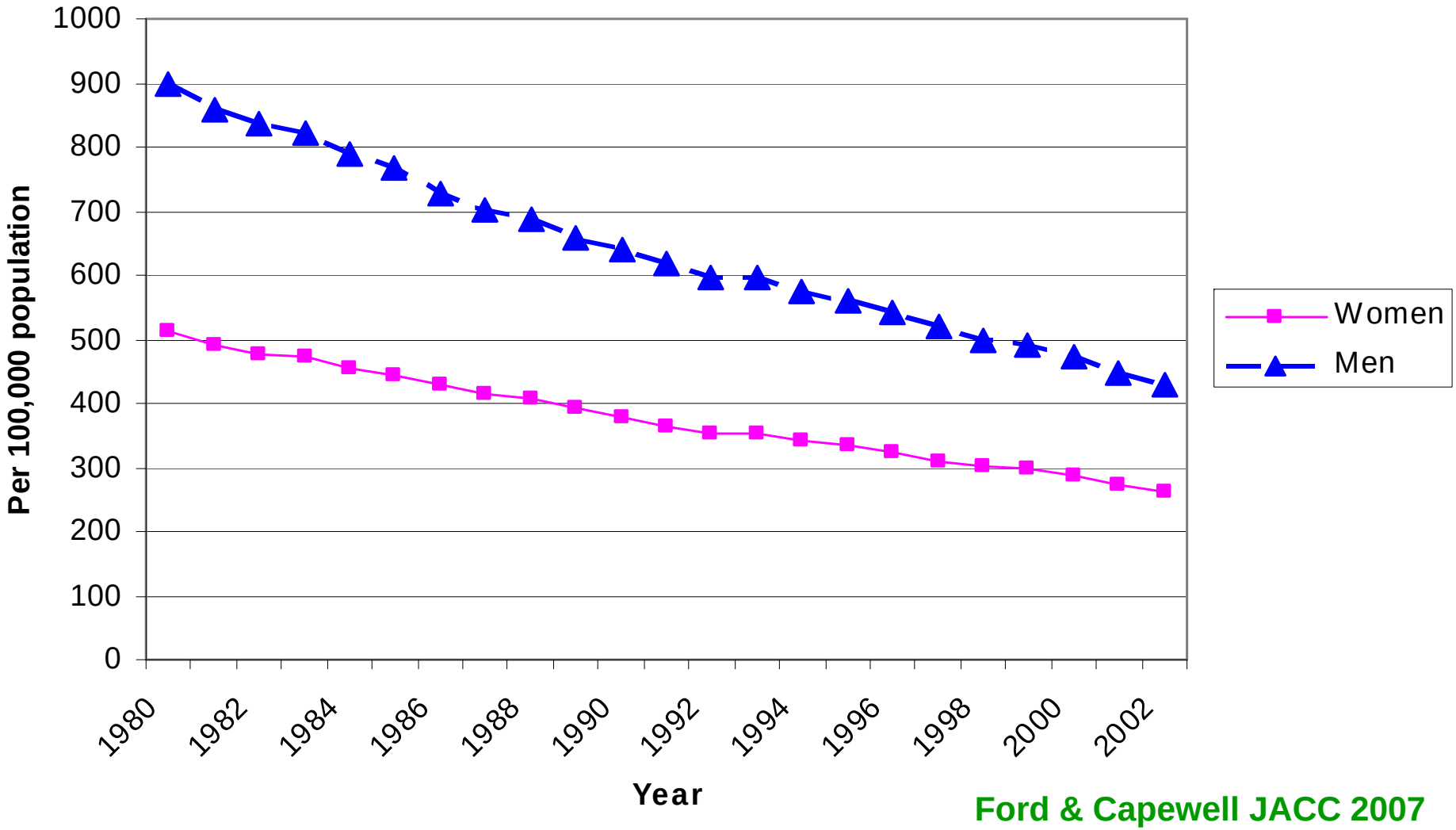


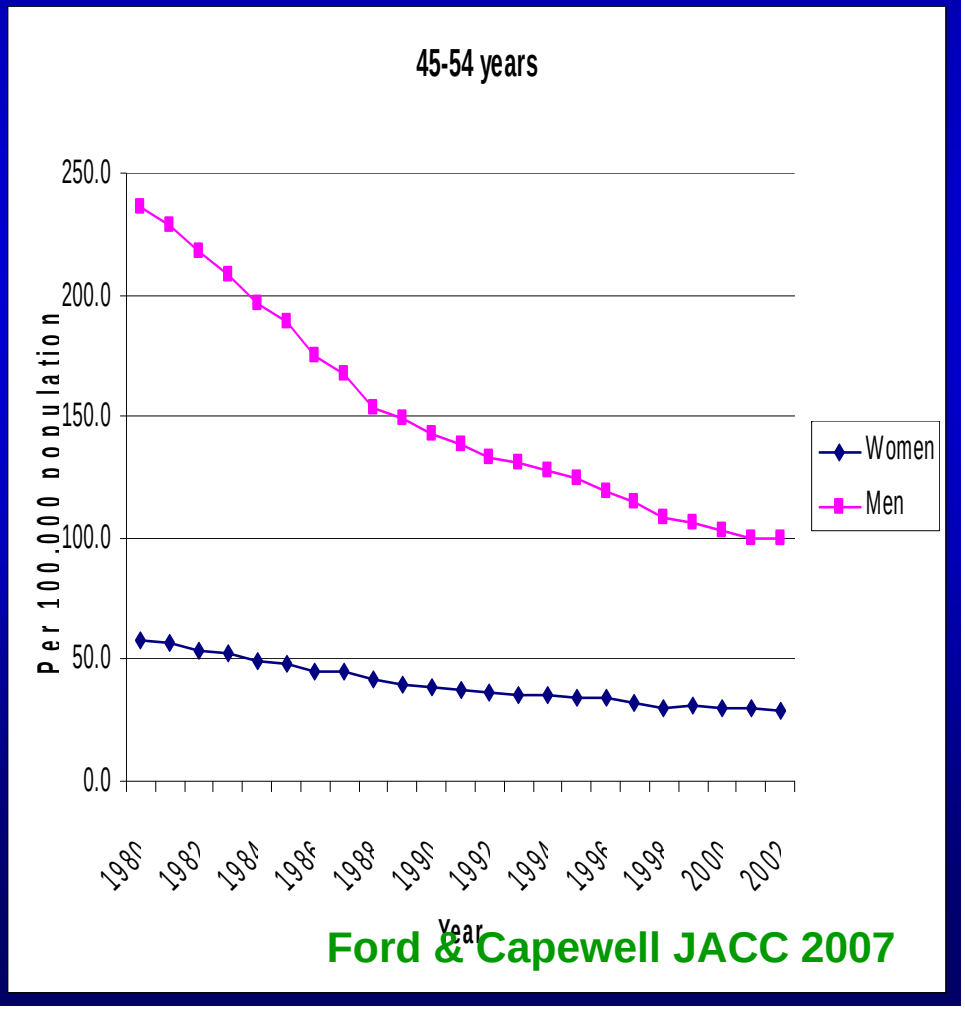


AGE-ADJUSTED CHD mortality trends USA 1980 - 2002



Ford & Capewell JACC 2007

AGE-SPECIFIC CHD mortality trends USA 1980 - 2002



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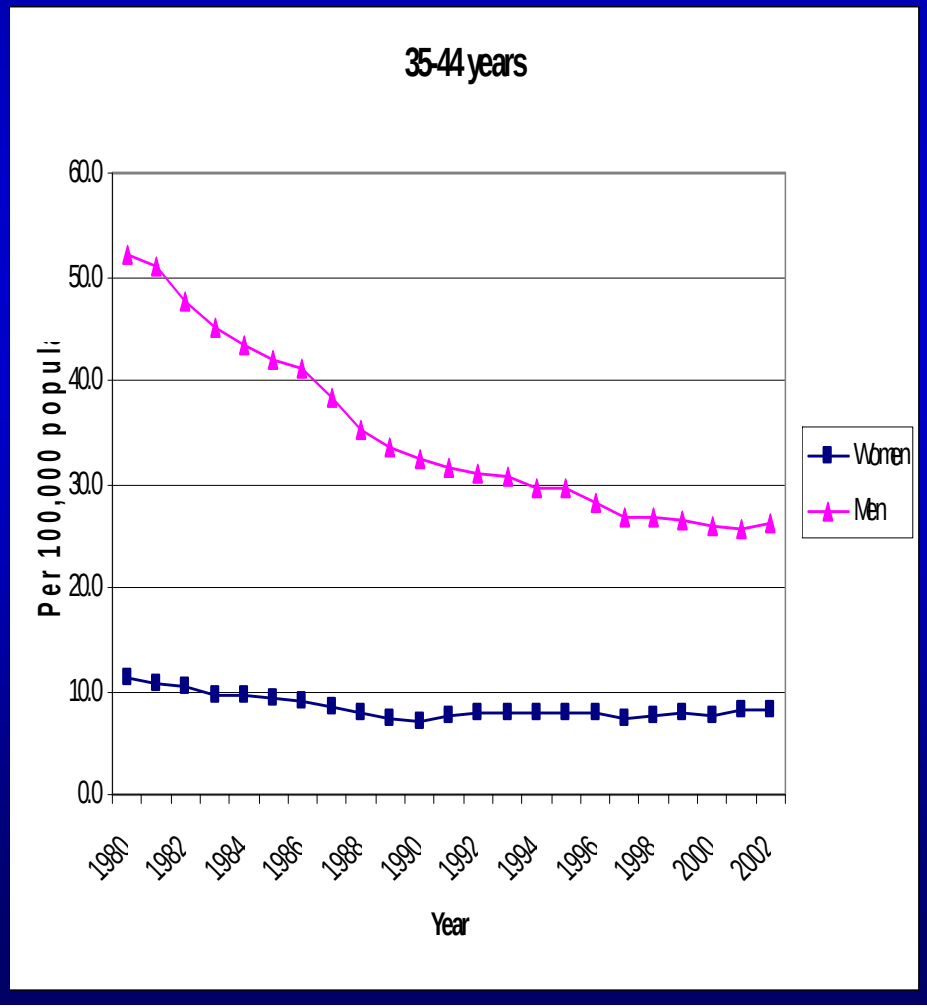
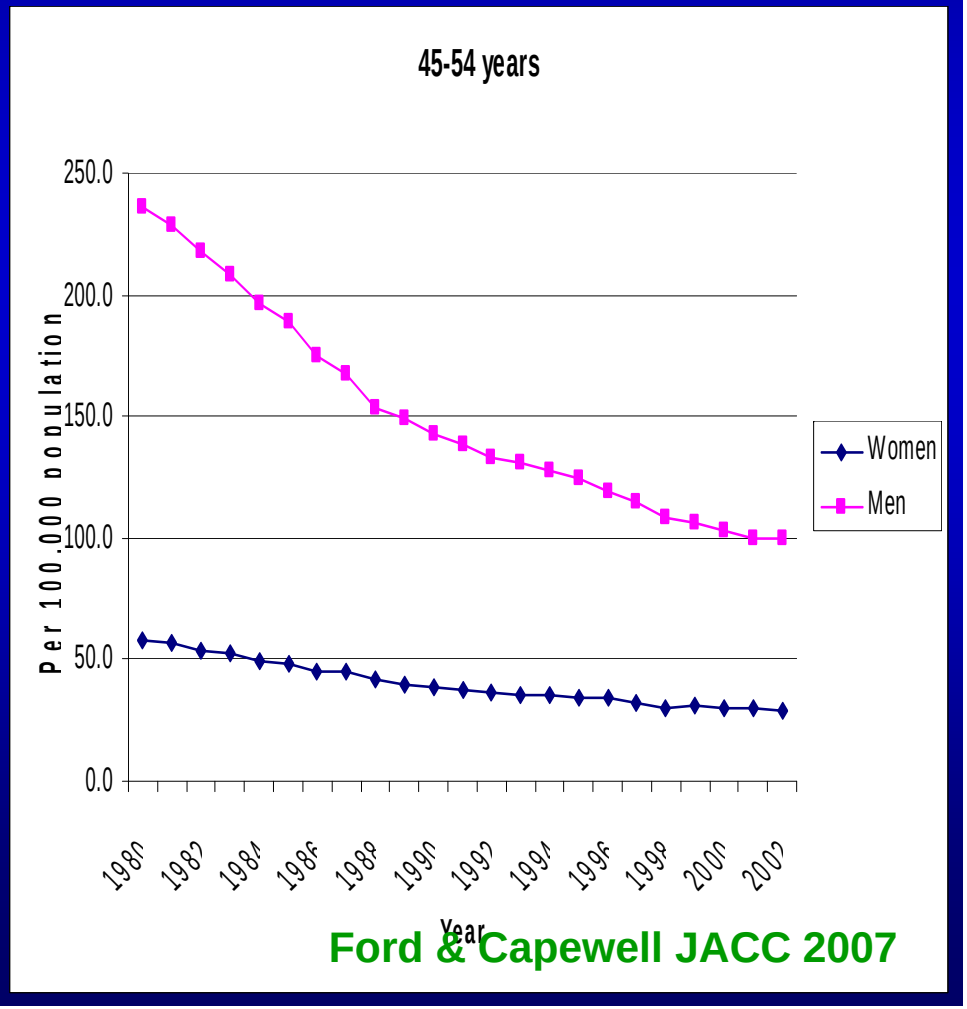


