Chronic diseases in low and middle income countries: more research or more action?

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Overview

More action needed

- Growing burden of chronic diseases
- Global health issue
- We know what to do
- Calls for action now

More research needed

- Evaluating burdens of disease
- Causes of chronic disease
- Health policy and systems research

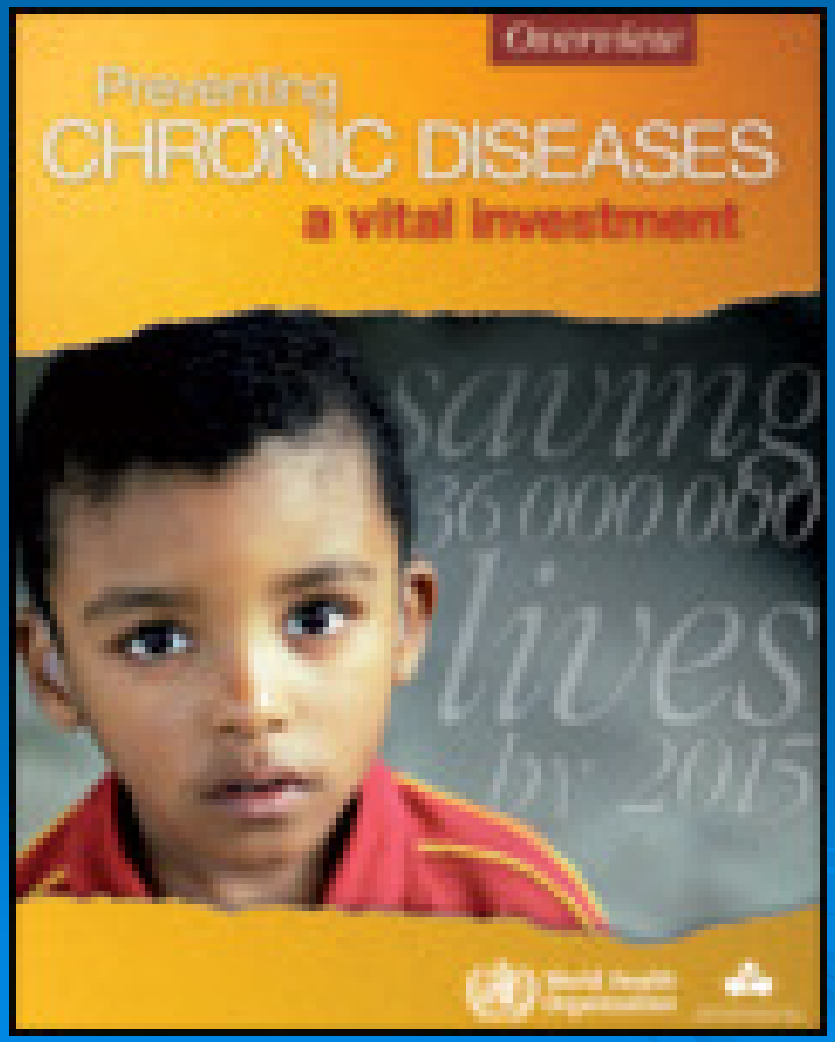
The arguments for more action

- Burdens of disease due to chronic diseases are rising
- Hit people at their peak economic productivity
- Health system needs reforming to cope
- Cost-effective interventions are available which would save lives if implemented
- It is affordable for most countries
- Powerful advocacy is needed

The case against more research in low and middle income countries

- Results from high income countries are applicable – use these
- Other more pressing problems: infectious diseases
- There are no funds for NCD research
- There are no good researchers/teams
- Action on NCDs NOT research is needed

World Health Organization & World Bank have emphasised need for chronic diseases in low and middle income countries to be taken seriously



nature Vol 450|22 November 2007

Grand challenges in chronic non-communicable diseases

The top 20 policy and research priorities for conditions such as diabetes, stroke and heart disease.

Abdallah S. Daar[1], Peter A. Singer[1], Deepa Leah Persad[1], Stig K. Pramming[2], David R. Matthews[3], Robert Beaglehole[4], Alan Bernstein[5], Leszek K. Borysiewicz[6], Stephen Colagiuri[7], Nirmal Ganguly[8], Roger I. Glass[9], Diane T. Finegood[10], Jeffrey Koplan[11], Elizabeth G. Nabel[12], George Sarna[6], Nizal Sarrafzadegan[13], Richard Smith[14], Derek Yach[15] and John Bell[16]

Chronic non-communicable diseases (CNCDs) are reaching epidemic proportions worldwide[1–3]. These diseases — which include cardiovascular conditions (mainly heart disease and stroke), some cancers, chronic respiratory conditions and type 2 diabetes — affect people of all ages, nationalities and classes.

The conditions cause the greatest global share of death and disability, accounting for around 60% of all deaths worldwide. Some 80% of chronic-disease deaths occur in low- and middle-income countries. They account for 44% of premature deaths worldwide. The number of deaths from these diseases

R. CANDIA/AP

P. PARKS/AFP/GETTY

Poor diet and smoking are two factors that contribute to the millions of preventable deaths that occur each year.

nature Vol 450|22 November 2007

Grand challenges in chronic non-communicable diseases

The top 20 policy and research priorities for conditions such as diabetes, stroke and heart disease.

- raise public awareness;
- enhance economic, legal and environmental policies;
- modify risk factors;
- engage business and community;
- mitigate health impacts of poverty and urbanization;
- re-orientate health systems

THE LANCET

8-14 December 2007

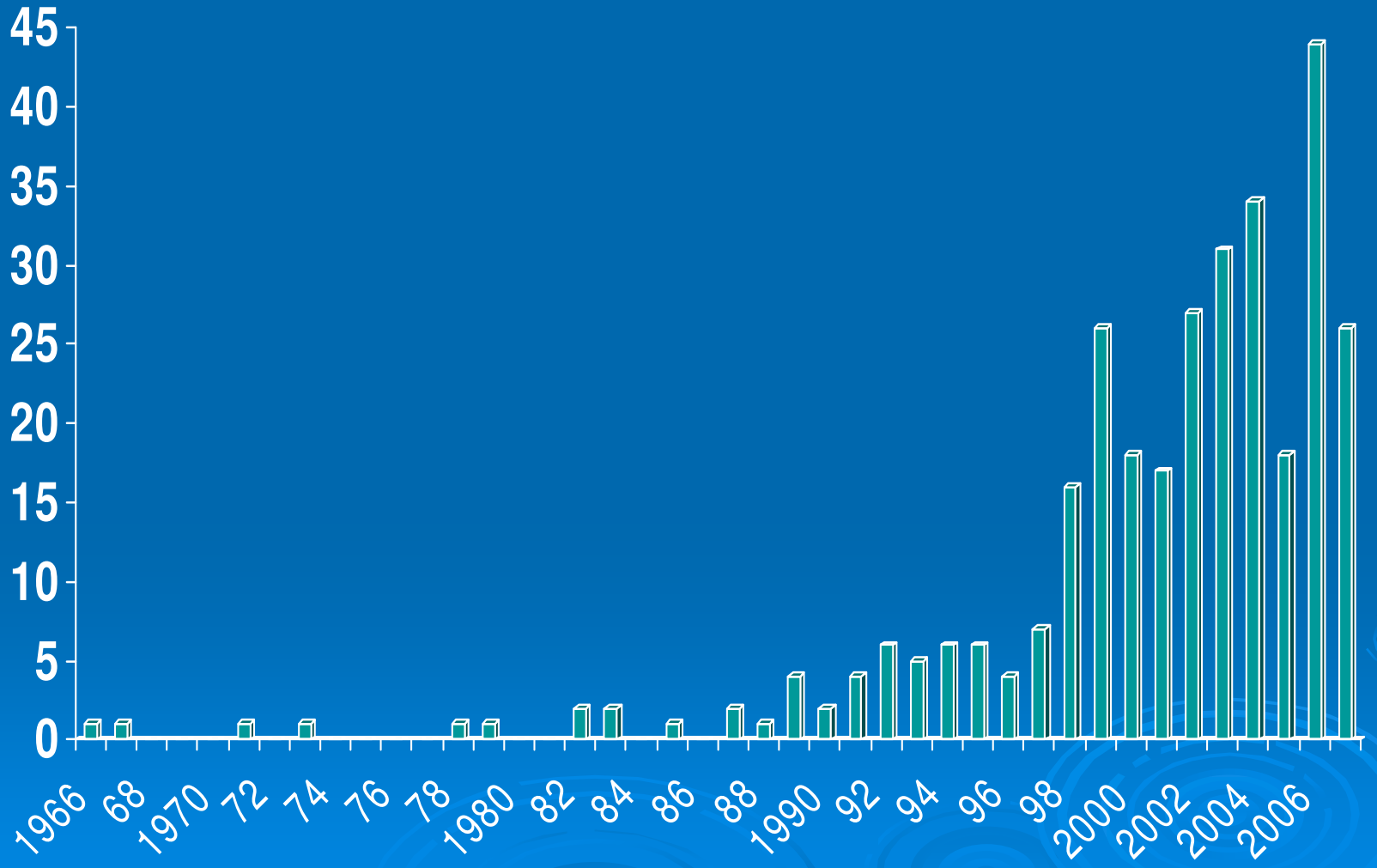
"No serious conversation about global health can now take place without at least citing chronic diseases as a critical part of international health strategies"

Chronic diseases

"36 million deaths from chronic diseases could be postponed by public health and primary care in the next 10 year at a cost of US$1.50 per person per year"

