



**1st Global Conference on Healthy  
Lifestyles and Noncommunicable  
Diseases Control  
Moscow, 28-29 April, 2011**

# **The International Agenda for Stroke**

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# Ischemic and Hemorrhagic Stroke

Ischemic strokes are the most common and arise from blood vessel narrowing and platelet adhesion as with CAD, leading to blood clot formation and brain injury.

Hemorrhagic strokes are more common in some populations especially in Asia and results from the rupture of a blood vessel or aneurysm. The outlook is much worse and almost 50% will die.

# Stroke Facts in Developed Countries

## Stroke is

- cause no 1 of disability
- cause no 2 of dementia
- cause no 3 of death
- major cause of
  - epilepsy
  - falls
  - depression

# Incidence and prevalence of stroke

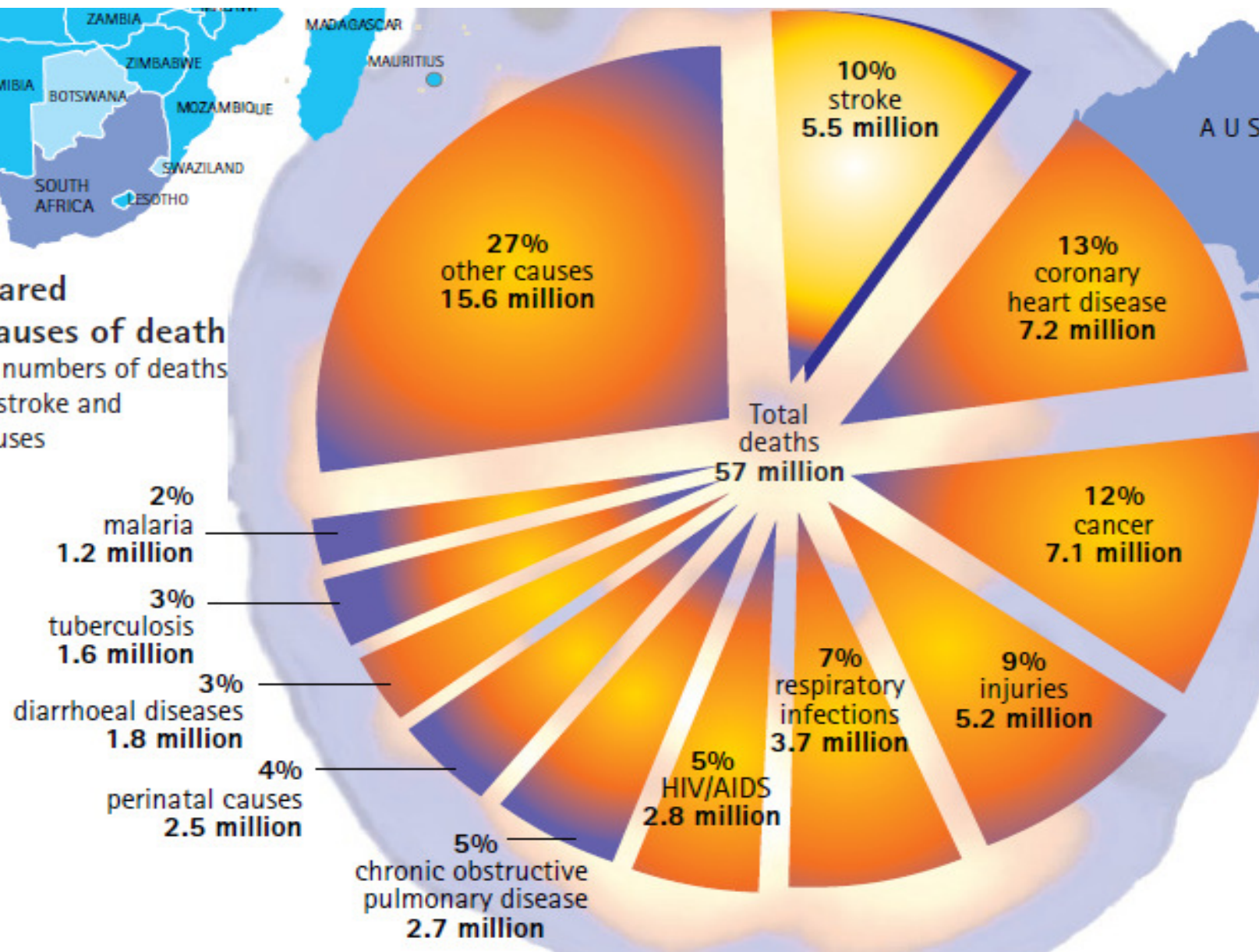
	Incidence	Prevalence
<b>World</b>	<b>9.0 million</b>	<b>30.7 million</b>
<b>Africa</b>	<b>0.7</b>	<b>1.6</b>
<b>Americas</b>	<b>0.9</b>	<b>4.8</b>
<b>Eastern</b>		
<b>Mediterranean</b>	<b>0.4</b>	<b>1.1</b>
<b>Europe</b>	<b>2.0</b>	<b>9.6</b>
<b>South-East Asia</b>	<b>1.8</b>	<b>4.5</b>
<b>Western Pacific</b>	<b>3.3</b>	<b>9.1</b>