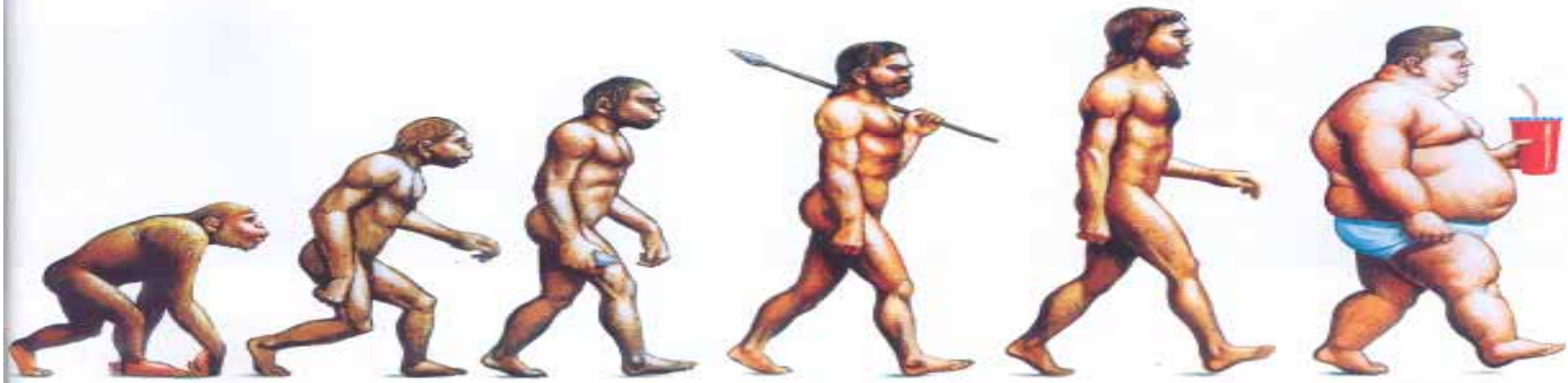


Ford & Capewell JACC 2007

The Economist

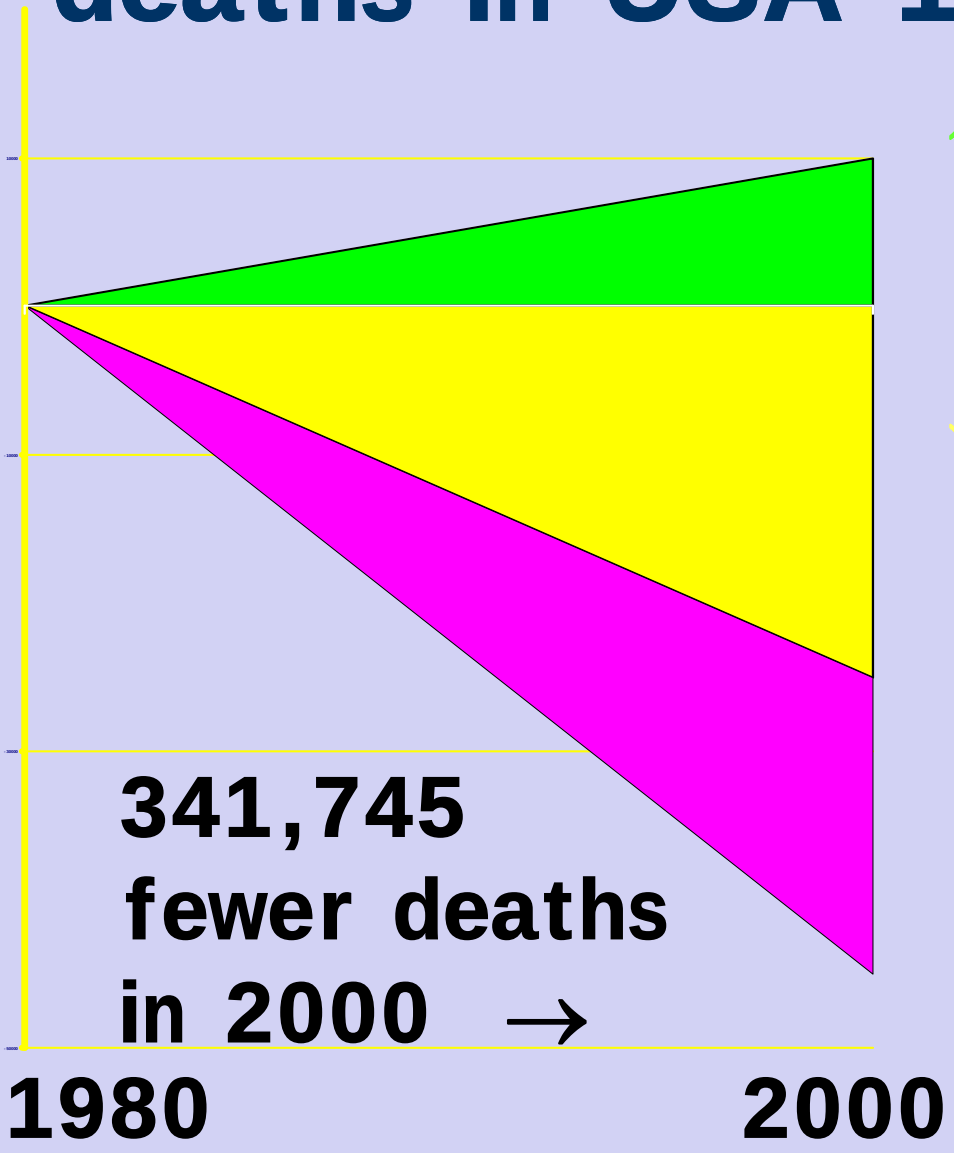
DECEMBER 13TH–19TH 2003 www.economist.com

The shape of things to come



Explaining the fall in CHD deaths in USA 1980-2000

NEJM 2007; 356: 2388.



⇑ ***Risk Factors worse +17%***

⇓ ***Risk Factors better -65%***

Treatments -47%

Explaining the fall in CHD deaths in USA 1980-2000

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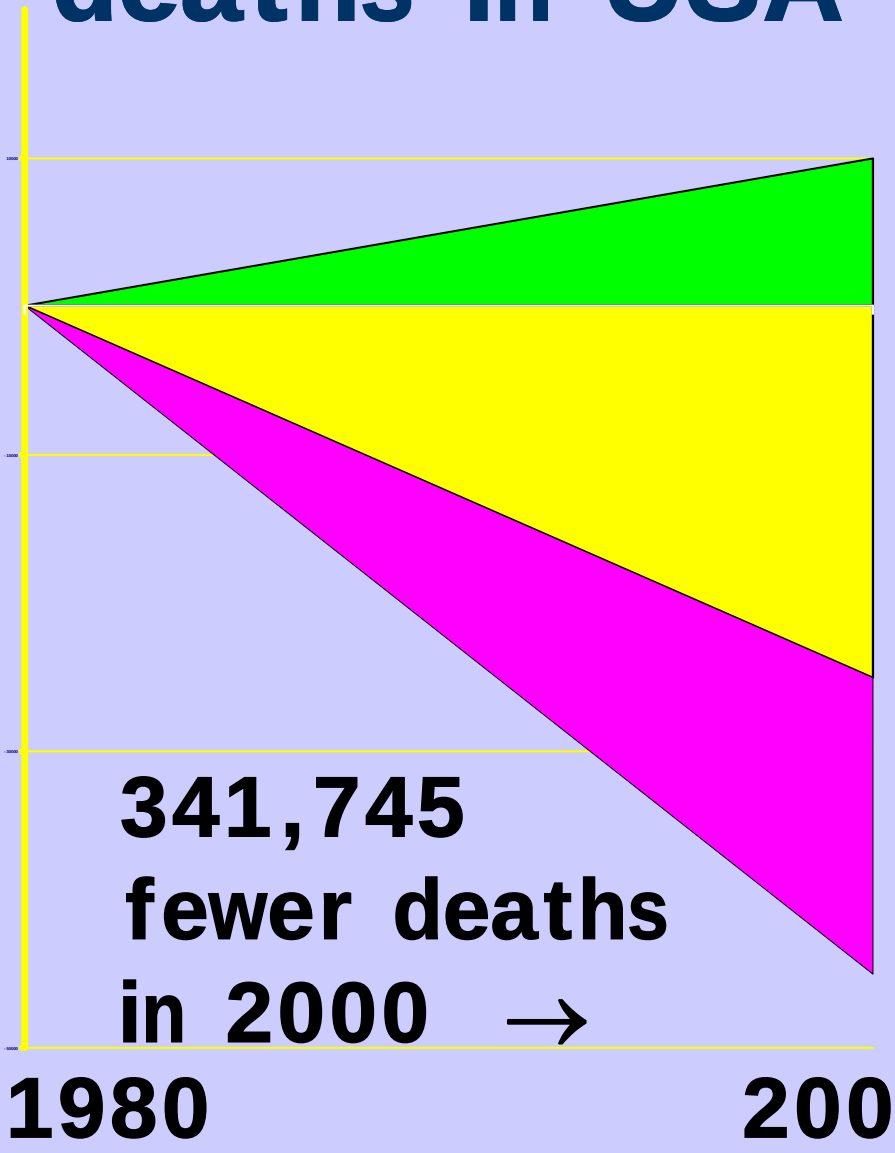


⇑*Risk Factors worse +17%*

↑ **Obesity (increase) +7%**

↑ **Diabetes (increase) +10%**

⇓*Risk Factors better -65%*

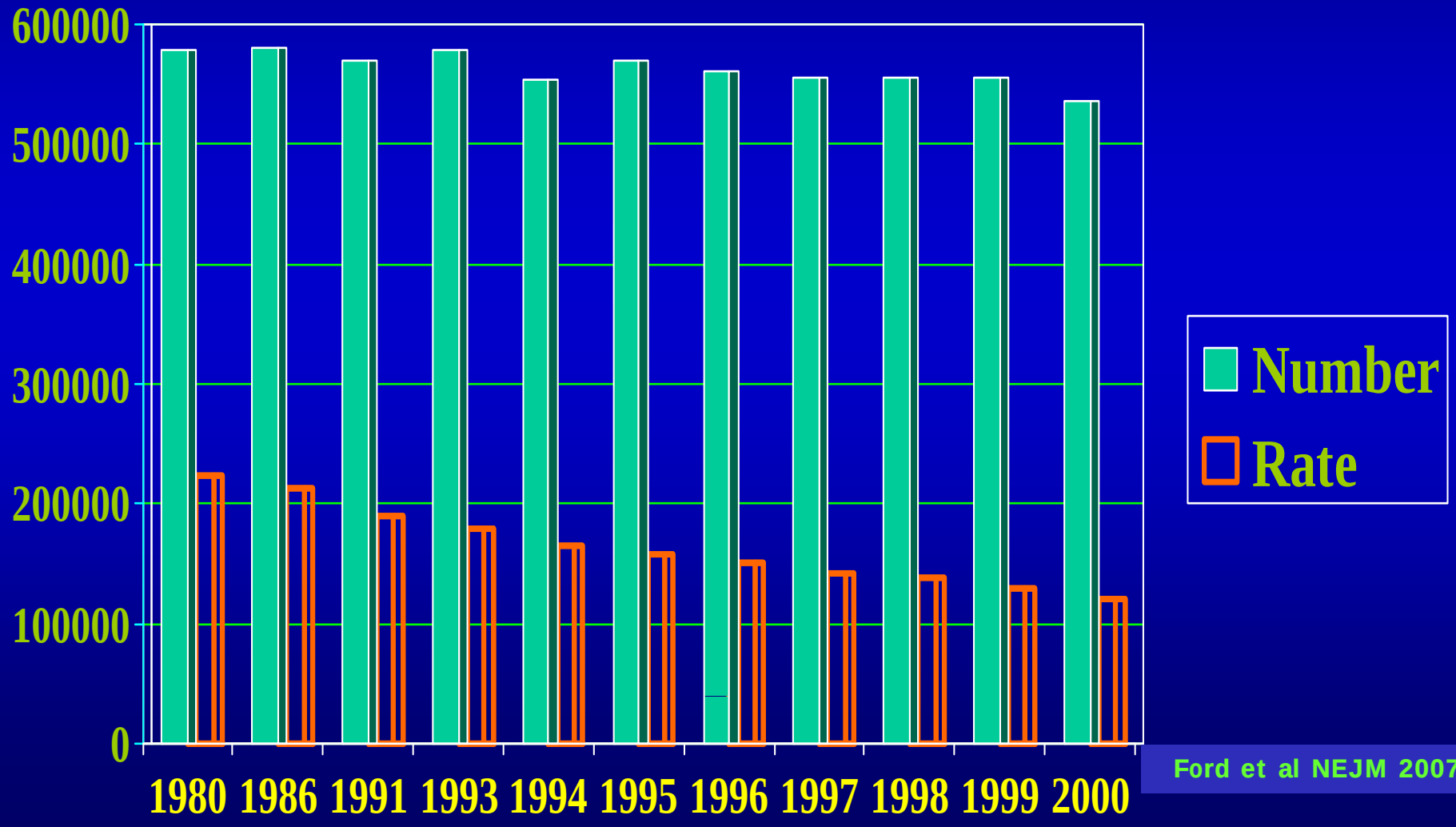
⇓**Population BP fall -20%**
⇓**Smoking -12%**
⇓**Cholesterol (diet) -24%**
↑**Physical activity -5%**