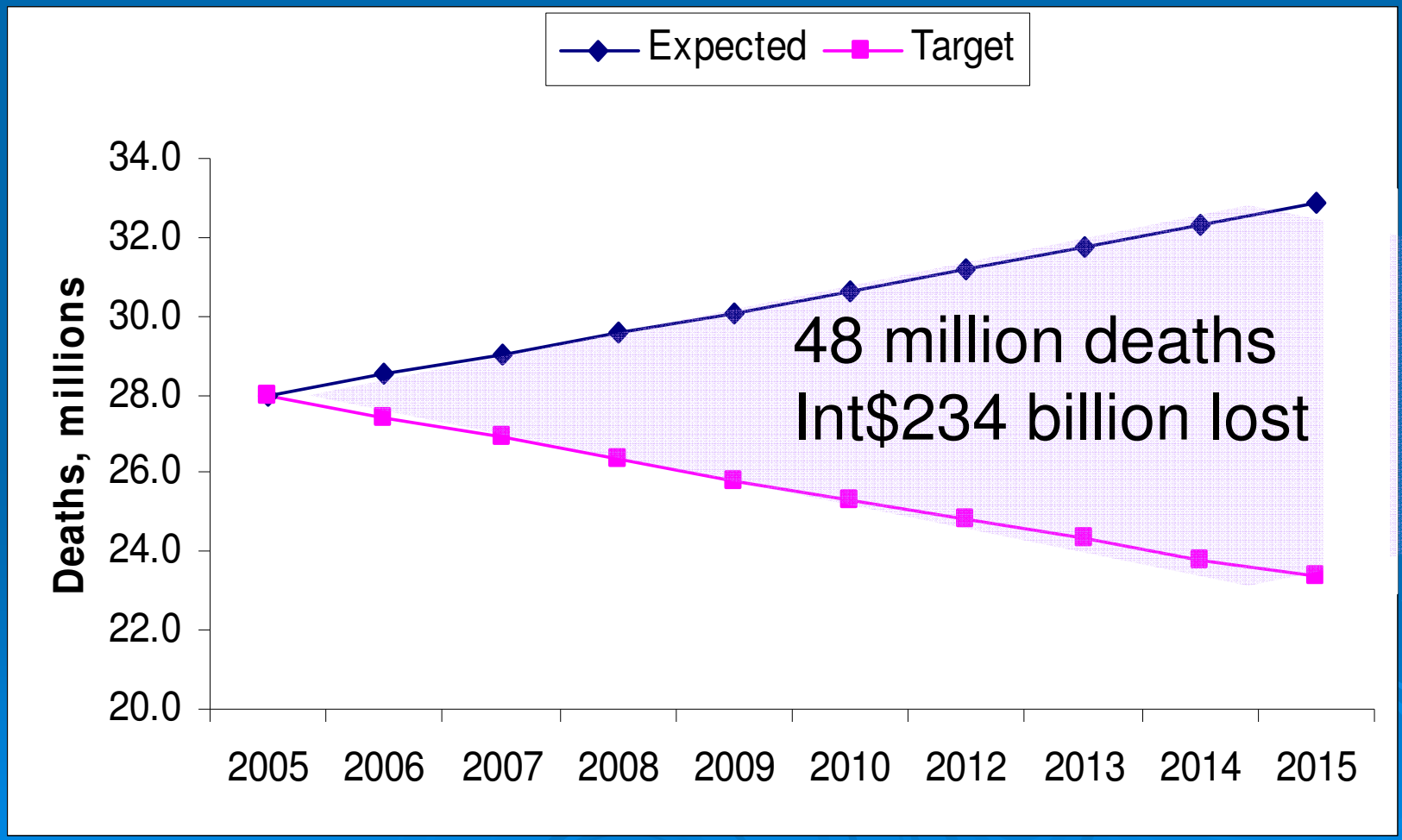
Beaglehole, Ebrahim, Reddy et al, Lancet 2008

“Calls to action”: all medical journals 1966-2007

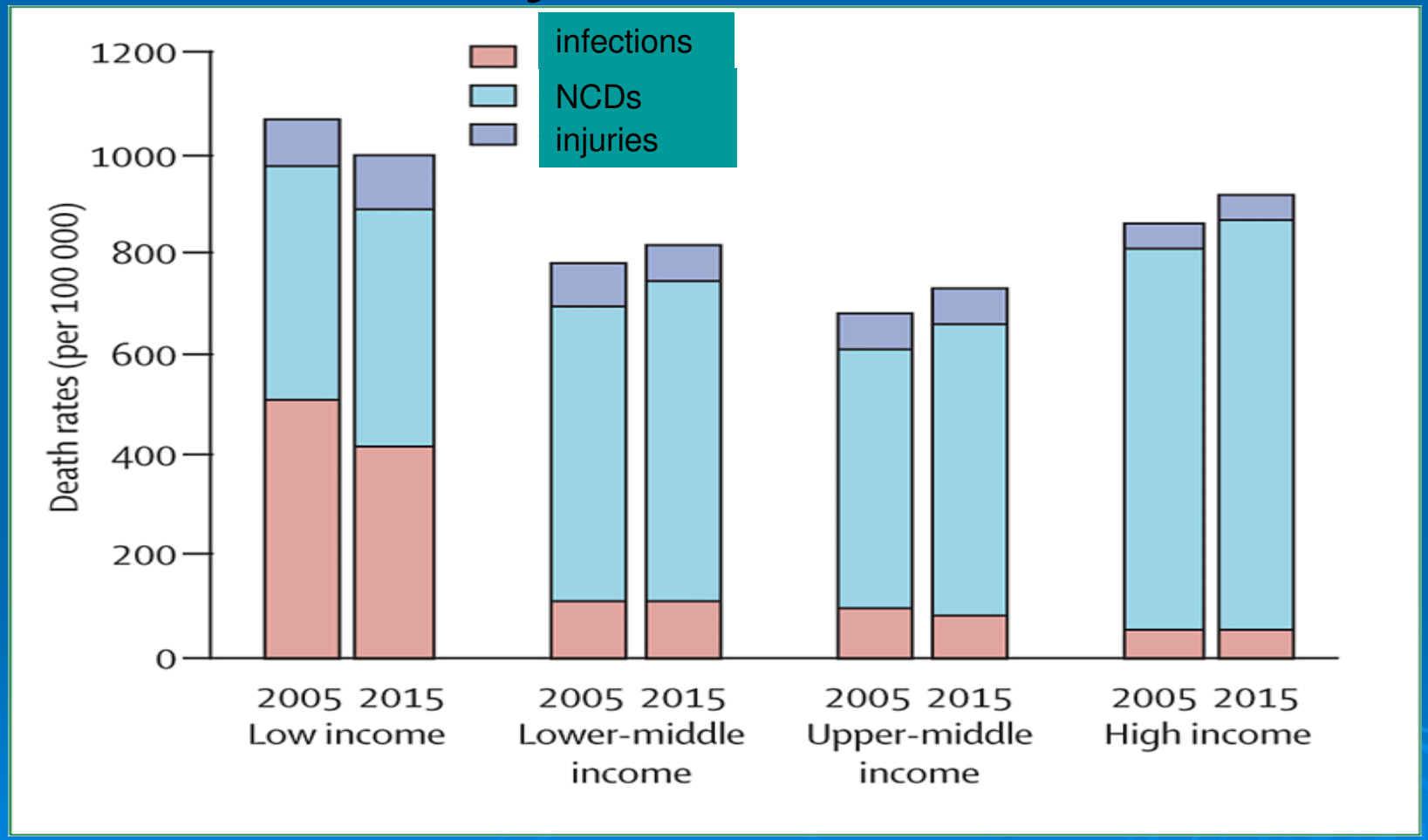


Source: Medline

Trends in chronic disease mortality: LMICs



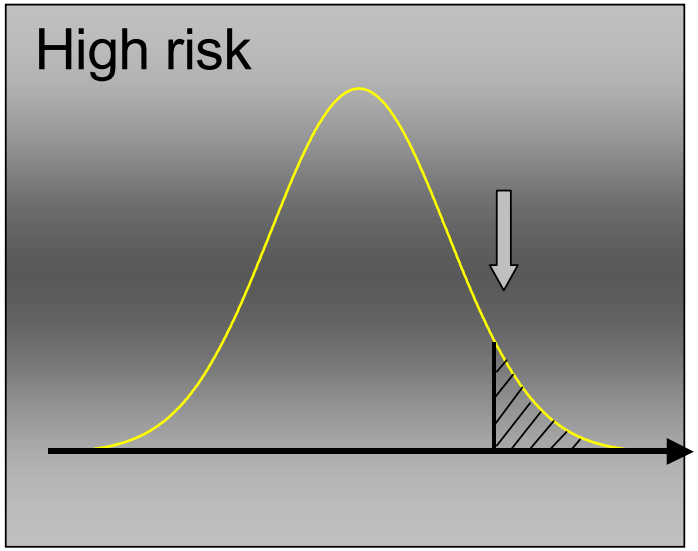
Death rates by broad causes and country economic status

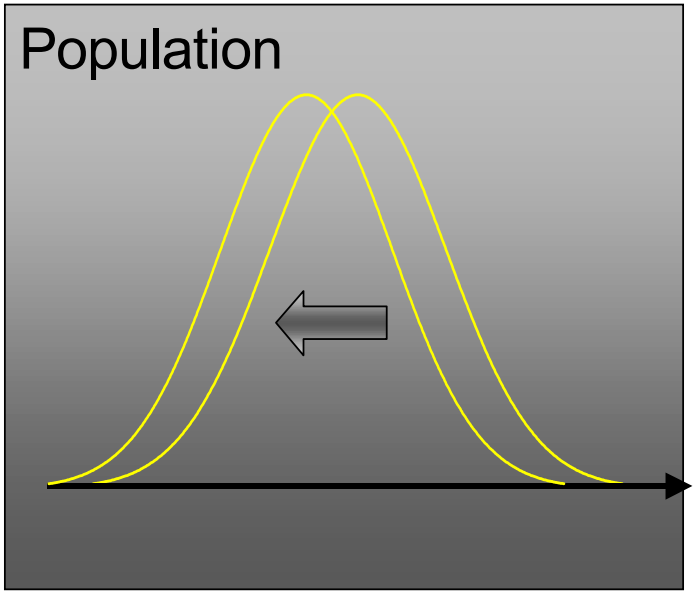


Strong et al. Lancet 2005;366:1578-1582

WHO's new strategy for low and middle income countries

- Population wide: tobacco control, salt restriction (awareness, voluntary code)
- High risk strategy: all those with CVD + those at high risk (1.5% annual risk of death) defined by risk factor profiles (age, sex, smoking, BP, BMI) treated with "multi-drug regimen"