**12.6 million have moderate-severe disability,  
8.9/12.6 million in low-mid income countries**



## Stroke compared with other causes of death

Percentages and numbers of deaths  
worldwide from stroke and  
other leading causes  
2002

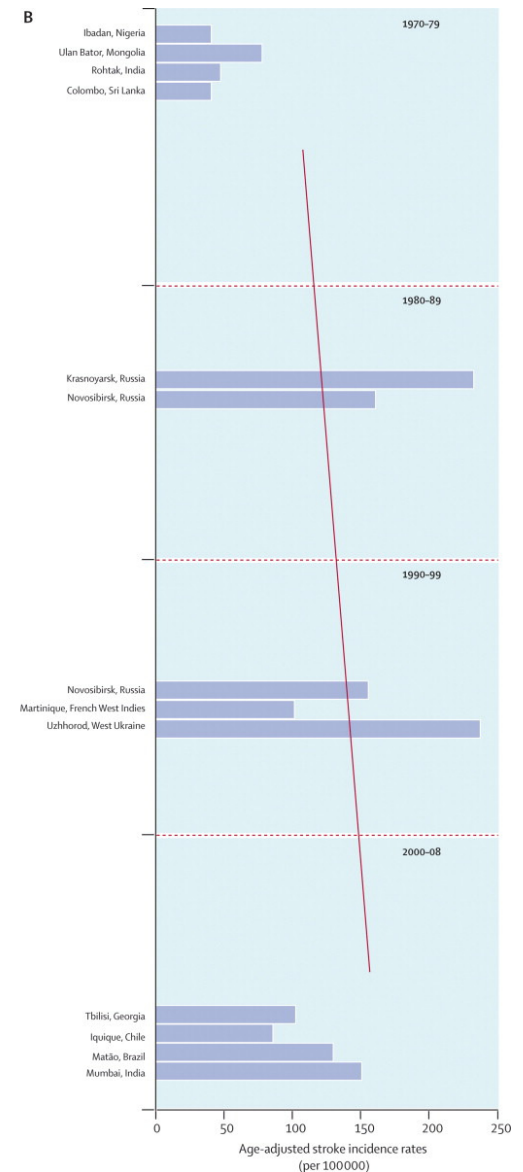
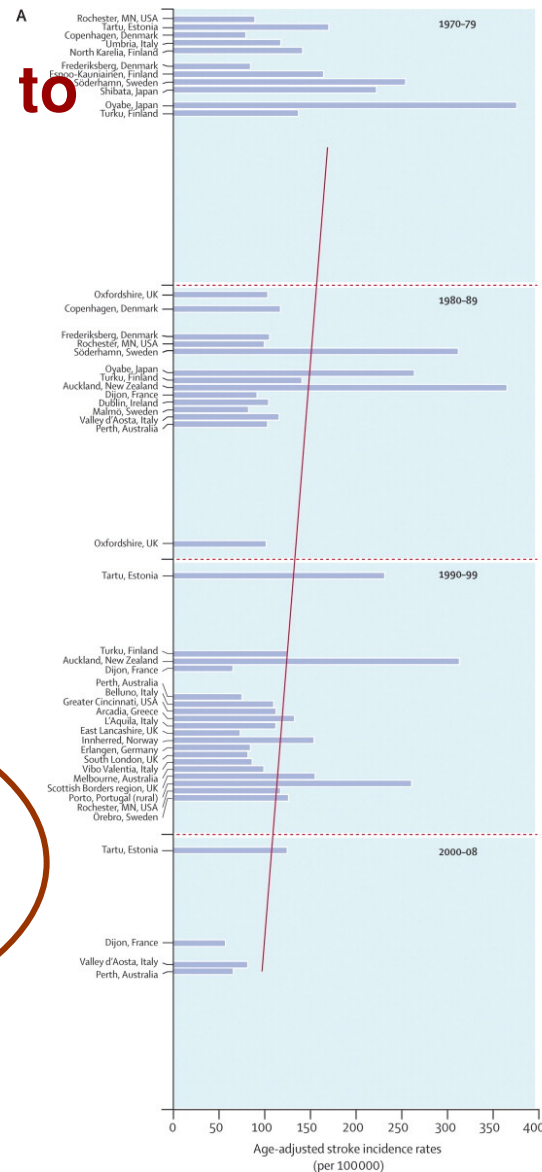