Treatments -47%

Unexplained -9%

Demographic Trends: *population ageing*

USA Trends 1980-2000: *CHD mortality* ***rates*** *versus* ***numbers*** of CHD deaths



Ford et al NEJM 2007

USA CHD projections 2000-2010

If recent risk factor trends continue

If Healthy People 2010 Targets reached

Capewell et al WHO Bulletin 2009

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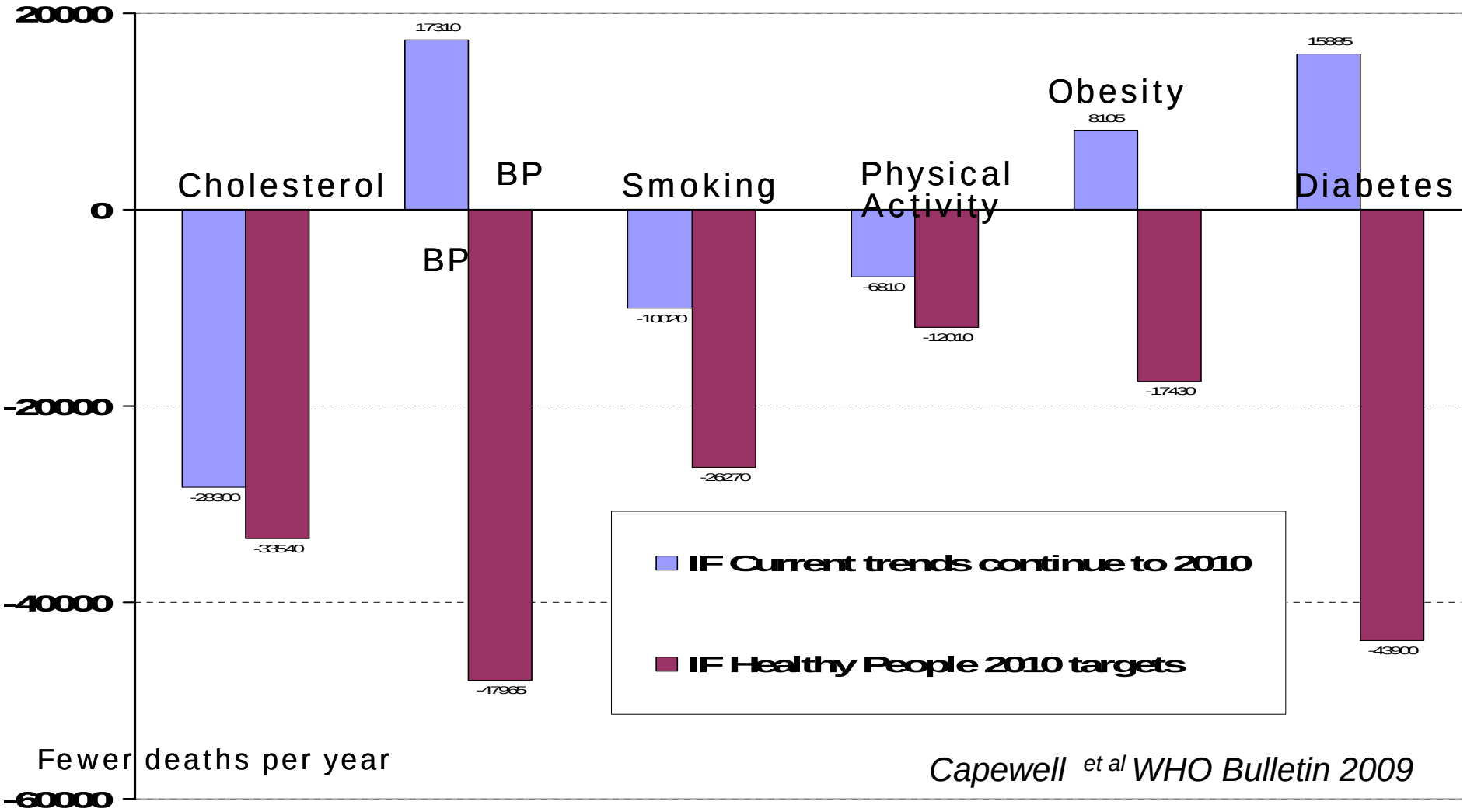


Capewell et al WHO Bulletin 2009

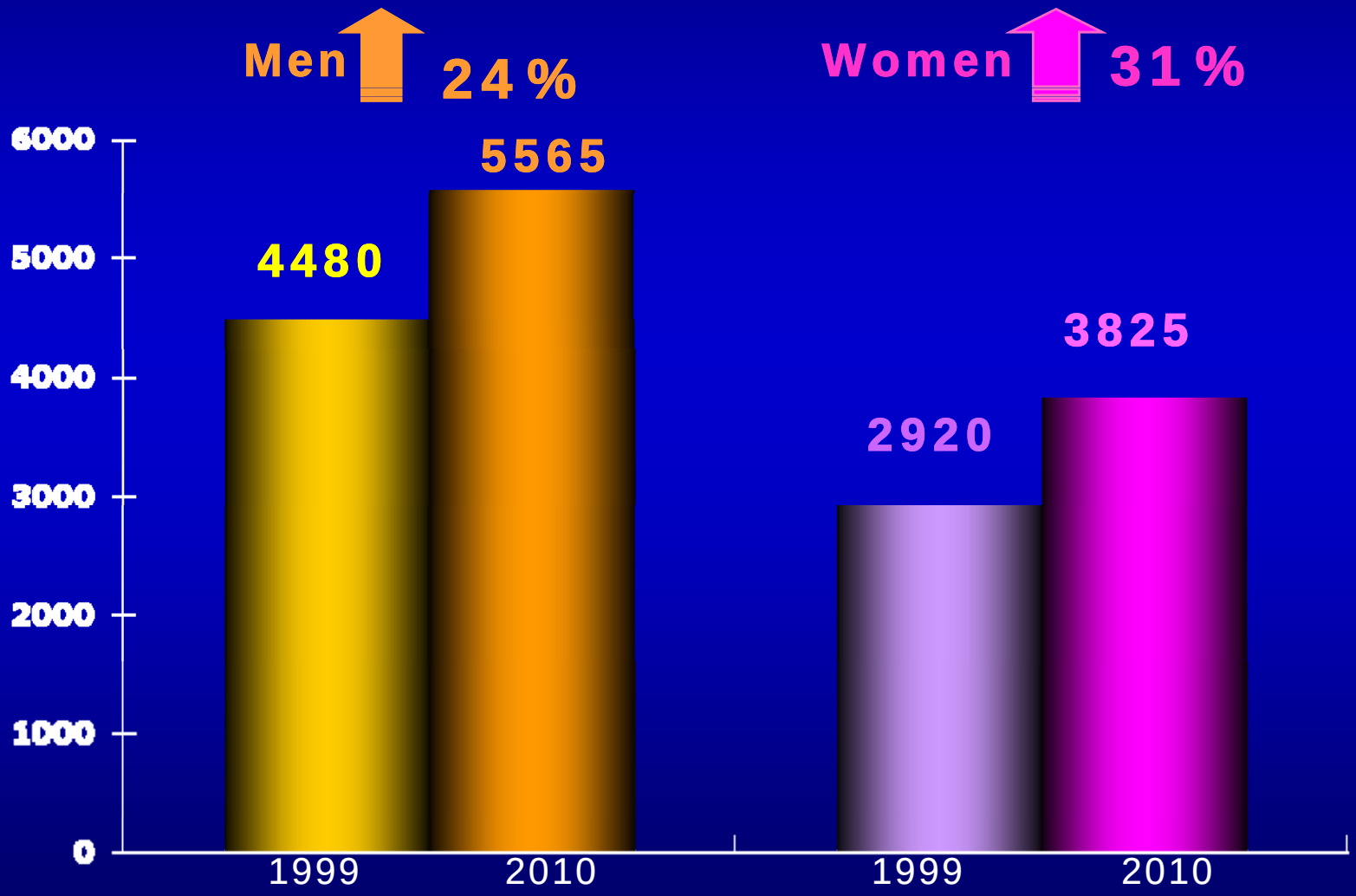
Beijing projections 1999- 2010

Cheng et al *BMC Public Health 2009* ***9*** *30*

Cheng et al *BMC Public Health 2009 9 30*

CHD DEATHS Beijing 2010 projections

27% increases simply due to population ageing



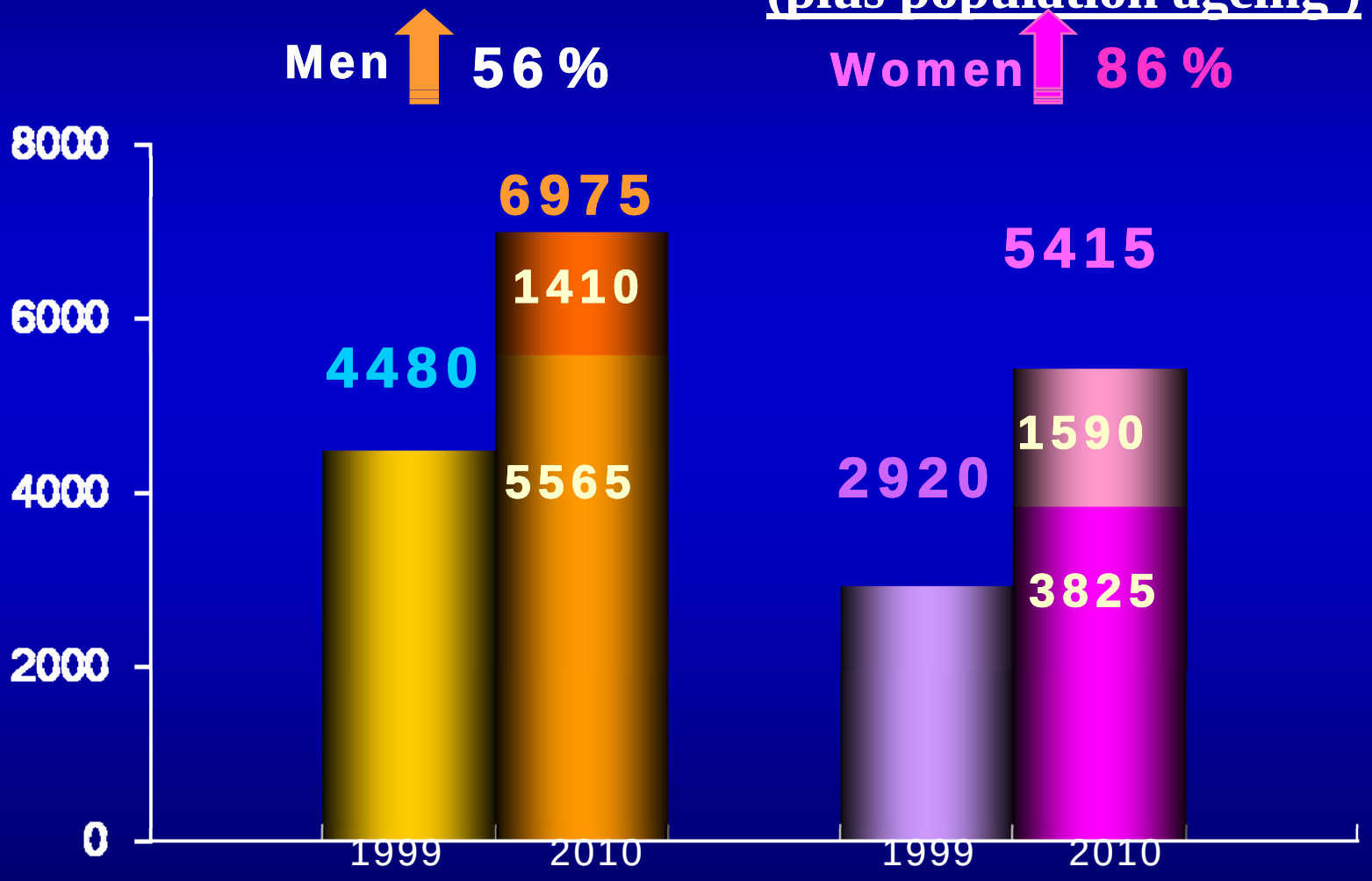
total 9390, 27% increase (approx 1990 more deaths)

Projected CHD Deaths in Beijing 2010

67% increase if risk factor trends continue to 2010)

Cheng et al *BMC Public Health 2009 9 30*

(plus population ageing)



total 12390, 67% increase (4990 more deaths)

Primary prevention in UK & USA:

Primary prevention in UK & USA:

tablets for individuals

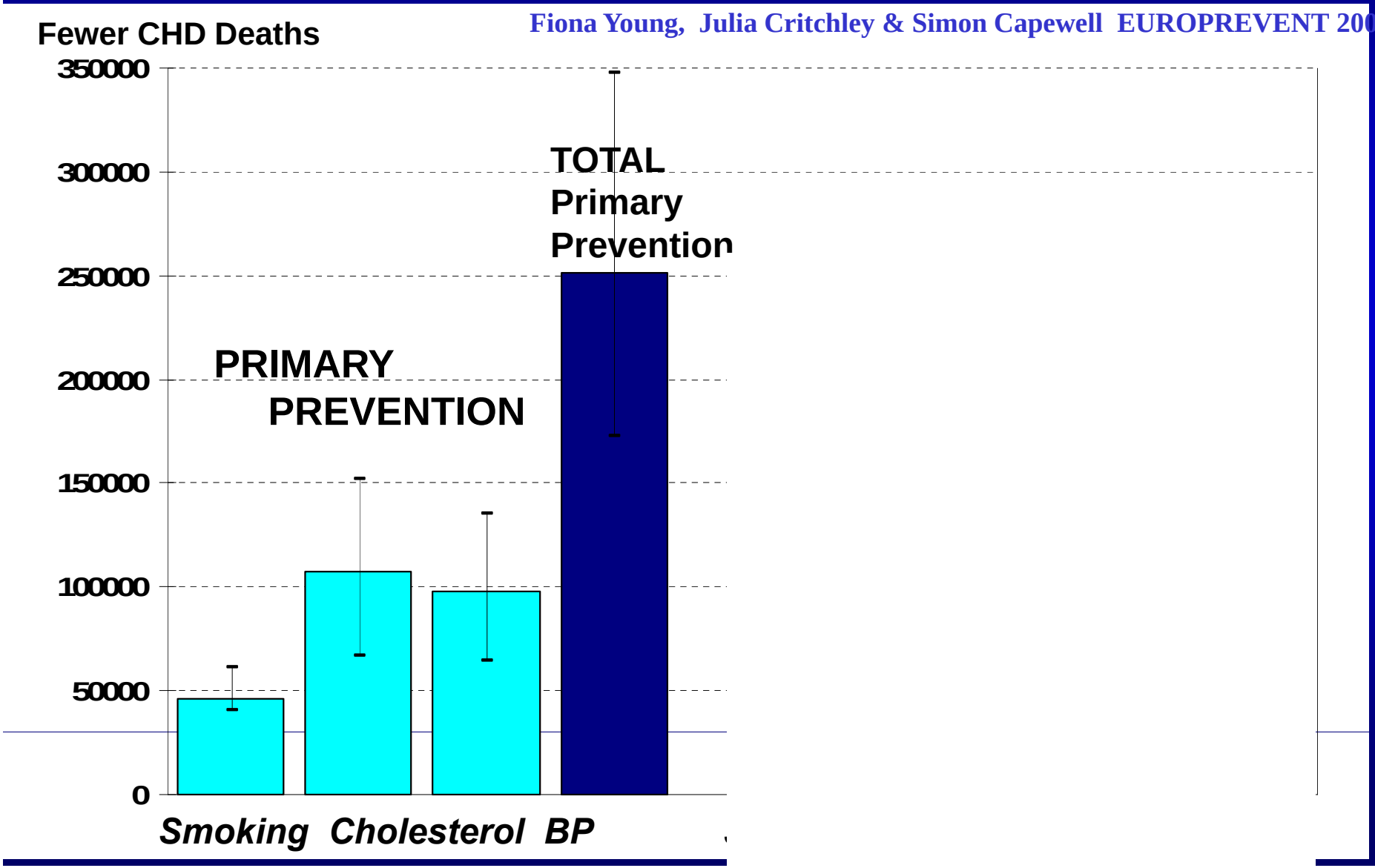
or

↓ *population risk factors?*

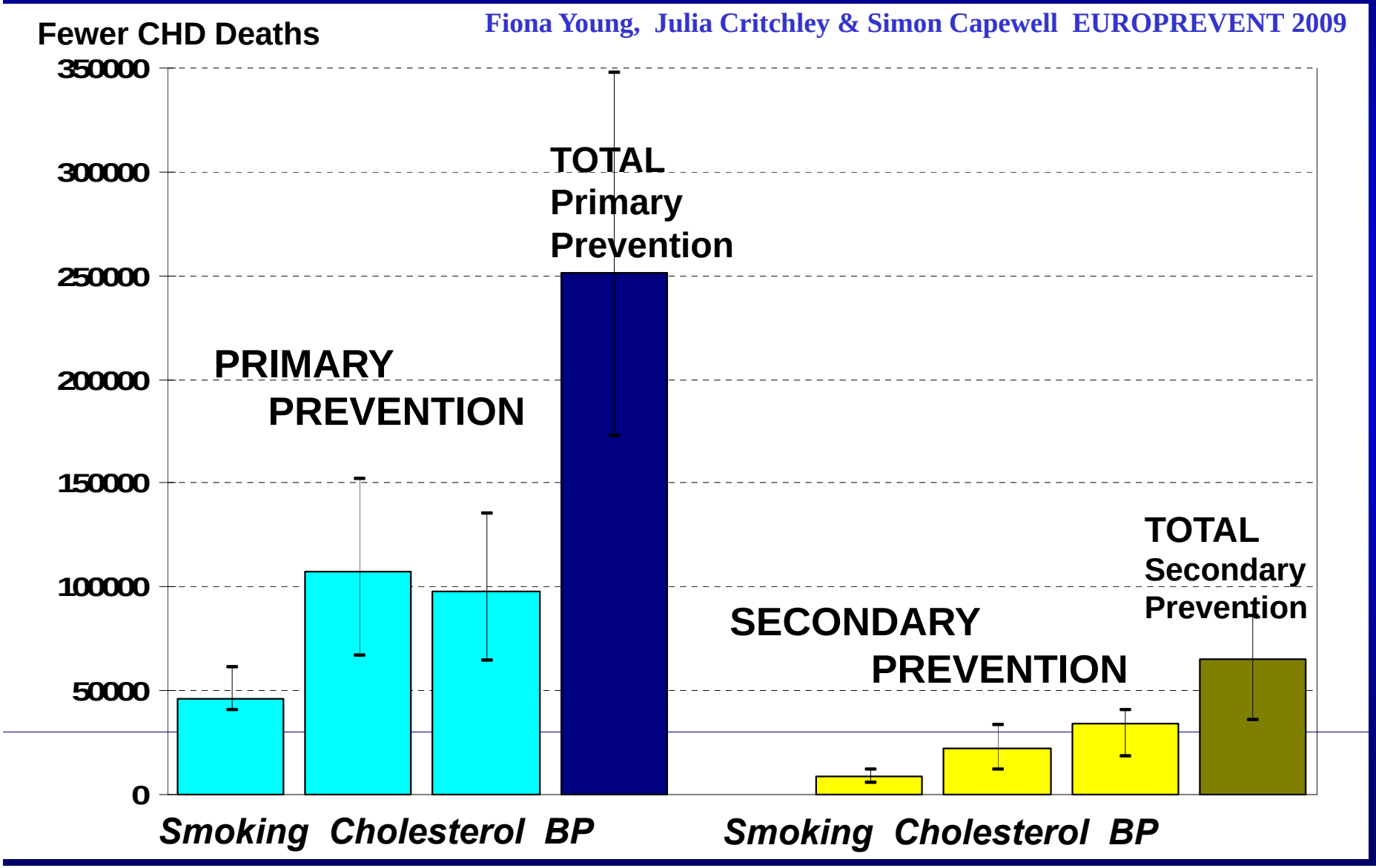
Fiona Young, Julia Critchley & Simon Capewell EUROPREVENT 2009