Prevention strategies

More cases occur below high risk thresholds

High risk approaches work but are costly and have to be maintained

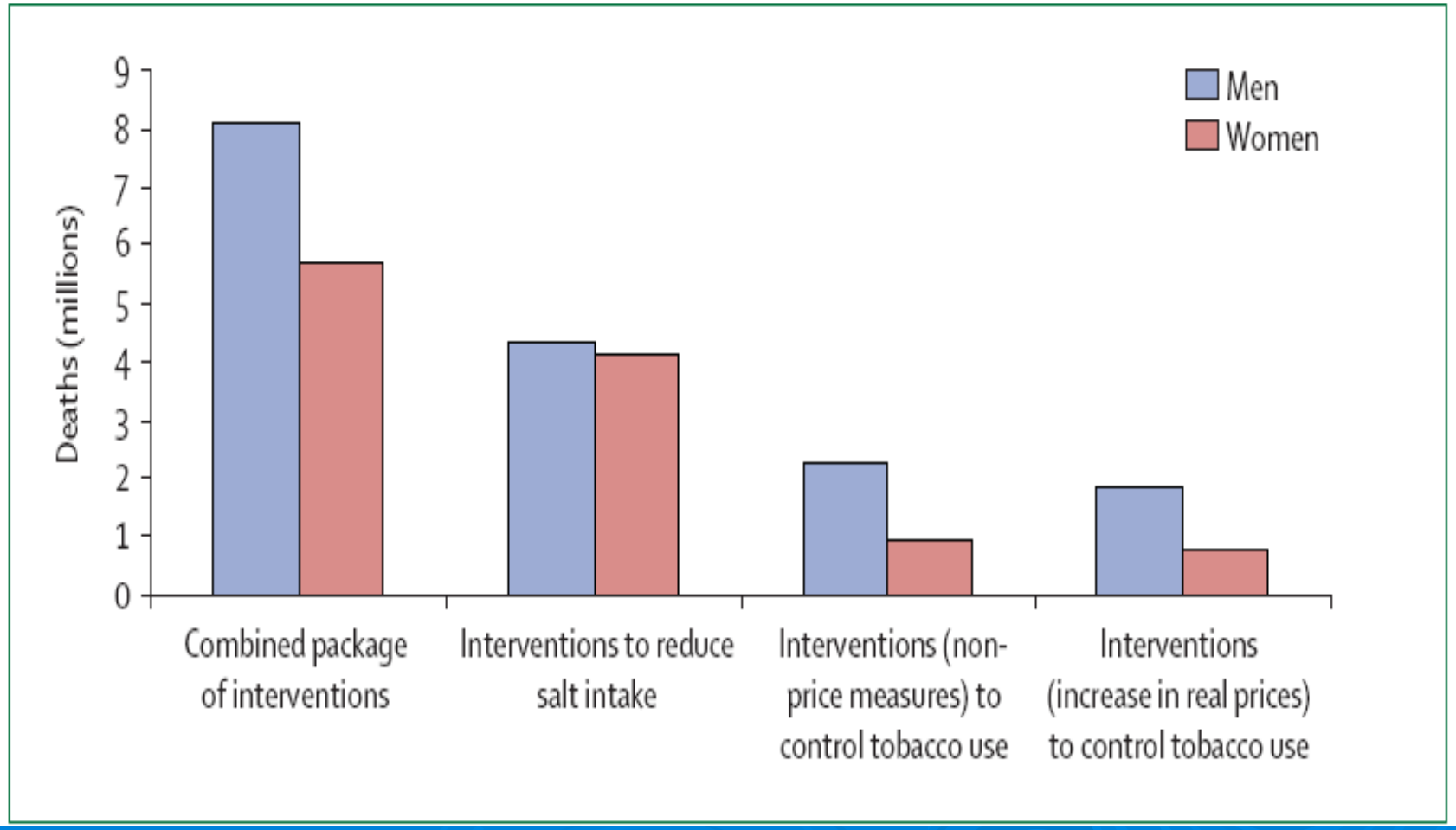
Moving risk factor distribution to the left will prevent more disease: changes are permanent

Population versus high risk strategies for prevention

"Population strategies may have their greatest impact in low to middle income countries where relatively simple and cheap strategies, including high taxes on smoking and replacing saturated with unsaturated fats, have yet to be widely implemented"

Taylor et al, BMJ 2006:332: 617-618

Deaths averted by population-level interventions (2006–15)



Asaria et al, Lancet 2007;370:2044-2053

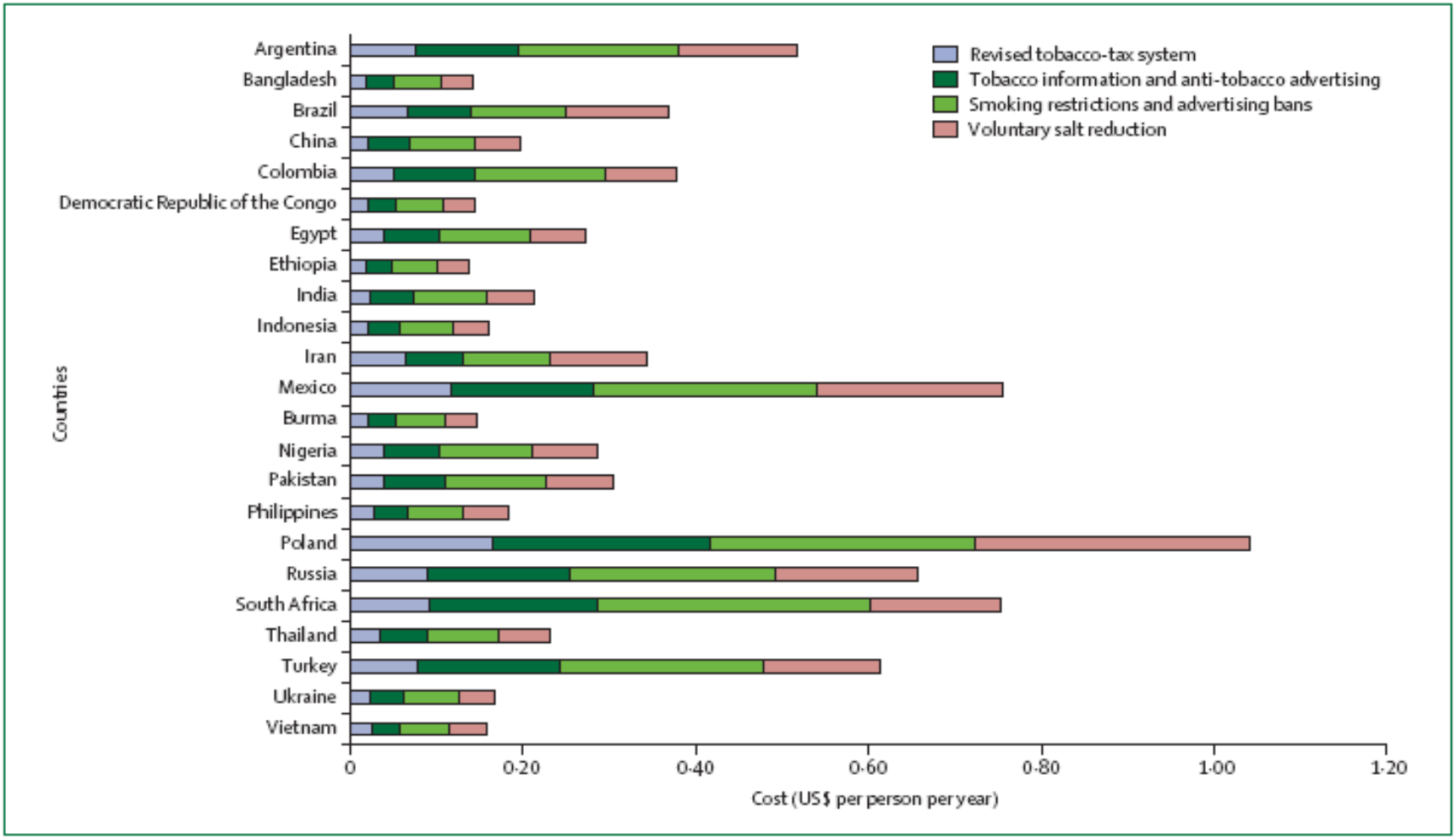
Chronic Diseases 3

Chronic disease prevention: health effects and financial costs of strategies to reduce salt intake and control tobacco use

"Over 10 years (2006–2015), 16·5 million deaths could be averted by implementation of these interventions, at a cost of less than US$0·40 per person per year in low-income and lower middle-income countries, and US$0·50–1·00 per person per year in upper middle-income countries (as of 2005)"

Asaria et al, Lancet 2007;370:2044-2053

Cost to implement the package of interventions (US$ per person per year, 2005)