Source: 2004 WHO World Atlas on CVD/Stroke

# Time trends in ischemic stroke 1970 to present:

High-income countries:  
*decrease 42 %*

Low-middle income countries:  
*more than doubled*



Feigin et al. Lancet Neurology, 2009

# **COSTS OF STROKE IN THE US: 2007 AHA ESTIMATES**

- Direct and indirect costs = \$40 billion
- Mean lifetime cost = \$140,048
- Inpatient hospital costs for an acute stroke event account for 70% of first-year post stroke costs.
- Estimates of total stroke cost between 2005-2050, in US dollars is projected to be \$1.52 trillion for non-Hispanic whites, \$313 billion for Hispanics, and \$379 billion for Blacks
- Loss earnings is expected to be the highest cost contributor in each race/ethnic group.

**Table 4. Cost Estimates From the 71 Studies Reporting Costs for Stroke or Ischemic Stroke, Stratified by Geographic Region**

Geographic Region	N	Mean, \$	Median, \$	Range, \$
Eastern Europe	13	2822	1,865	468–11,523
Western Europe	40	9438	7,437	1,448–25,909
Sweden	14	24 548	24,984	7,413–54,157
UK	27	22 377	15,720	5,026–107,860
Japan	6	12 883	8901	8266–22 566
USA	53	28 253	21 006	7309–146 149
Other (New Zealand, Australia, Canada)	12	16 762	14 229	7473–44 874

# Prevention of stroke

## Commonality of risk factors for...

- ... stroke
- ... coronary heart disease
- ... peripheral vascular disease
- ... many types of dementia
- ... many types of cancer
- ... respiratory tract disorders
- ... diabetes
- ...