Fall in CHD deaths USA 1980-2000
Primary *versus* Secondary Prevention

Fiona Young, Julia Critchley & Simon Capewell EUROPREVENT 2009

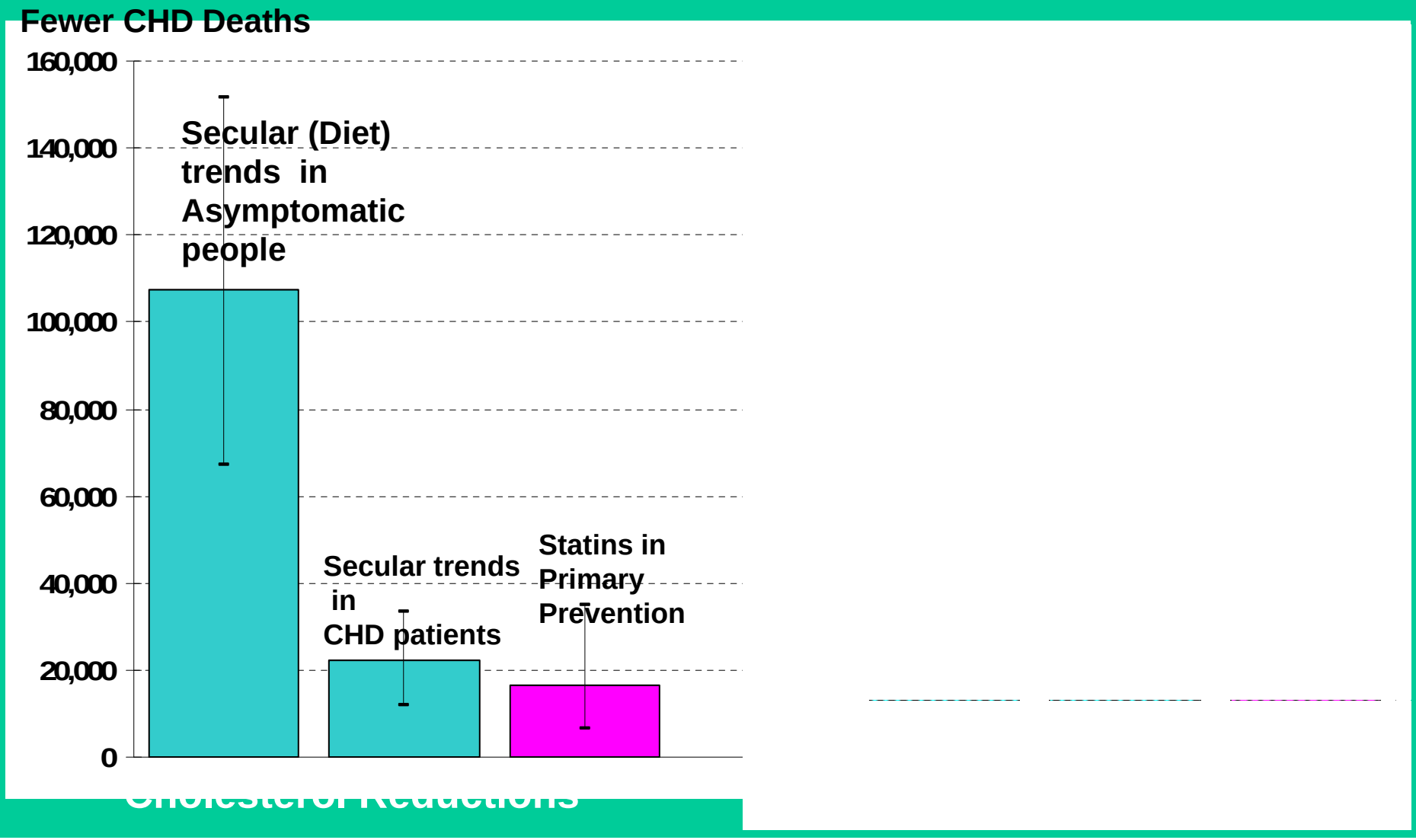


Fall in CHD deaths USA 1980-2000
Primary *versus* Secondary Prevention



Fall in CHD deaths USA 1980-2000: Secular & medical risk factor reductions

Fiona Young, Julia Critchley & Simon Capewell EUROPREVENT 2009



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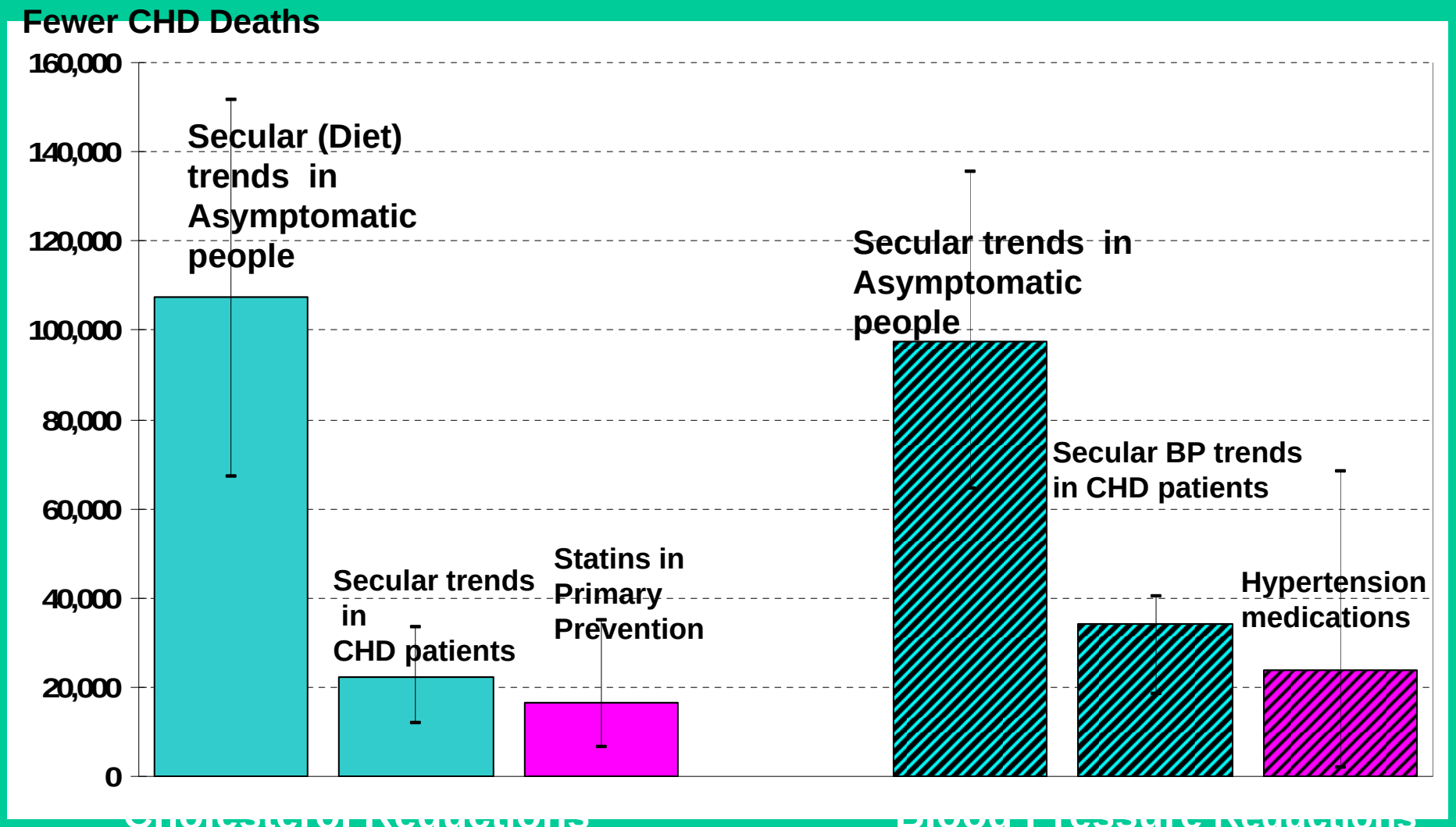

The Party is over: ↑*CVD mortality*
after two decades of good news

CONCLUSIONS

CVD trends: mortality can fall or rise

Recent flattening in young people is real

Adverse risk factor trends: BMI, BP, Smoking

Demographic ageing

1' prevention: Policies for Populations

NOT tablets for individuals

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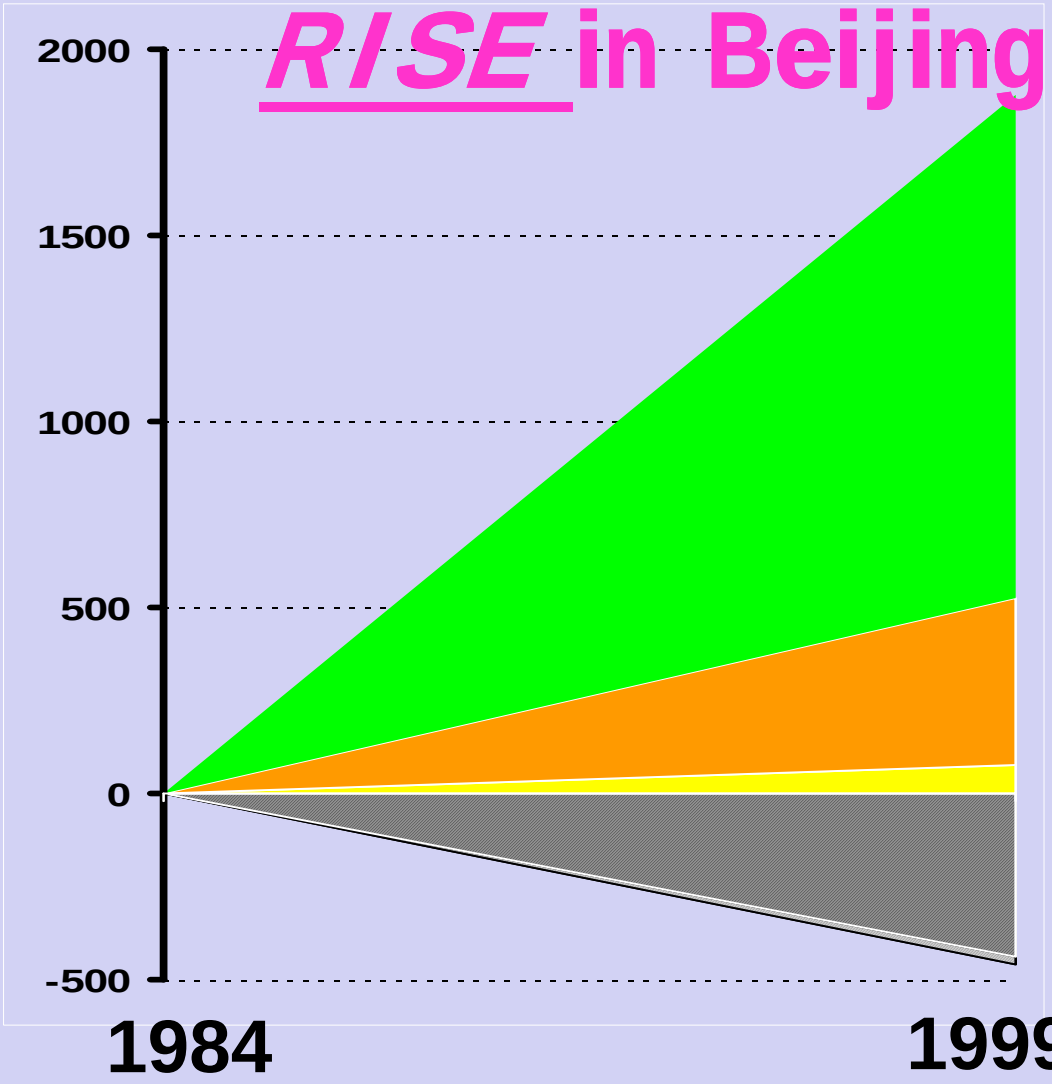
RESERVE SLIDES

IMPACT model: CHD mortality *RISE* in Beijing 1984 – 1999



Critchley, Capewell et al
Circulation 2004 110: 1236-1244

In 1999: 1820 EXTRA DEATHS ATTRIBUTABLE TO RISK FACTOR CHANGES

Cholesterol 77%

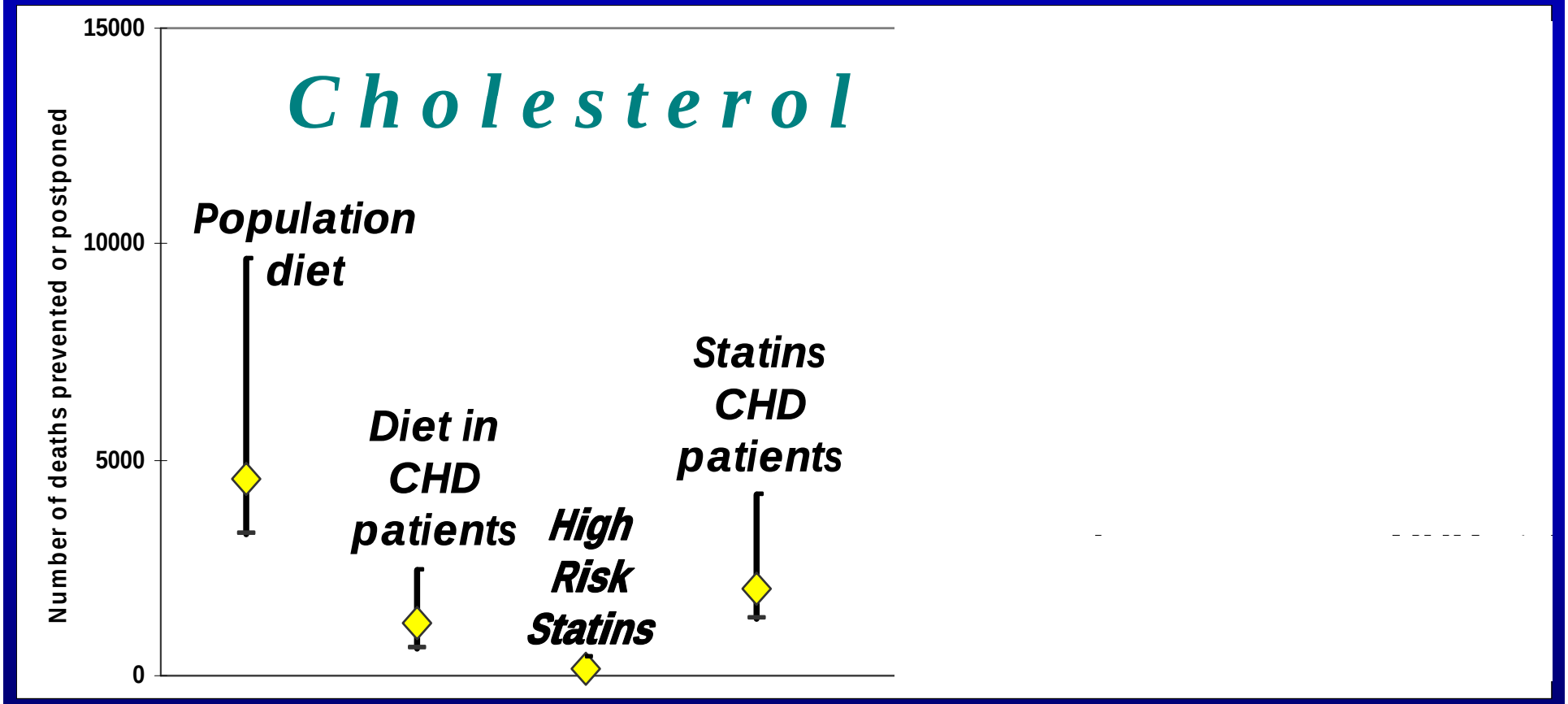
Diabetes 19%
BMI 4%
Smoking 1%

370 FEWER DEATHS BY TREATMENTS

AMI treatments	41%
Hypertension treatment	24%
Secondary prevention	11%
Heart failure	10%
Aspirin for Angina	10%
Angina:CABG & PTCA	2%

CHD prevention in England & Wales 1981-2000: Population v. *High Risk* Strategies

Deaths prevented or postponed (Sensitivity analysis)



Unal et al BMJ 2005 331 614

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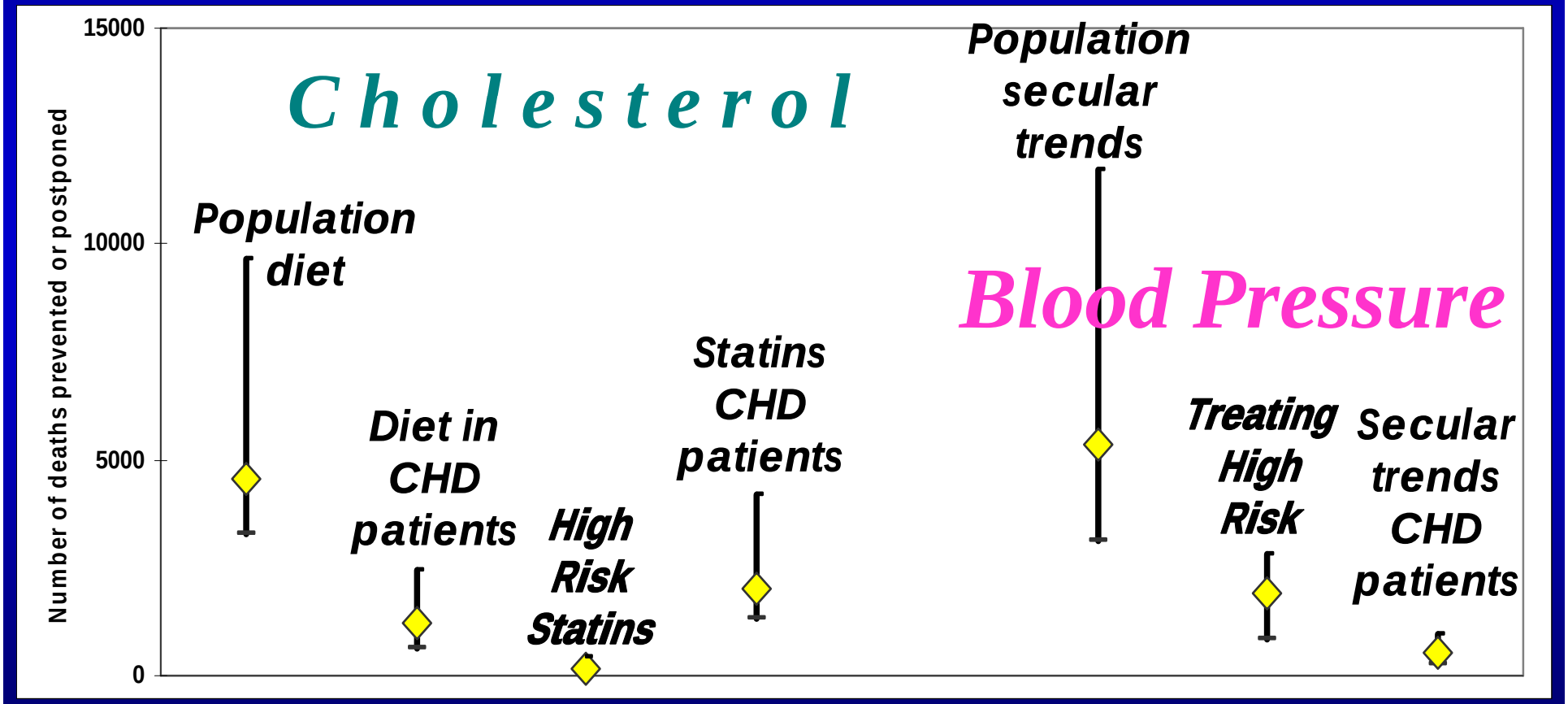