Asaria et al, Lancet 2007;370:2044-2053

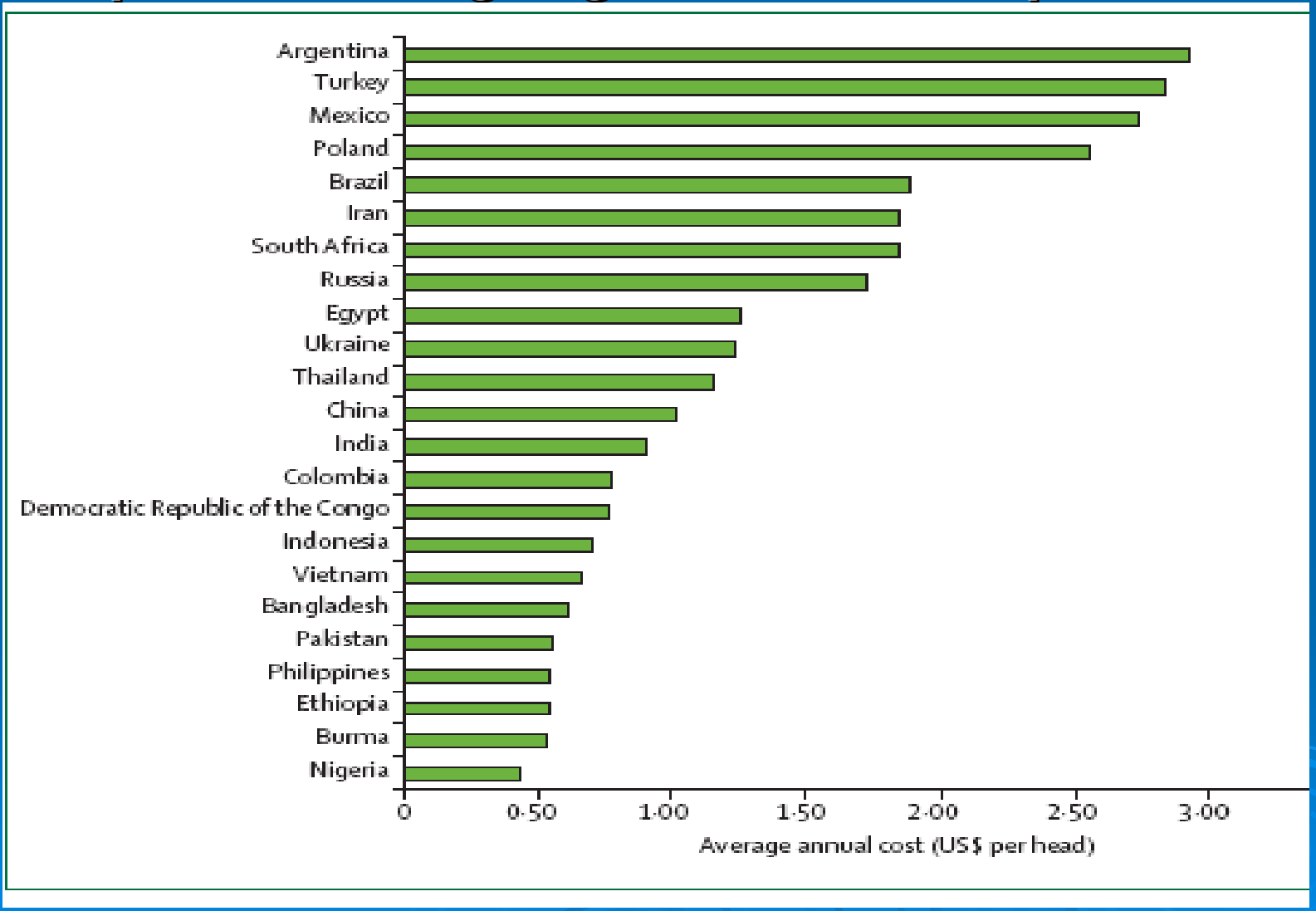
BMJ

28 June 2003

A pill to prevent 80% of heart attacks

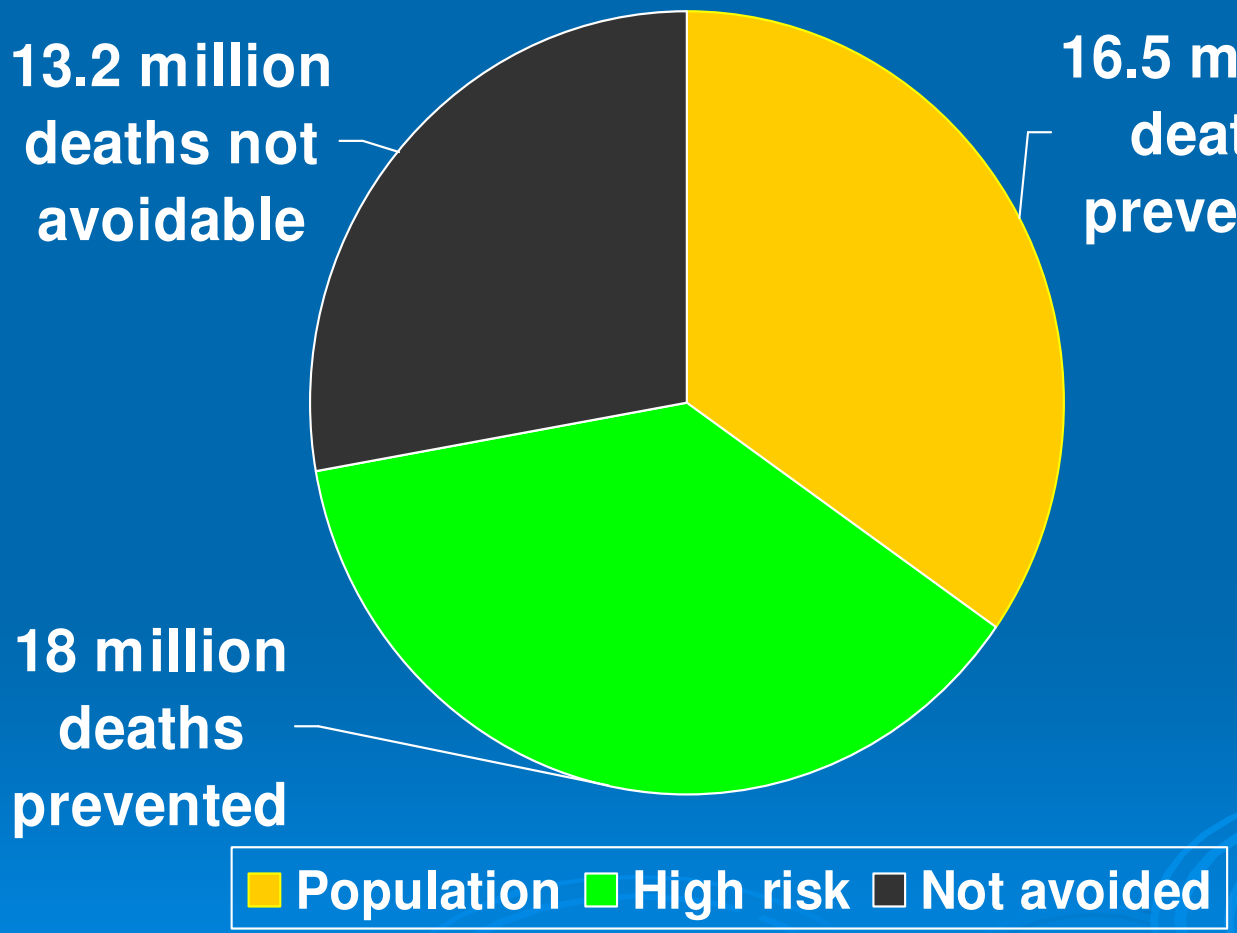
Polypill would contain a statin, three antihypertensives, folic acid and aspirin

Average yearly cost (US$ per head) of scaling up a multidrug regimen for CVD prevention



Lim et al. Lancet 2007; 370: 2054–62

Potential impact of interventions on death rates over 10 years



The arguments for more research

- What is the burden, economic and social consequences of chronic diseases?
- Why do things we think work, not work in different places and times?
- How do we improve coverage, diagnostics, and adherence to effective interventions?
- How do we develop better health systems for both chronic and infectious diseases?

The case for more research in low and middle income countries

- High and growing burden of deaths and DALYs attributed to NCDs
- Growing need for health systems research and HSR
- Health policies for NCDs need evaluating
- Determining the “causes of causes” requires wide variation in risk factor distributions
- Research in LMICs is beneficial for HICs: e.g. cholesterol lowering, no safe level of smoking

Evaluating the burden of NCDs

Completeness poor

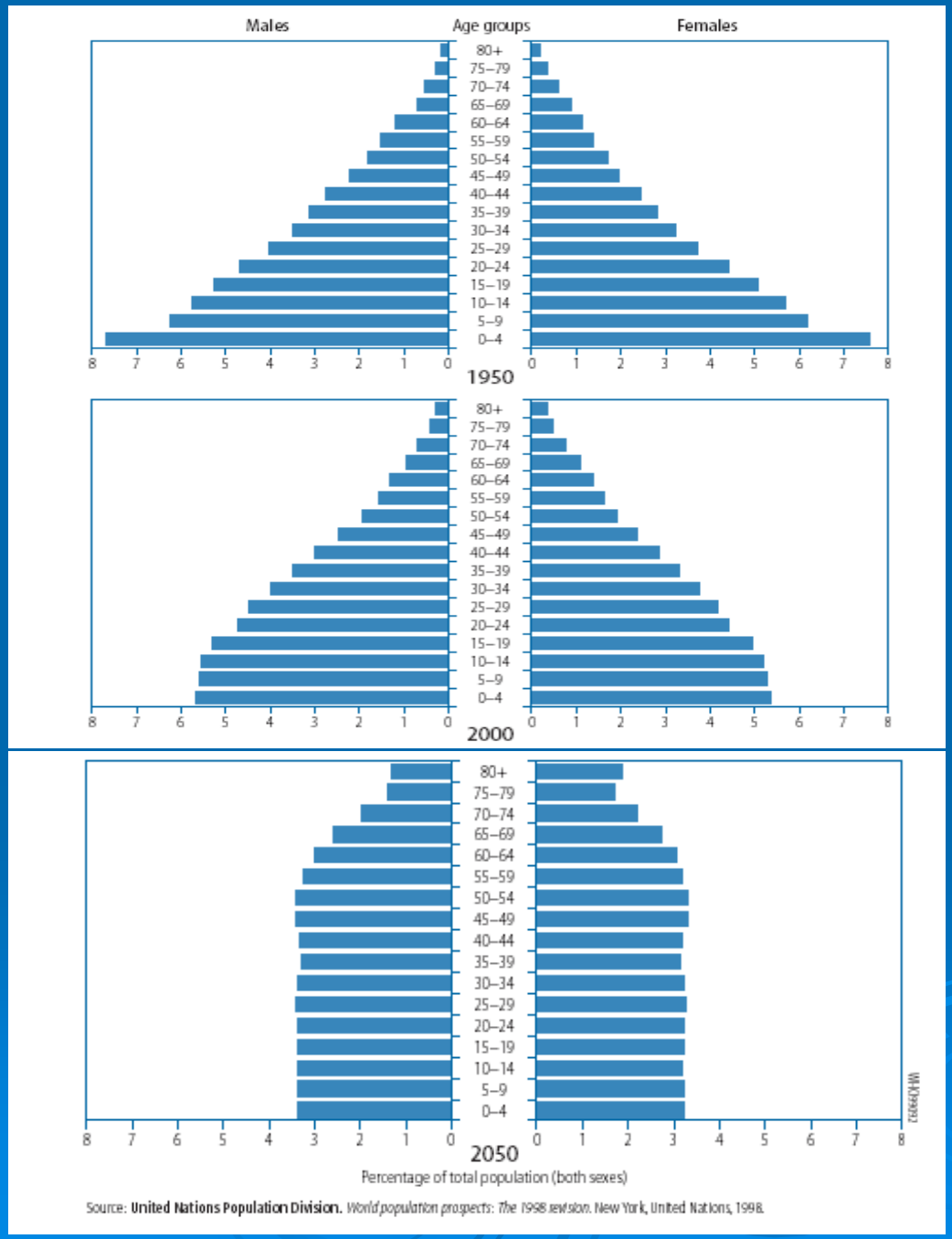
Quality limited

Projections weak

Cardiovascular disease in developing countries

- Inflating the burden: denominator free statistics
  - 15 million deaths a year world wide, 11 million in developing/transitional countries
  - Population size and age structure
- The lack of good data from most of the developing world