*Non-communicable diseases (NCD)*



**Need to  
join hands**

# Stroke risk factors

## *Non-modifiable*

Age, Gender, Race, Heredity

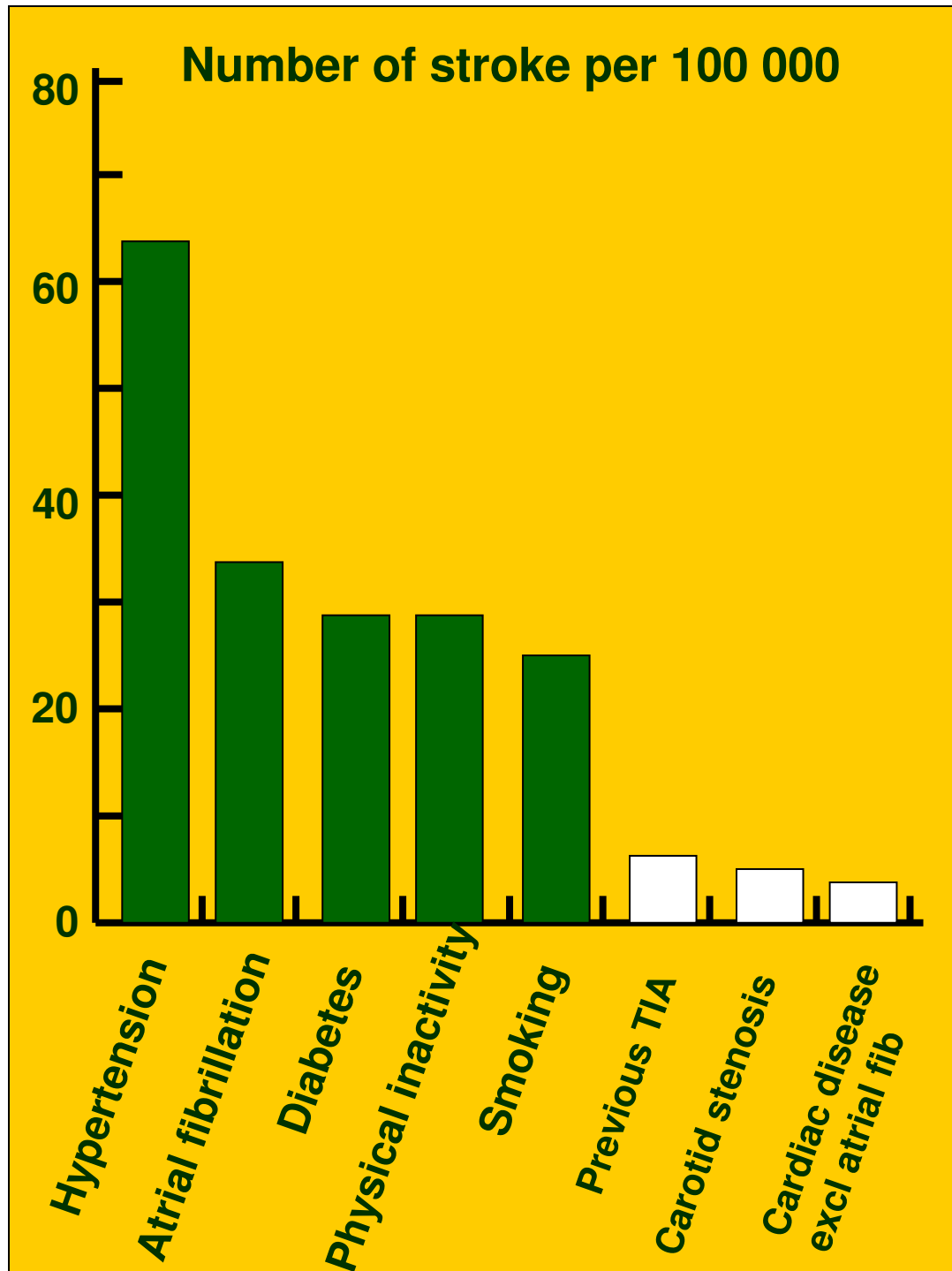
## *Modifiable*

### **Medical Conditions**

- Hypertension
- Atrial fibrillation
- Hyperlipidemia
- Diabetes mellitus
- Carotid stenosis
- Prior TIA or stroke
- Elevated homocysteine