Unal et al BMJ 2005 331 614

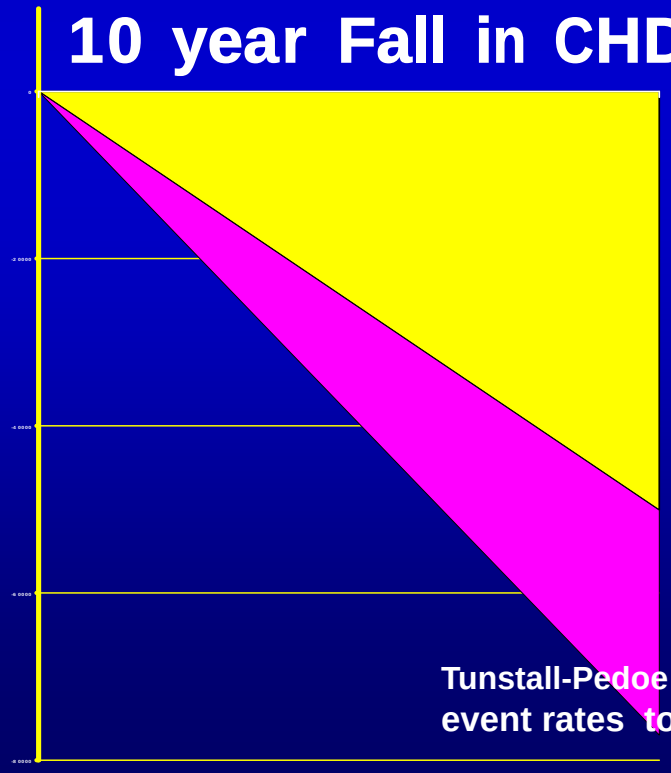
WHO MONICA Project

Monitored

10 year CHD trends from mid 1980s – mid 1990s
across 37 populations *in* 21 countries

166,000 events registered during 371 population-years

10 year Fall in CHD mortality rates: -27%

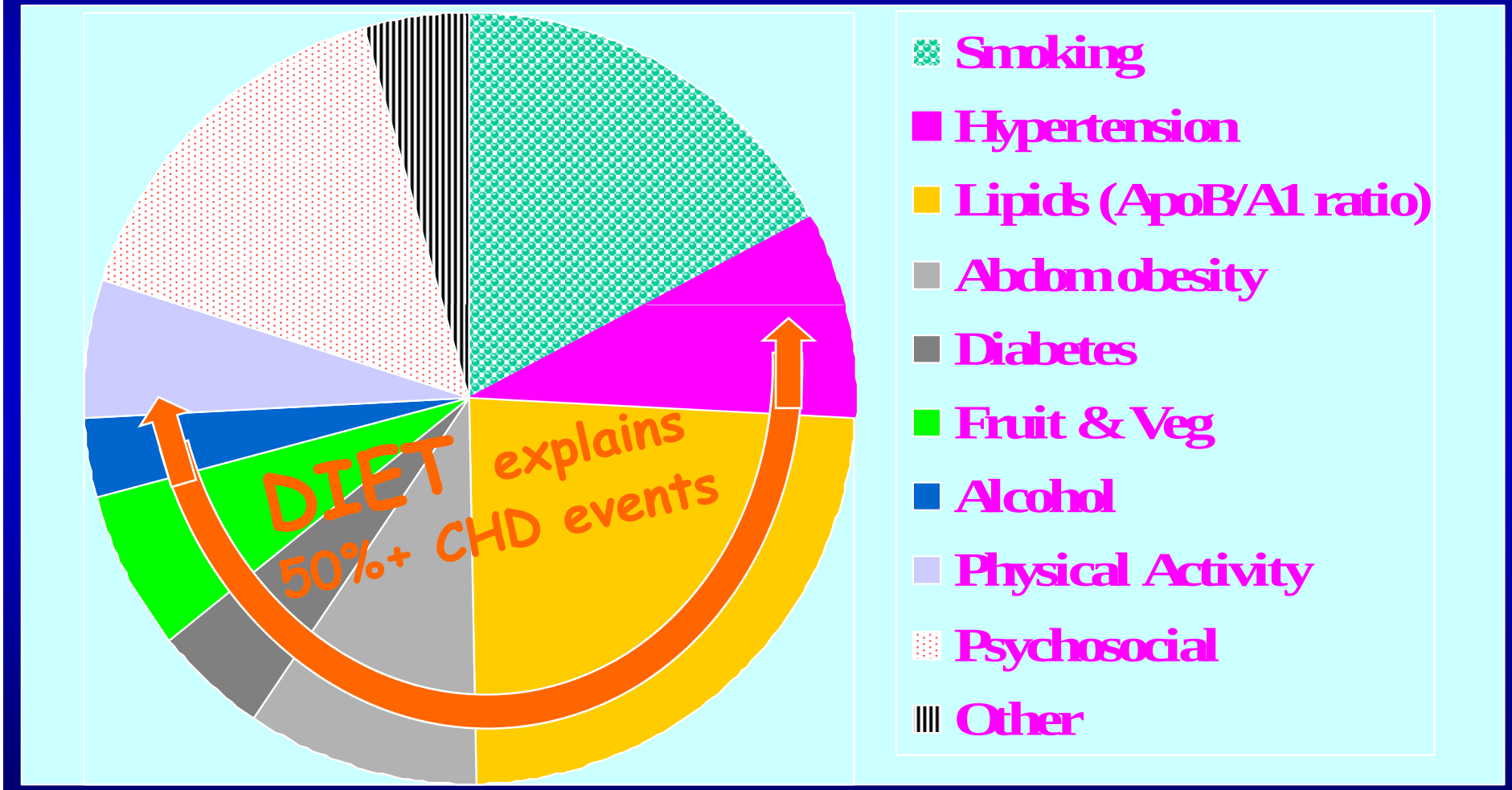


Event rates -21%
(incidence ≅ risk factors)

Case fatality –6%
(≅ treatments)

Tunstall-Pedoe et al. Contribution of trends in survival & coronary-event rates to changes in CHD mortality *Lancet 1999* 353 *1547*

INTERHEART Study "nine potentially modifiable risk factors account for over 90% of the risk of an initial acute myocardial infarction" *Population attributable risk fractions*



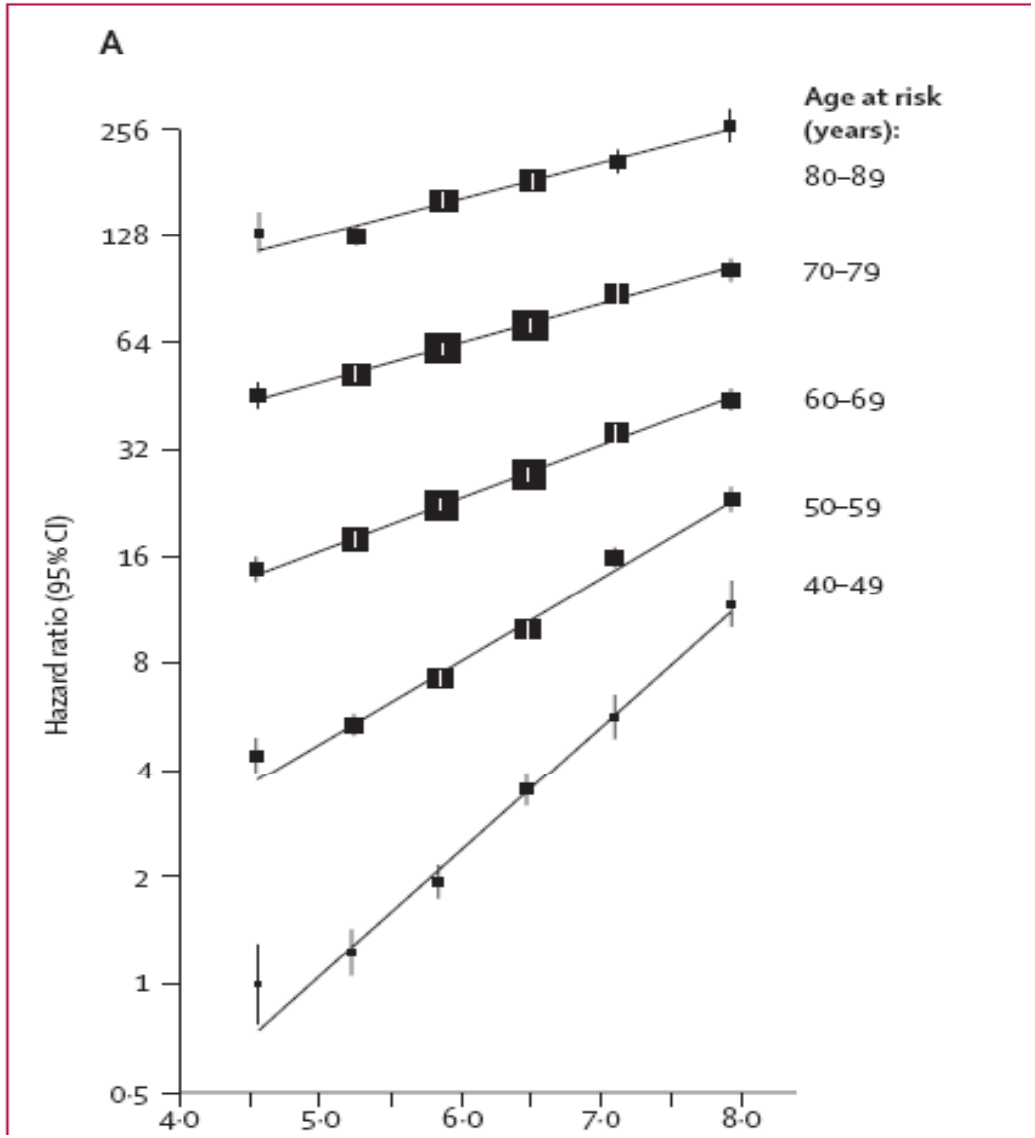
Salim Yusuf et al . Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study). Lancet 364 9437 11 Sept 2004

Meta-analysis of individual cholesterol data for 900,000 adults in 61 prospective studies

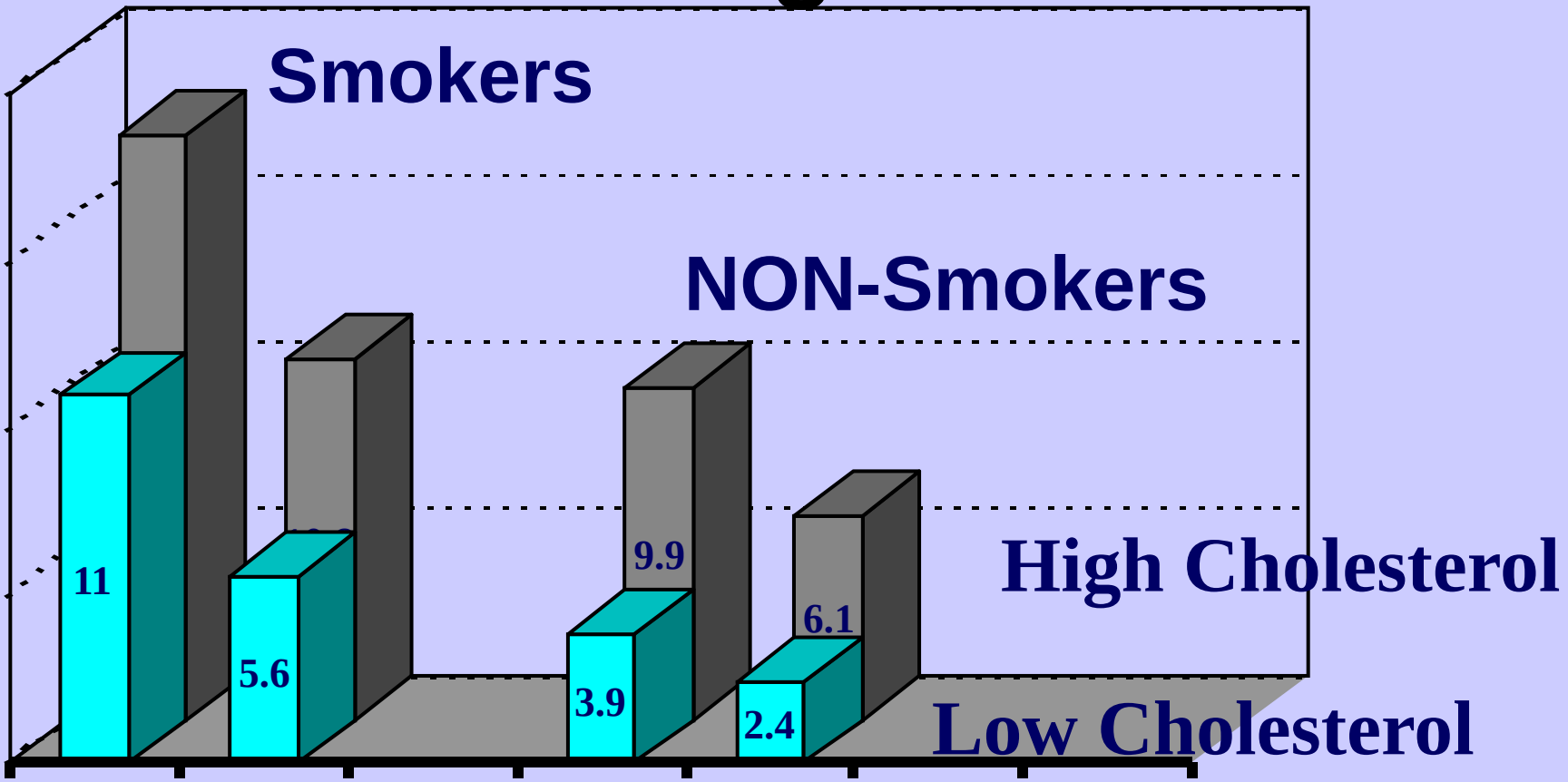
Prospective Studies Collaboration *Lancet 2007; 370: 1829*