Population ageing results in increased population at risk of CVD and big percent increases in CHD and stroke

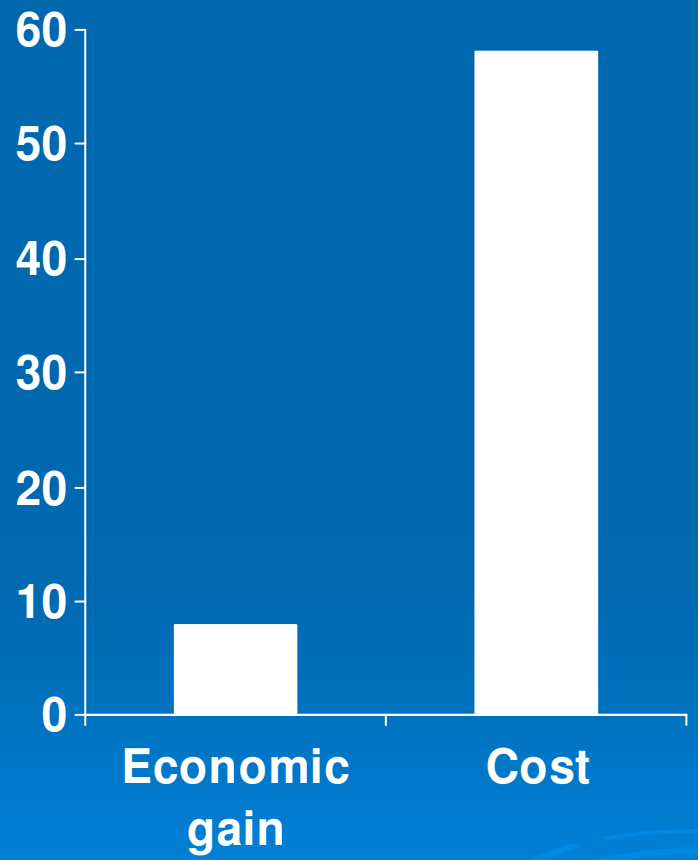


1950

2000

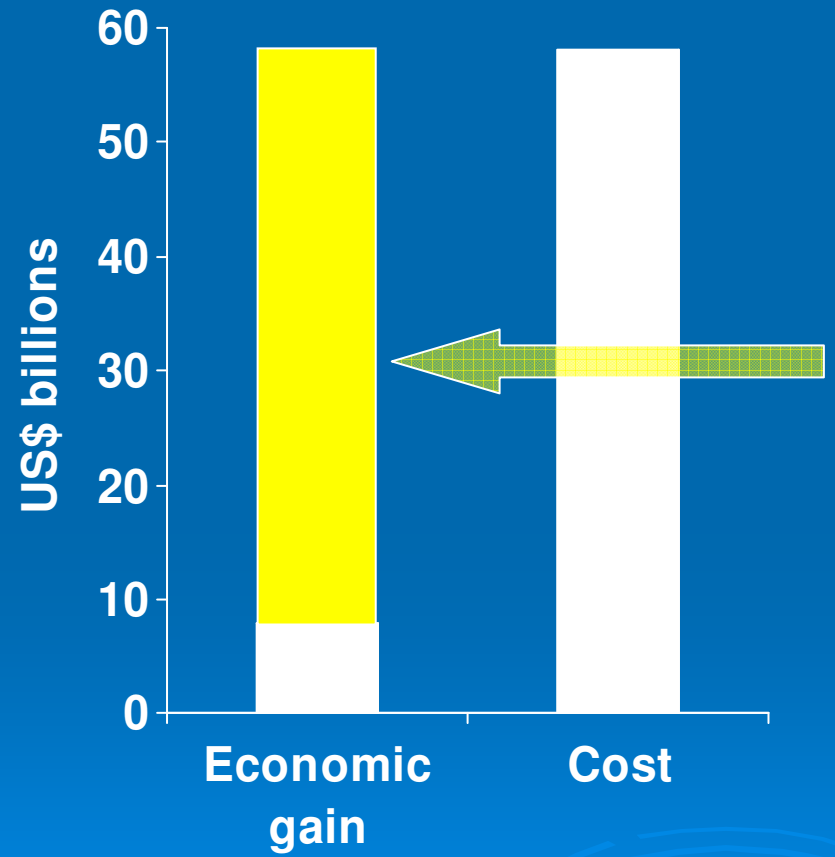
2050

Economic gains vs costs of implementation do not match



- Most health budgets are fully committed with no head-room for new spending
- If funds found, how will health inequitites be avoided?
- But analysis fails to take into account the value of a human life

Economic gains vs. costs of implementation do not match



- But analysis fails to take into account the value of a human life
- About 34 million deaths avoided – so value a human life at US$1500 – costs and gains now balance

It's affordable!

- The amount required to implement proposed strategies is:
- 3% of UK National Health Service annual budget
- 50% of UK Department for International Development annual budget
- 25% of India's military annual spending

Finding the causes of NCDs

Distribution of risk

“Causes of causes”

Pre-requisite for prevention

Effects of migration, urbanisation, population ageing

A life course perspective

of maintaining independence in older age

Ageing and Health
World Health Organization

WHO/HSC/AHE/99.2
Distr.: General

BANGLADESH NUTRITIONAL BLINDNESS STUDY

HELEN KELLER INTERNATIONAL
INSTITUTE OF PUBLIC HEALTH NUTRITION

NUTRITIONAL FINDINGS

টিকা

	মাত্রা		
	১	২	৩
টিকা দেওয়ার তারিখ			
বি সি জি		■	
ডি পি টি			
পলিও			
হাম		■	
অন্যান্য			

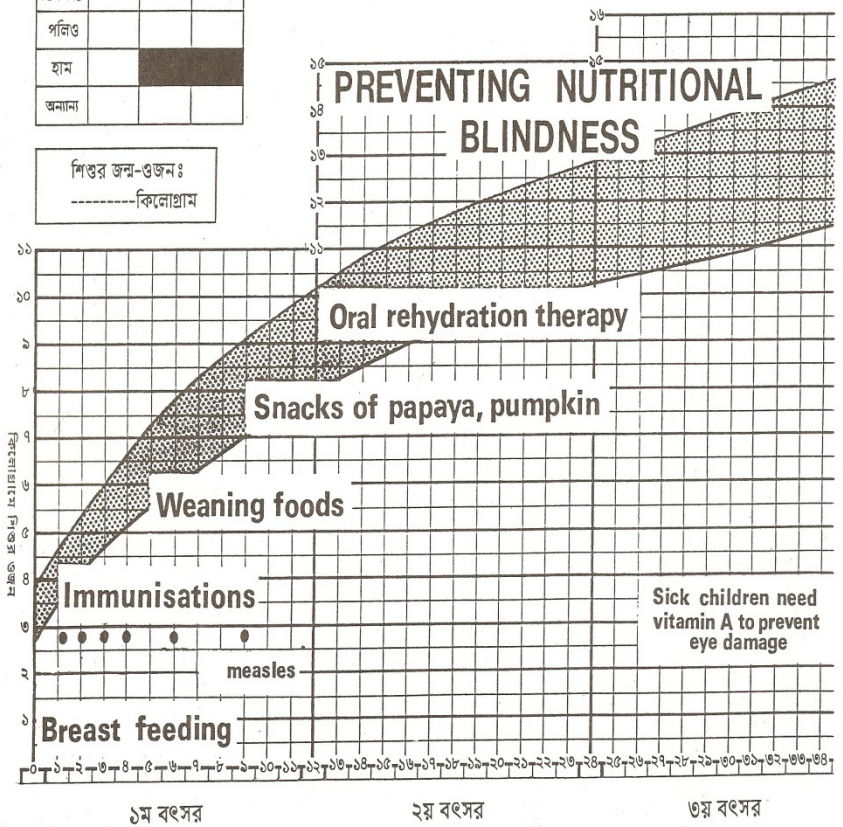
শিশুর জন্ম-ওজনঃ
---------কিলোগ্রাম

শিশুর এই কার্ডে অন্তর্ভুক্তির দু'মাস থেকে যদি রেখা উপরের দিকে যায় তাহলে শিশু ঠিকমত বাড়ছে।

রেখাটি সমান অবস্থায় থাকলে শিশুকে দৈনিক অতিরিক্ত খাবার দিন।

রেখাটি নিচের দিকে গেলে শিশুকে ডাক্তার দেখান এবং দৈনিক অতিরিক্ত আরো কয়েকবার খাবার দিন।

পরিবার পরিকল্পনা সম্পর্কে জানতে হলে আপনার এলাকার স্বাস্থ্য ও পরিবার পরিকল্পনা কর্মীর পরামর্শ নিন।



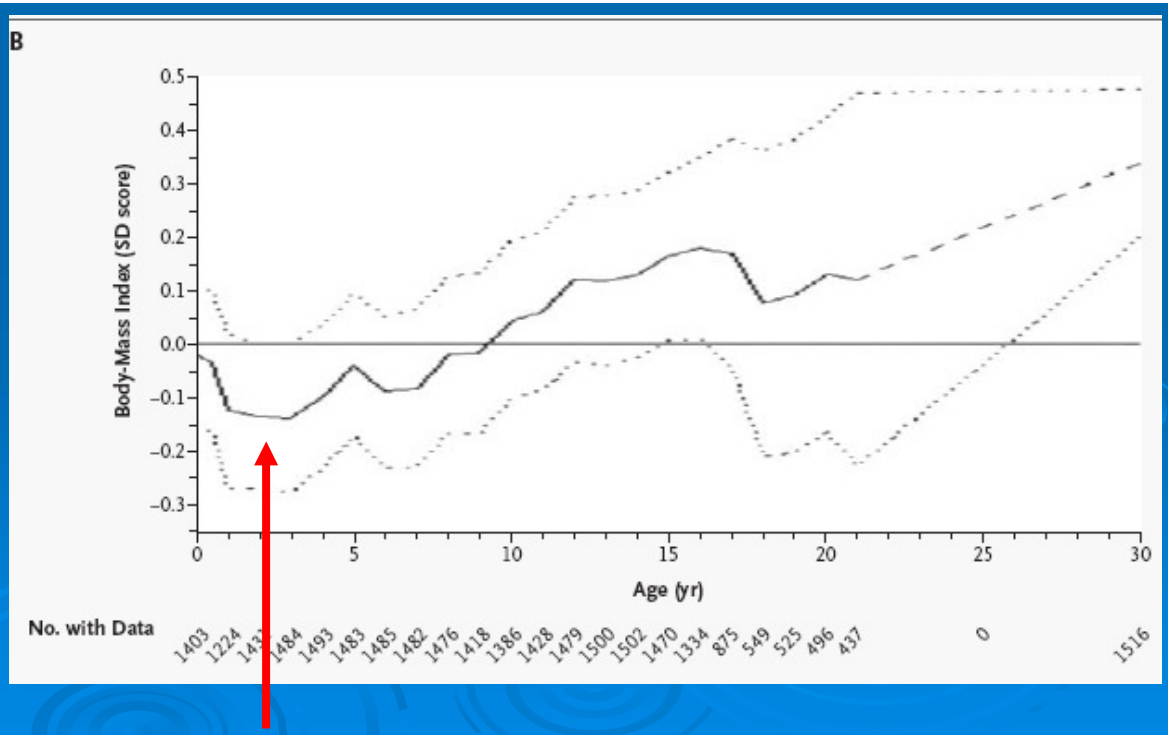
The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 FEBRUARY 26, 2004 VOL. 350 NO. 9

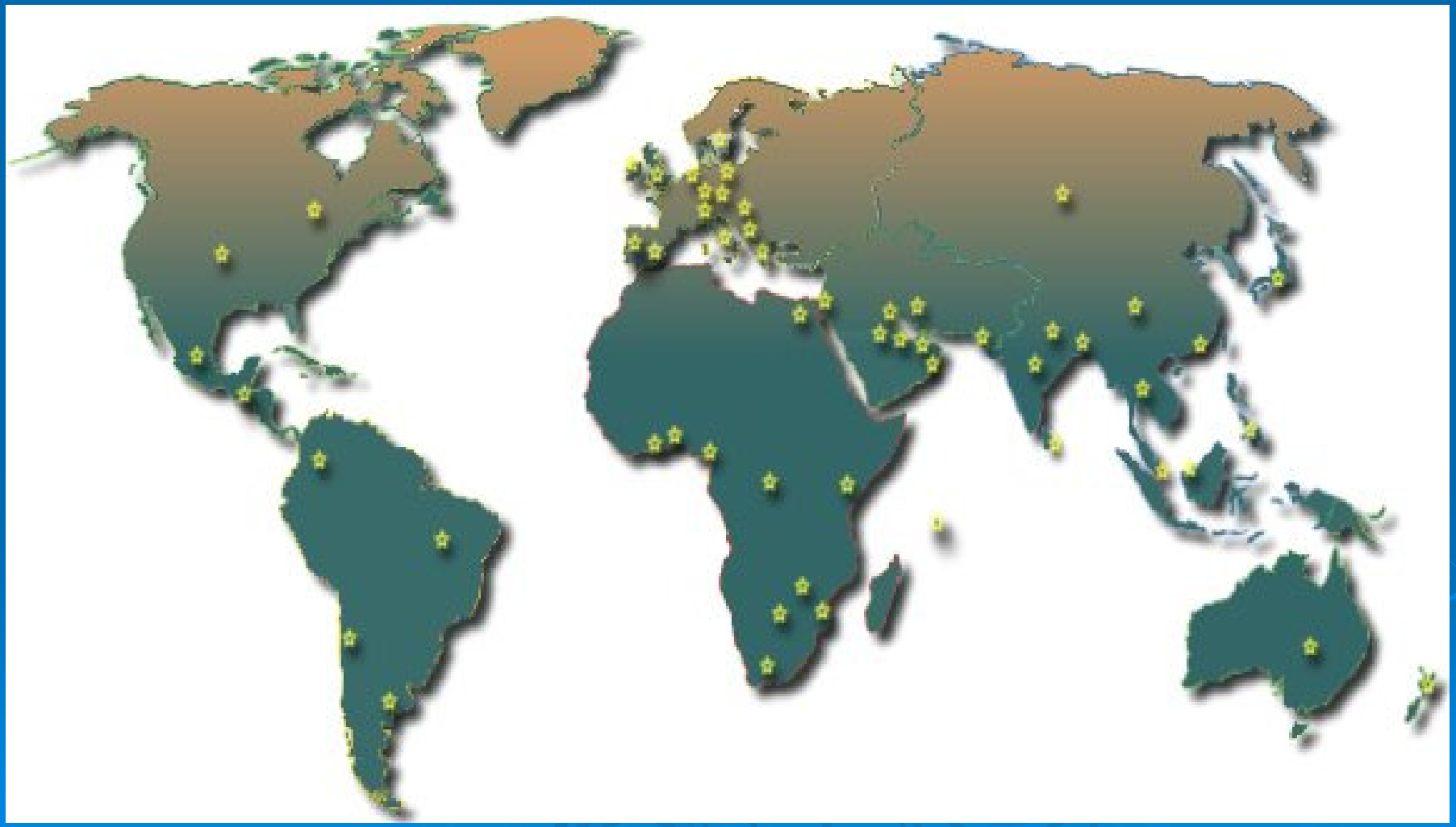
Relation of Serial Changes in Childhood Body-Mass Index to Impaired Glucose Tolerance in Young Adulthood

Santosh K. Bhargava, M.D., Harshpal Singh Sachdev, M.D., Caroline H.D. Fall, D.M., Clive Osmond, Ph.D., Ramakrishnan Lakshmy, Ph.D., David J.P. Barker, Ph.D., Sushant K. Dey Biswas, M.Stat., Siddharth Ramji, M.D., Dorairaj Prabhakaran, D.M., and Kolli Srinath Reddy, D.M.

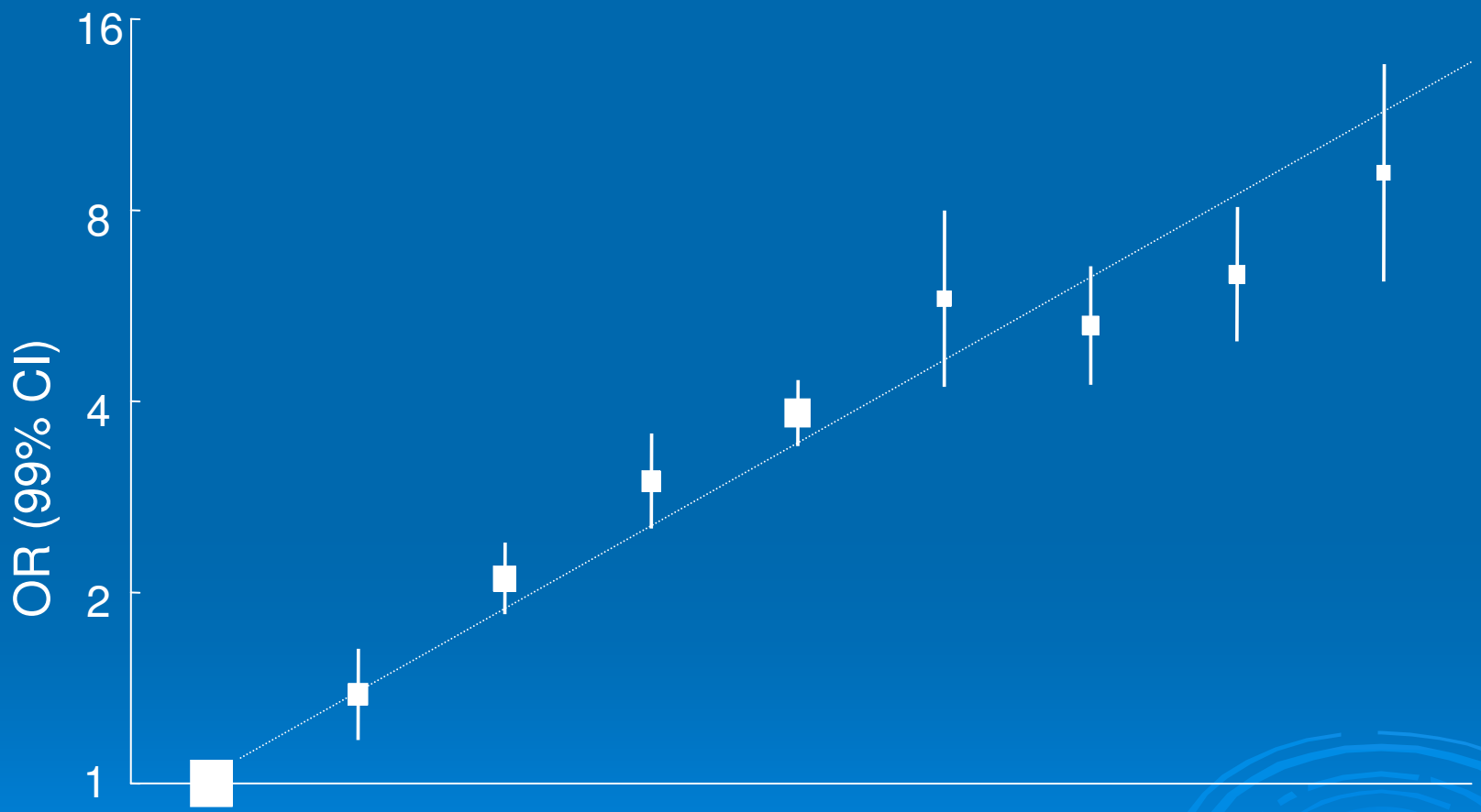
Association between thinness in infancy and impaired glucose tolerance or diabetes in young adulthood. Crossing into higher categories of BMI after age of 2 years is also associated with these disorders.