Age-specific CHD death rates

Hazard ratio for 1mmol/l lower usual total cholesterol at the start of that decade



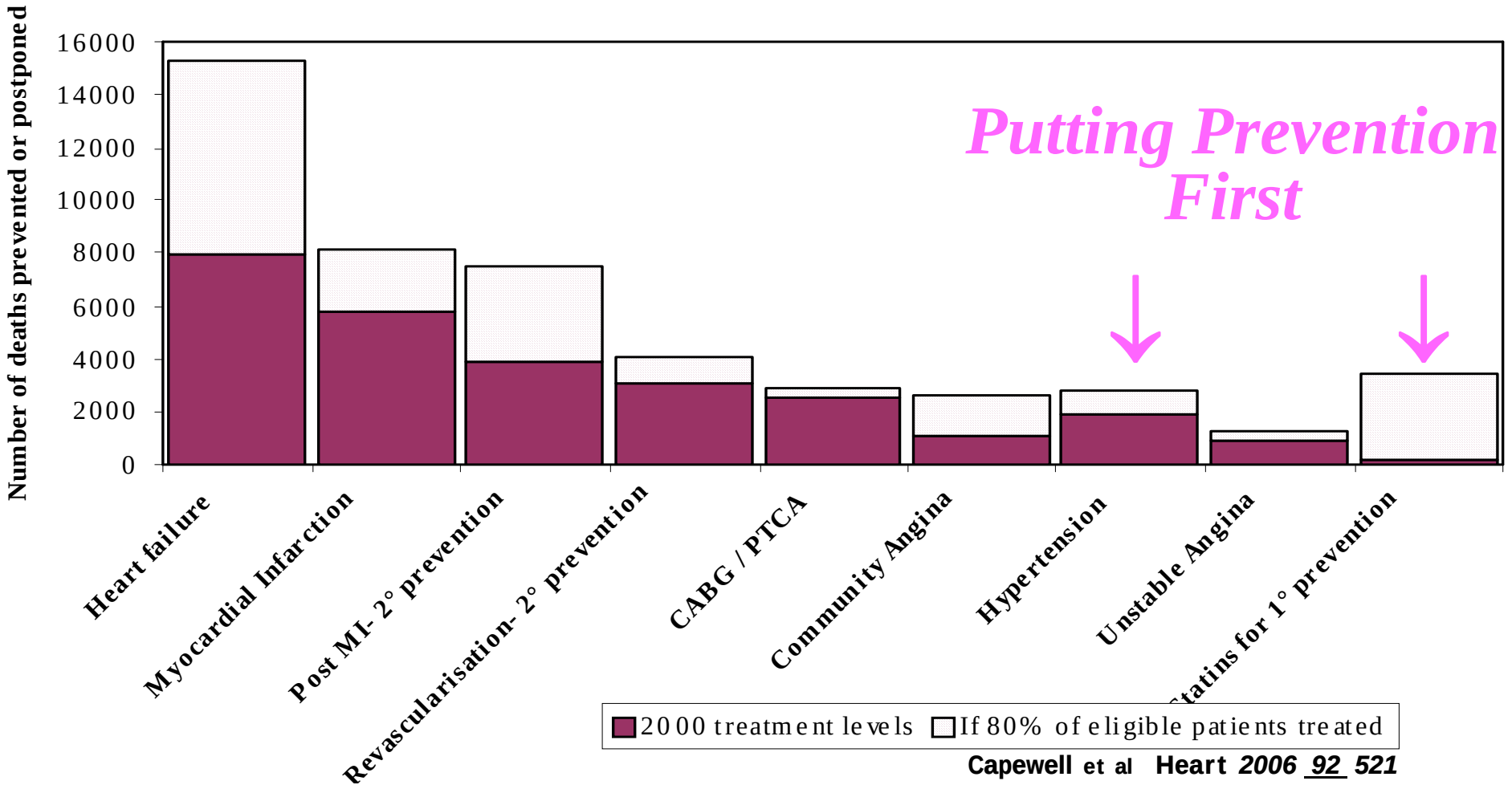
Five year CHD death rates in British men aged 35-64 (BRHS)



WHAT IF Treatment Uptakes in England & Wales Increased?

Actual Uptakes ≅ 50% 25,805 Deaths postponed

IF ⇑80% eligible patients 20,910 deaths postponed



Capewell et al Heart *2006 92 521*

Estimating the potential changes in CHD mortality in England & Wales between 2000 and 2010

WHAT IF risk factors

a) continue recent trends ?

b) *undergo* ***additional reductions ?***

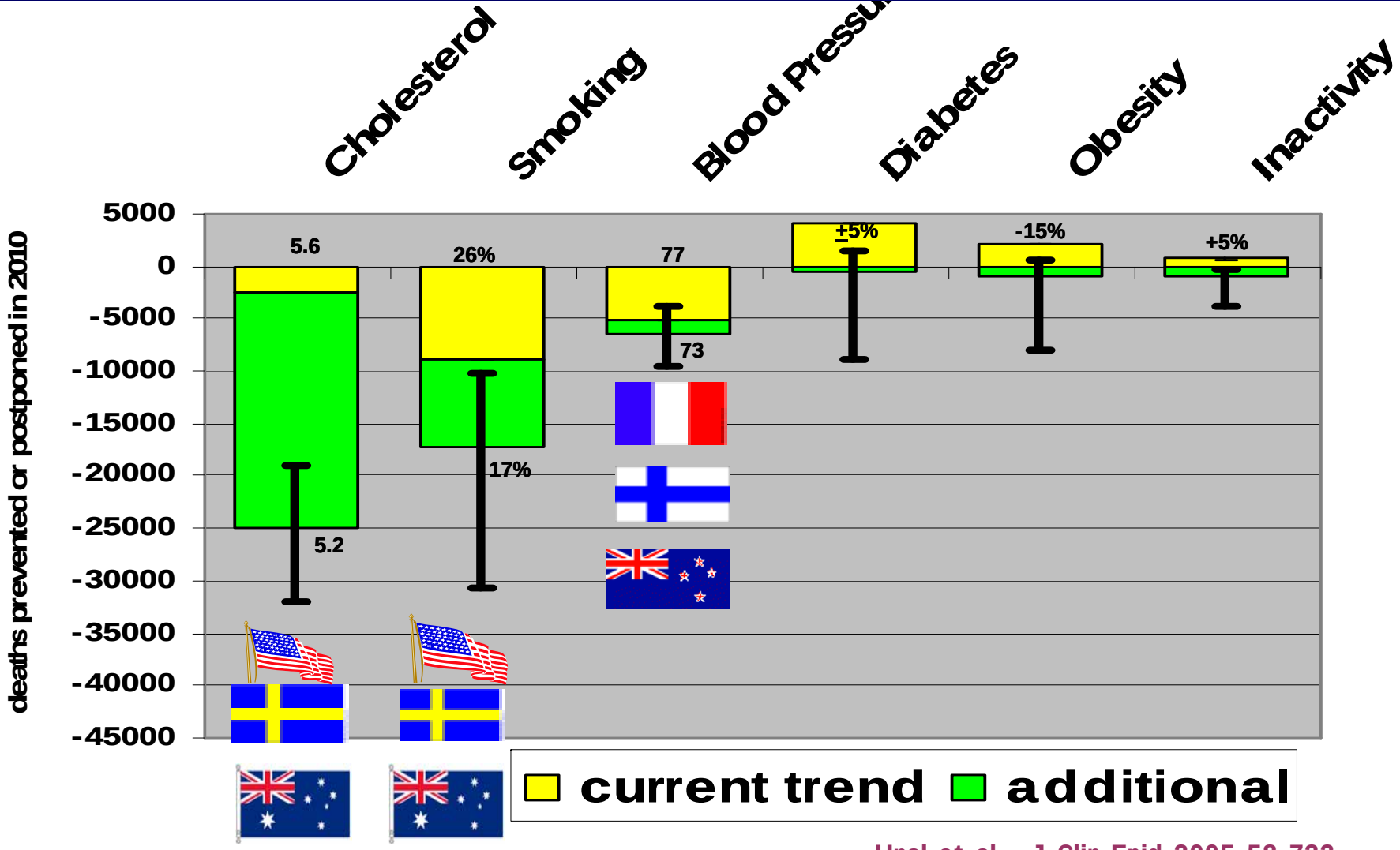
(as already achieved in Australia, USA, Sweden, Finland etc)

Unal et al J Clin Epid 2005 58 733
Kelly & Capewell HDA 2004 www

Potential changes in CHD mortality in England & Wales between 2000 and 2010 *IF risk factors*

a) continue recent trends

b) additional reductions already achieved elsewhere



Unal et al J Clin Epid 2005 58 733

High Risk prevention strategy

Advantages

- Intervention appropriate to individual
- Motivation (subject & physician)
- Cost-effective use of resources
- Risk/benefit ratio favourable

Disadvantages

- Not very effective
- Large efforts to indentify the high-risk persons (screening)
- Screening failures & inequalities
- Risk Scoring Inaccurate
- Treatment failures
- Compliance <50%
- Does not eliminate underlying cause
- Risk decreased not abolished
- Behaviourally inappropriate (deviating from the social norm)
- Medicalises healthy subjects
- Increases inequalities

Using IMPACT to explain CHD trends and examine future policy options

Conclusions 2

CHD mortality: Big falls in UK & elsewhere

- ♥ Reflect risk factor reductions > treatments
- ♥ Primary prevention more effective than 2' prevention
- ♥ Primary prevention: Population-based more effective than targeting high risk individuals
- ♥ Policy interventions have biggest potential to reduce CVD
- ♥ Key policy targets: ⇑Tobacco Control & ⇓Junk Food

Heart of mersey

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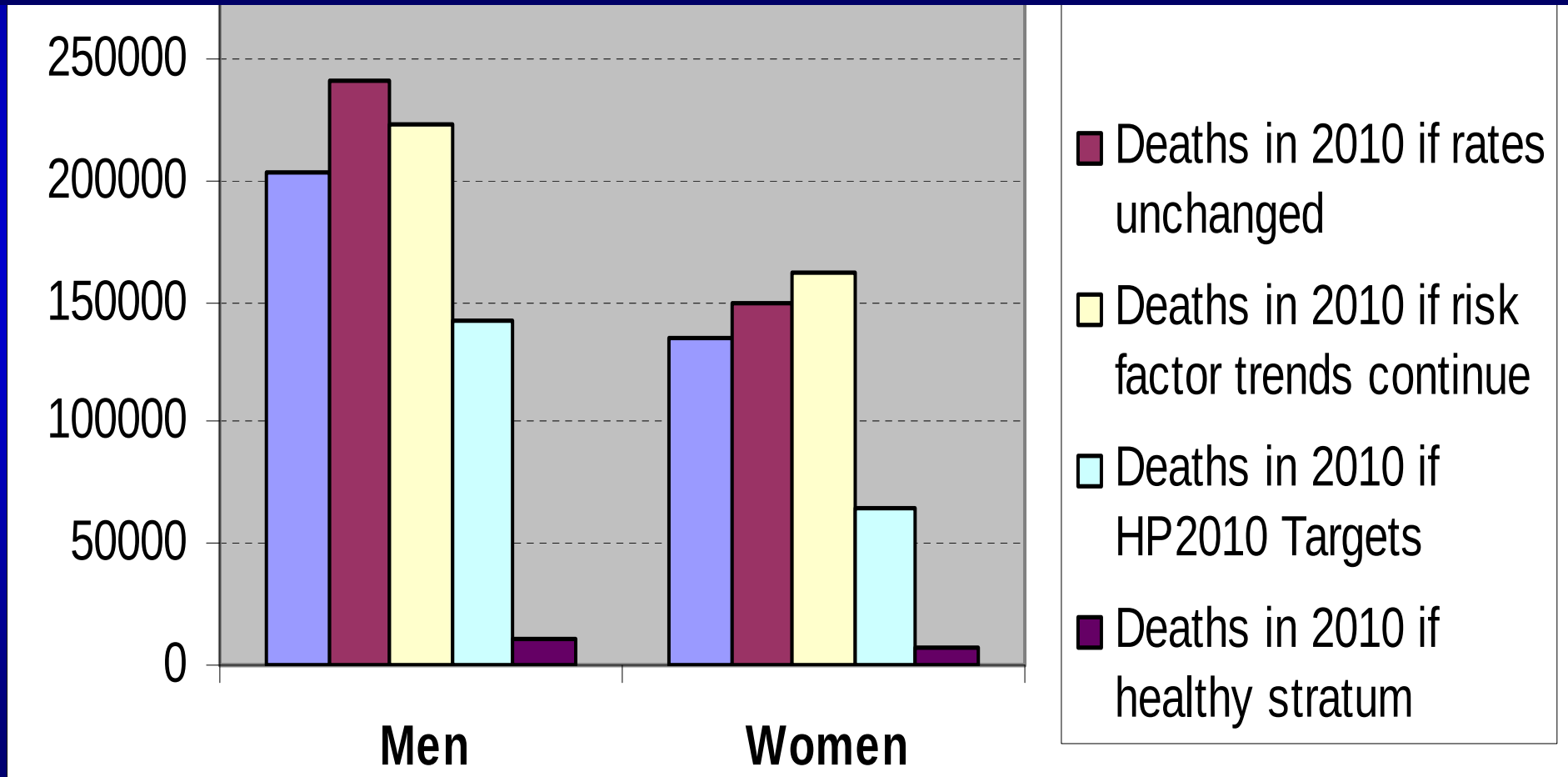
USA: Estimated reduction in CHD deaths in 2010 assuming

a) recent risk factor trends simply continue,

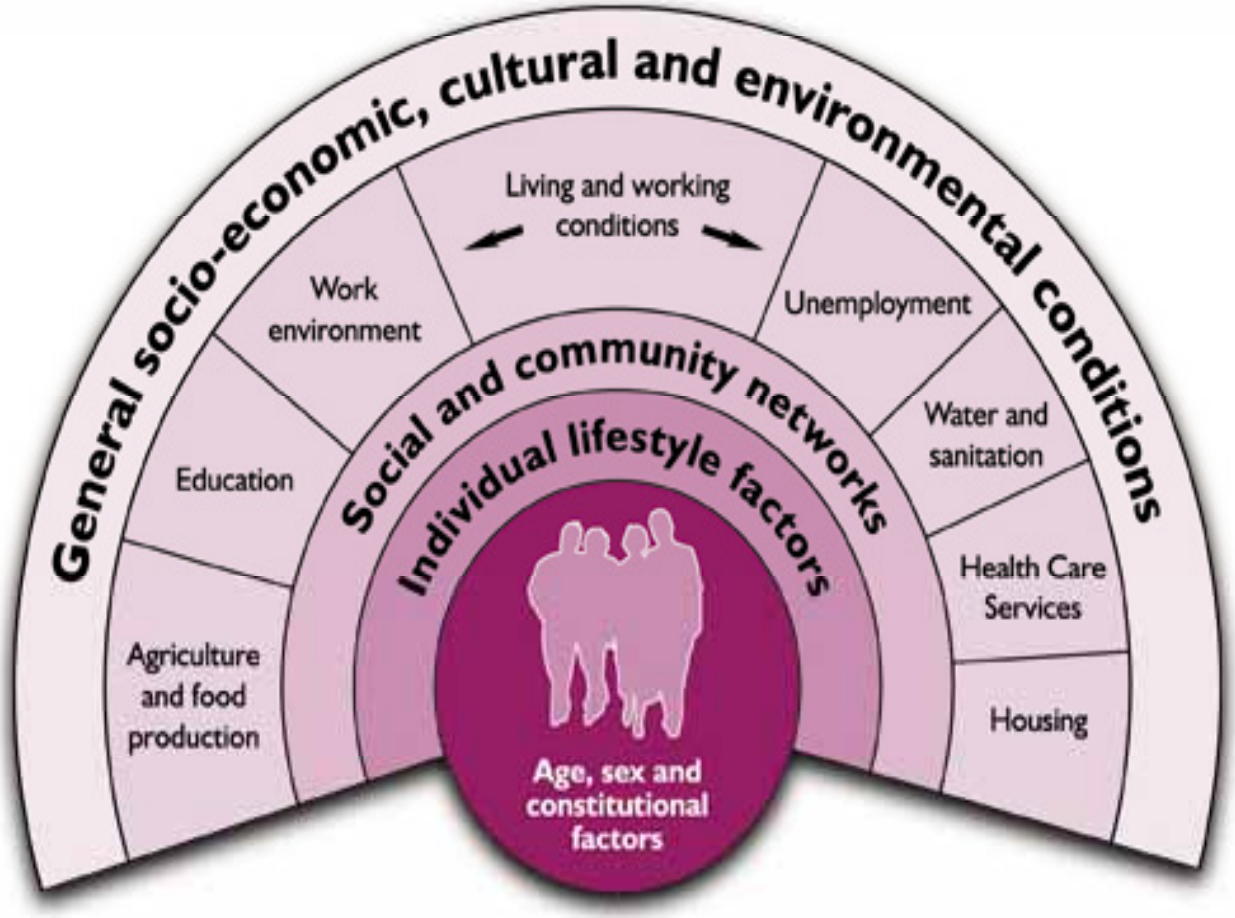
***b) Healthy People 2010* targets are reached,**

c) additional reductions to equal the *low-risk stratum* in the US population



Capewell et al Circulation 2008

Determinants of Health - Broadening Involvement



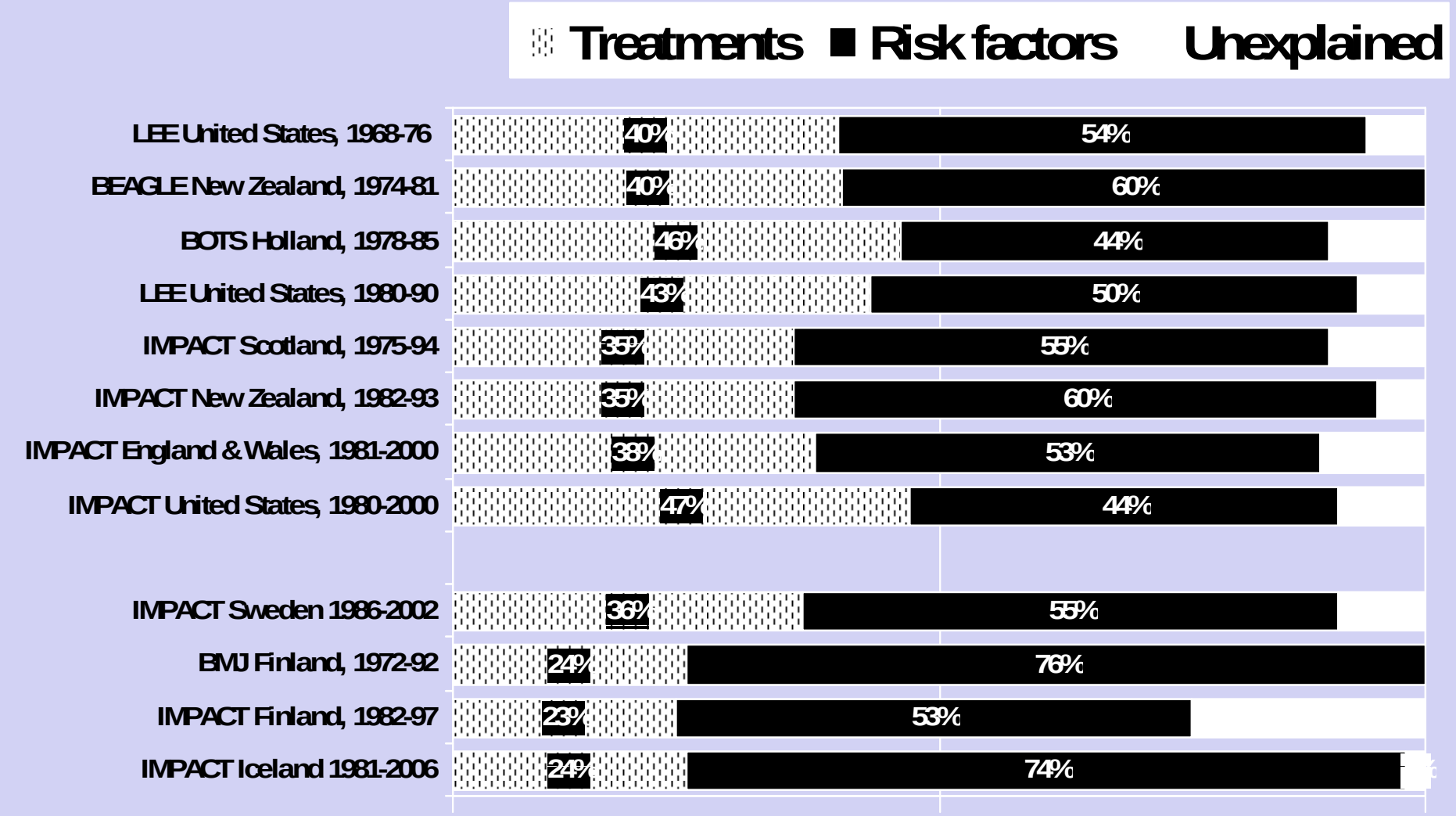
Whitehead and Dahlgren (1996) Tackling Inequalities in Health

Key determinants of health call for an 'open' health sector

Environment, water and sanitation, education, employment, trade, tourism, agriculture, fisheries and food, transport and infrastructure, social policy and welfare, energy, accommodation and housing

Comparisons with other studies

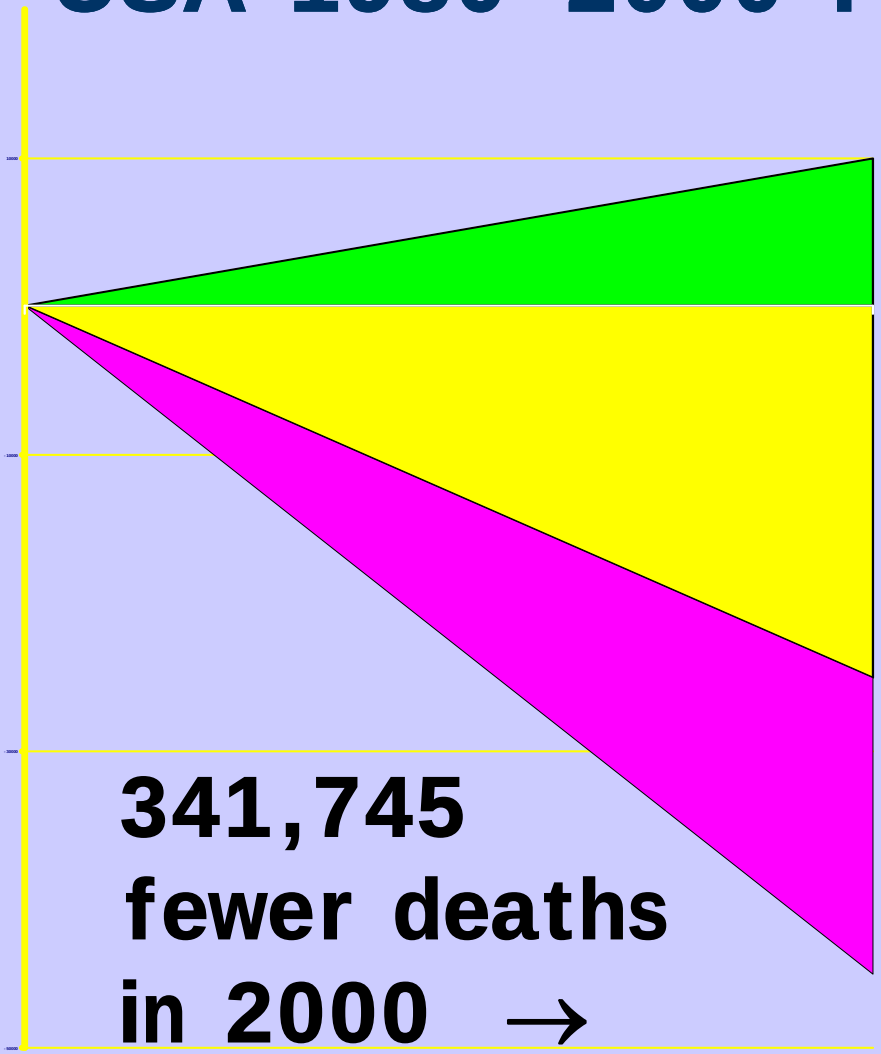
% CHD mortality falls attributed to:



NEJM 2007 **356** 2388 updated

Explaining the fall in CHD deaths in USA 1980-2000 : RESULTS

NEJM 2007; 356: 2388.



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 therapies	-7%
Statins (primary prevention)	-5%

Unexplained -9%