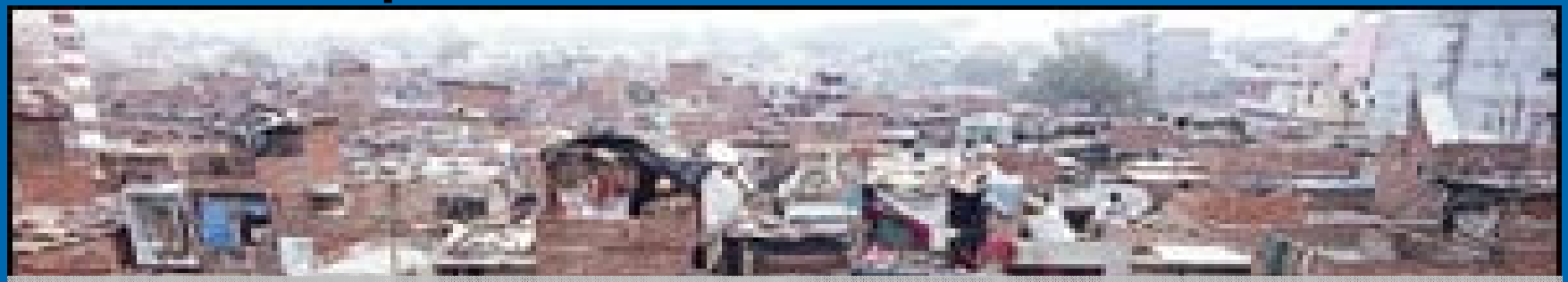
INTERHEART – C:C study of causes of MI in 52 countries



INTERHEART: Smoking and MI



Effects of urbanisation on the development of CVD risk factors



Research questions:

What effect does living in an urban slum have on blood pressure and lipid level trends with age?

Clean water equals lower diarrhoeal disease equals (maybe) lower blood pressure in adult life – see Lawlor et al. Am J Epi 2006;163:608-14

Health policy, systems and services research

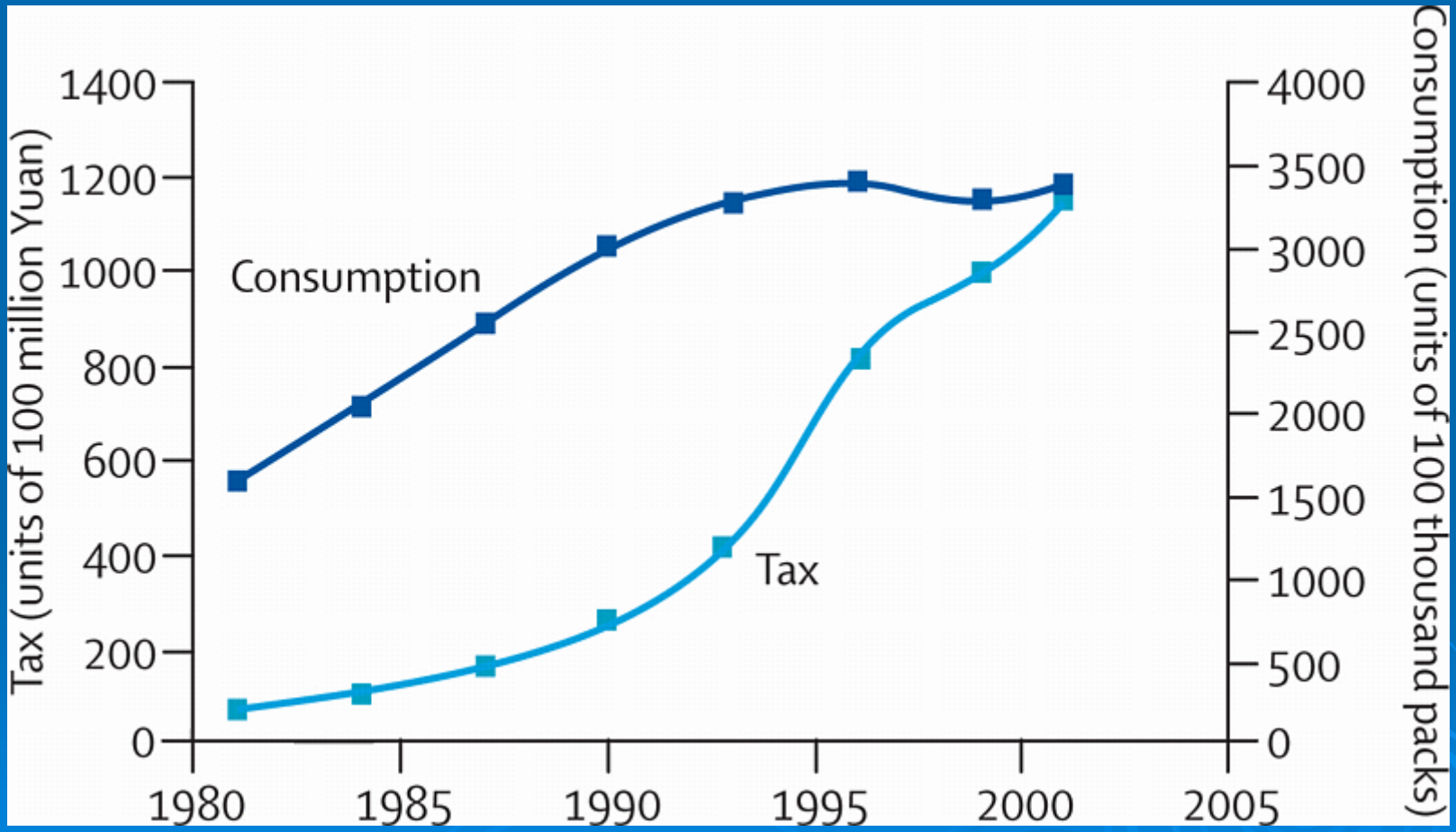
Essential!

Complex: private-public mix

Context specific

Health protection through taxation and legislation is a powerful means of primary prevention – effects need evaluating in each country

Tobacco: consumption and tax association in China



Wang et al Lancet 2005;366: 1821-4

Voluntary industry agreements and public advice to reduce salt use: effective or not?

What is called in the advertising trade “Ambush Marketing” – who benefited?

Health promotion policy

- Massive enthusiasm for export of health promotion to LMICs (eg. US Institute of Medicine, World Heart Federation
- Costs not considered
- Needs of affluent urban patients seem to have undue influence

First – what is effective?

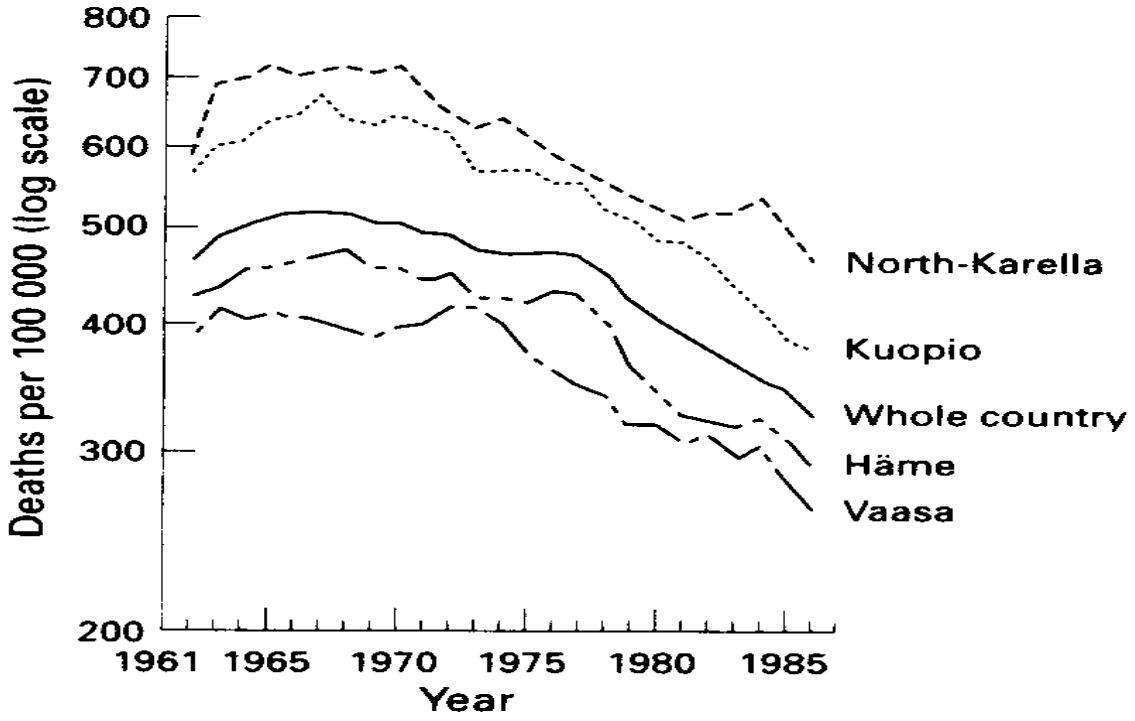
- Community-wide “North Karelia” style interventions?
- Health promotion programmes?
- Effectiveness vs. community effectiveness

North Karelia: risk factor trends

	Men		Women	
	N. Karelia	Koupio	N. Karelia	Koupio
Serum cholesterol mmol/l				
1972	7.1	6.9	7.0	6.8
1977	6.7	6.8	6.6	6.5
1982	6.3	6.3	6.2	6.0
1987	6.2		5.9	
1992	5.9		5.5	

Ebrahim & Davey Smith, Int J Epi, 2001;30:201-5

The decline in CHD - Finland



Age standardised mortality from ischaemic heart disease in selected counties in Finland 1961–87, three year moving averages, males aged 35–64.[30]

Disappointing results replicated many times

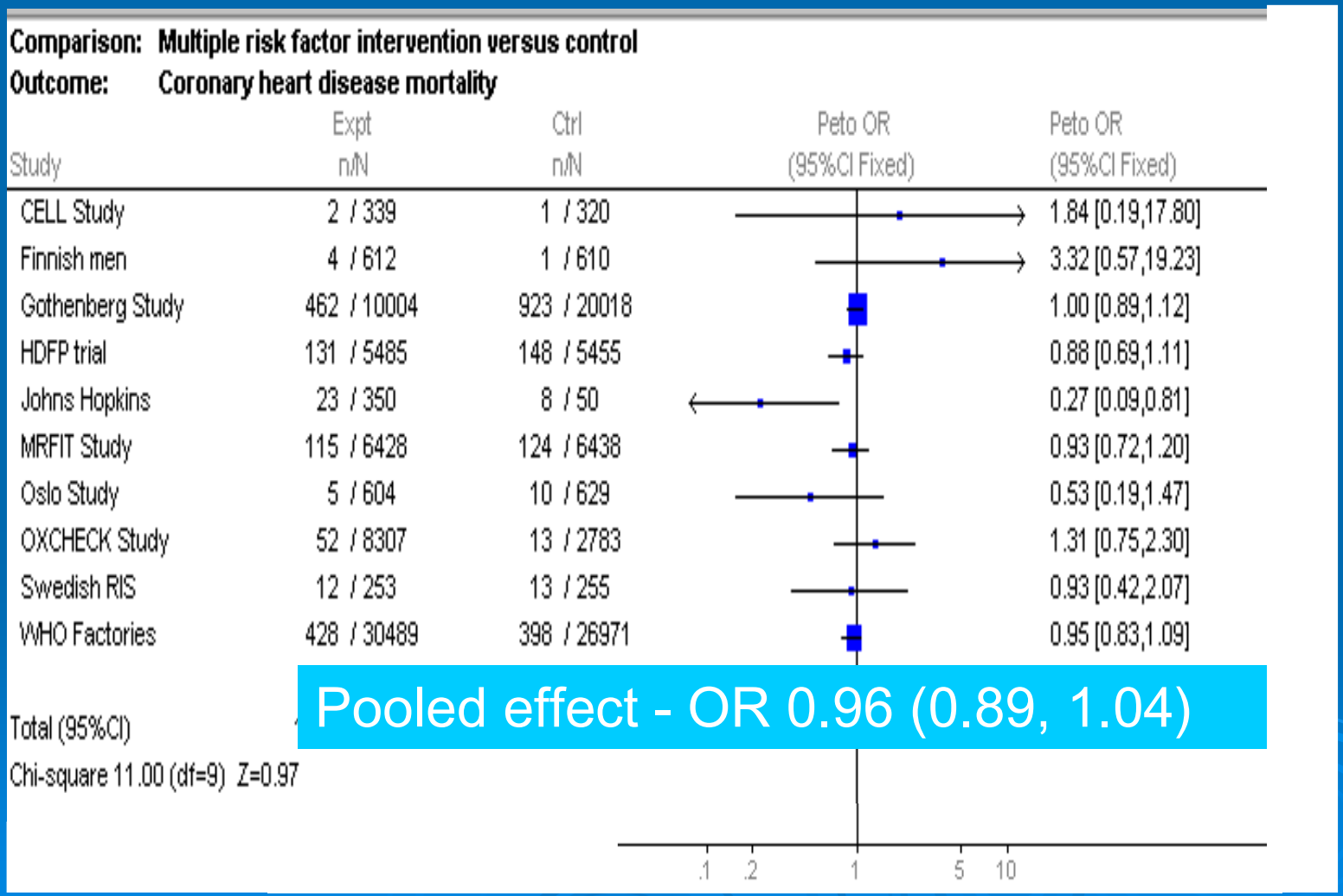
- Cardiovascular community control programs
- Stanford Heart Disease Prevention Program
- Stanford Five-City project
- Minnesota Heart Health Program
- Pawtucket Heart Health Program
- Heart Beat Wales
- COMMIT study

Multiple risk factor intervention

- Dietary modification
- Smoking cessation
- Increasing exercise
- +/- drug treatments

The randomised controlled trial evidence

Systematic review of multiple risk factor interventions: effect on CHD mortality



Ebrahim et al, Cochrane Library, 2004

So – why no big effects?

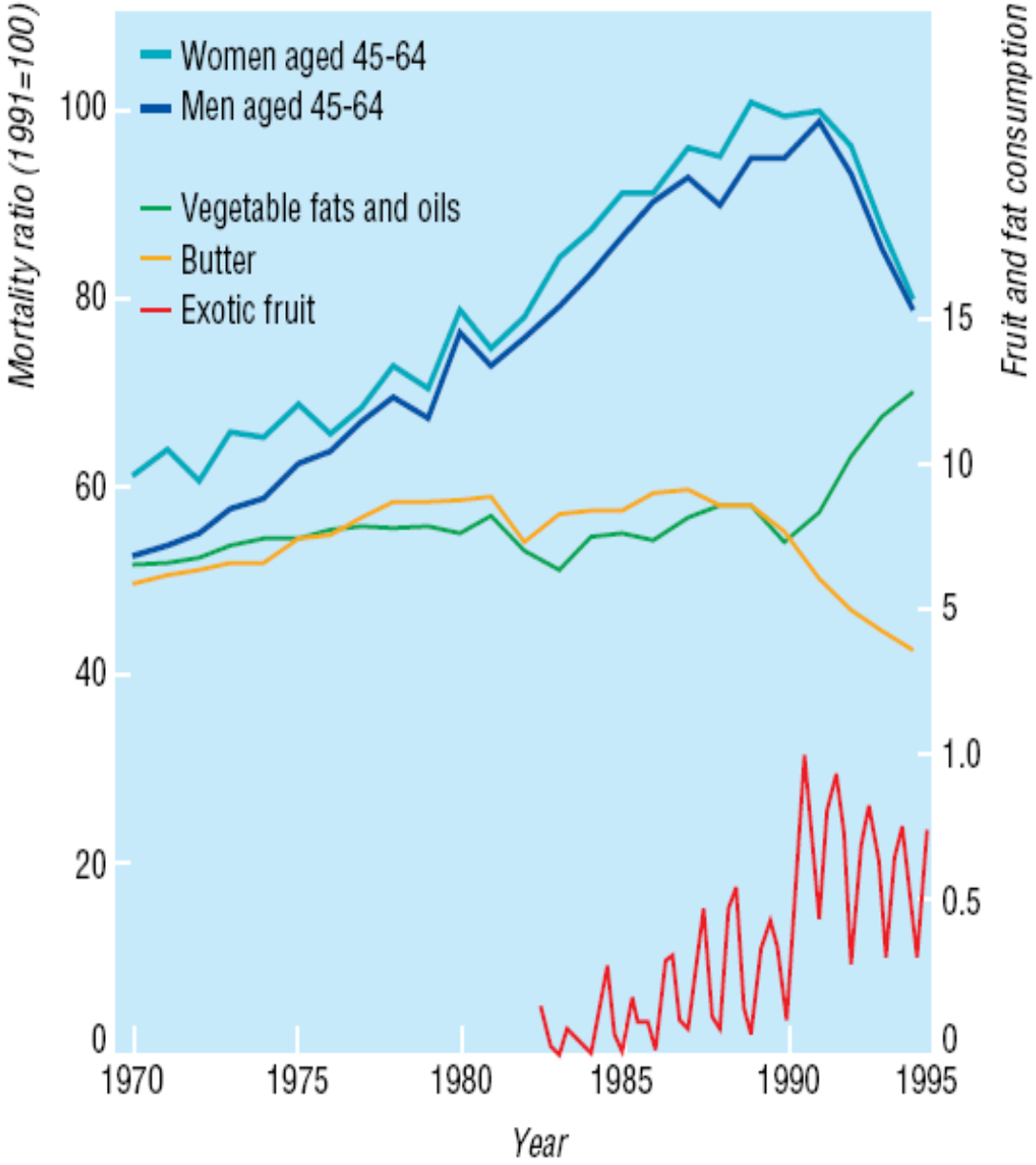
- Interventions used
- Latency of effects
- Quality of trials
- Limitations of RCTs

	Systolic BP Reduction, mmHg	Cholesterol reduction, mmol/l	Smoking Decrease, %	CHD mortality Relative risk
Randomized controlled trials in high income countries				
Ebrahim & Davey Smith	4.2	0.14	4.2%	0.96 (0.90, 1.04)
Community interventions in low and middle income countries				
Mauritius	Reduction	0.8		
South Africa	2.3-3.6	No effect	4.0%	-
China	0	-	Increase	-
Poland	-	-	-	28%
India*	3-5	0.7	10%	-

Modified from Gaziano etal Lancet 2007:370:

* Indian data from Indian Factories Study, Prabhakaran unpublished

Dramatic downturn in CHD mortality in Poland



"Changes in type of dietary fat and increased supplies of fresh fruit and vegetables seem to be the best candidates."

Zatonski et al. B*MJ* 1998;316;1047-1051

Evidence from the developing world

- Mauritius community intervention
  - Mass media, education in workplace and schools, + fiscal measures
- At 5 years:
  - Hypertension and smoking down by 19%
  - Hypercholesterolaemia (6.5+mmol/l) down by 77%
  - Obesity prevalence up by 56% and diabetes by 15%

Dowse et al, BMJ 1995;311:1255-9

Evidence from the developing world

- Mauritius study
  - Uncontrolled evaluation – baseline and 5 year survey
  - Government substituted soya oil for palm oil *
  - Cigarette and alcohol pricing not discussed
  - Obesity and diabetes increases suggest education not effective

* Uusitalo U et al. BMJ 1996;313:1044-6

Efficacy to "Community Effectiveness"

Potential effect

↓

Coverage

↓

Accuracy of diagnosis

↓

Professional compliance

↓

Adherence to treatment

↓

Side effects

↓

Community effectiveness

Efficacy to "Community Effectiveness"

Potential effect	**Polypill: 80% fall in bad outcomes**
Coverage	UK: less than 50%
Accuracy of diagnosis	90% accuracy
Professional compliance	90% compliant
Adherence to treatment	80% compliant
Side effects	85% no side effects

80% x 50% x 90% x 90% x 80% x 85%

Community effectiveness **22 % fall in bad outcomes**

Conclusions: more action needed!

- We have effective means of controlling population risk factor levels – we need to implement them
- Multi-drug regimens can contribute massive reductions in CVD – but do not deal with the root causes of CVD risk
- Implementing cost-effective interventions will require much greater efficiencies in primary care to achieve health gain
- There is definitely no case for less action!

Conclusions: more research needed!

- The case for research on NCDs in low and middle income countries is strong
- Research priorities
  - Evaluating the burden of NCDs
  - Finding the causes of NCDs
  - Health systems and health services research
- Increased research capacity needed