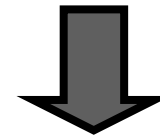
### **Behaviors**

- Cigarette smoking
- Alcohol abuse
- Physical inactivity



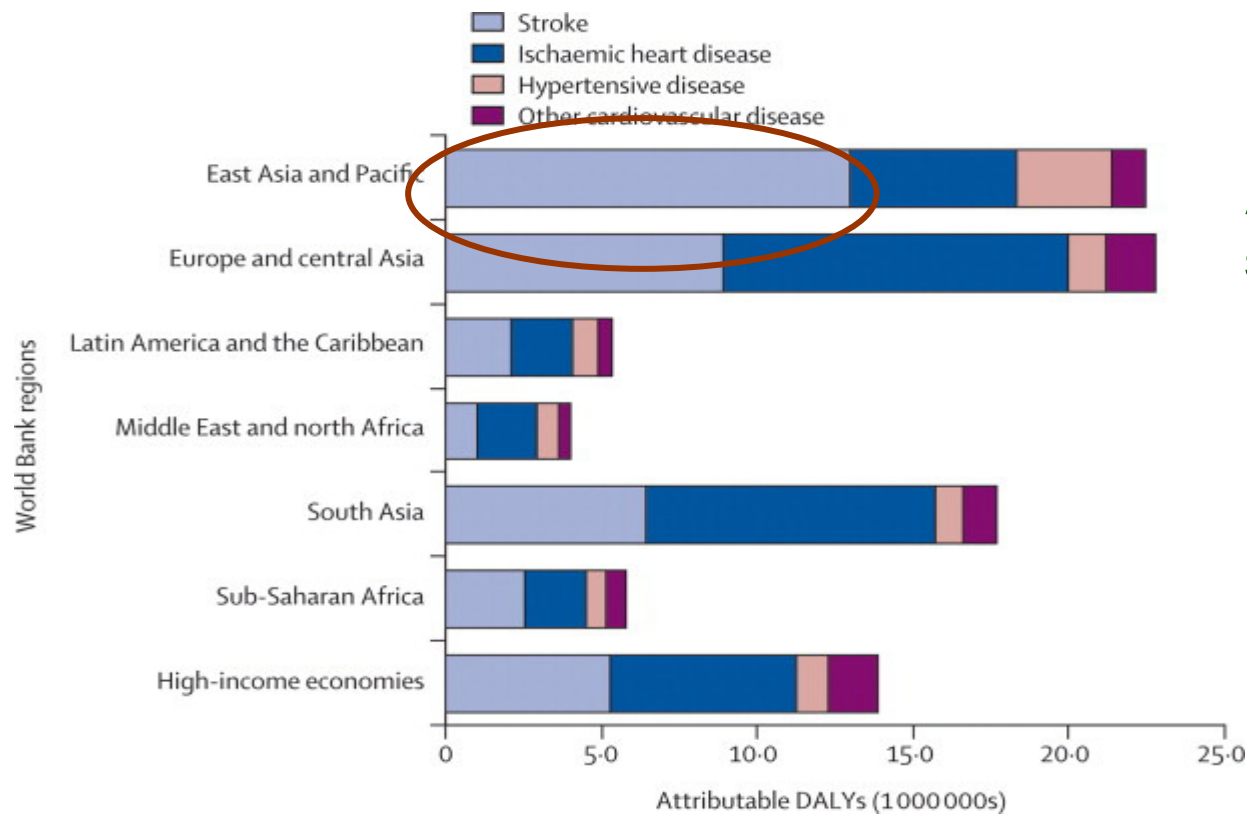
**For stroke the top 5 risk factors are**

- hypertension
- atrial fibrillation
- diabetes
- physical inactivity
- smoking



**account for 2/3 of all first-ever strokes**

# Global burden of blood-pressure related disease

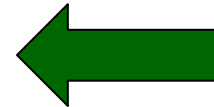


**About 54 % of all strokes attributable to high blood pressure**

**Lawes et al. Lancet 2008;371:1513-18**

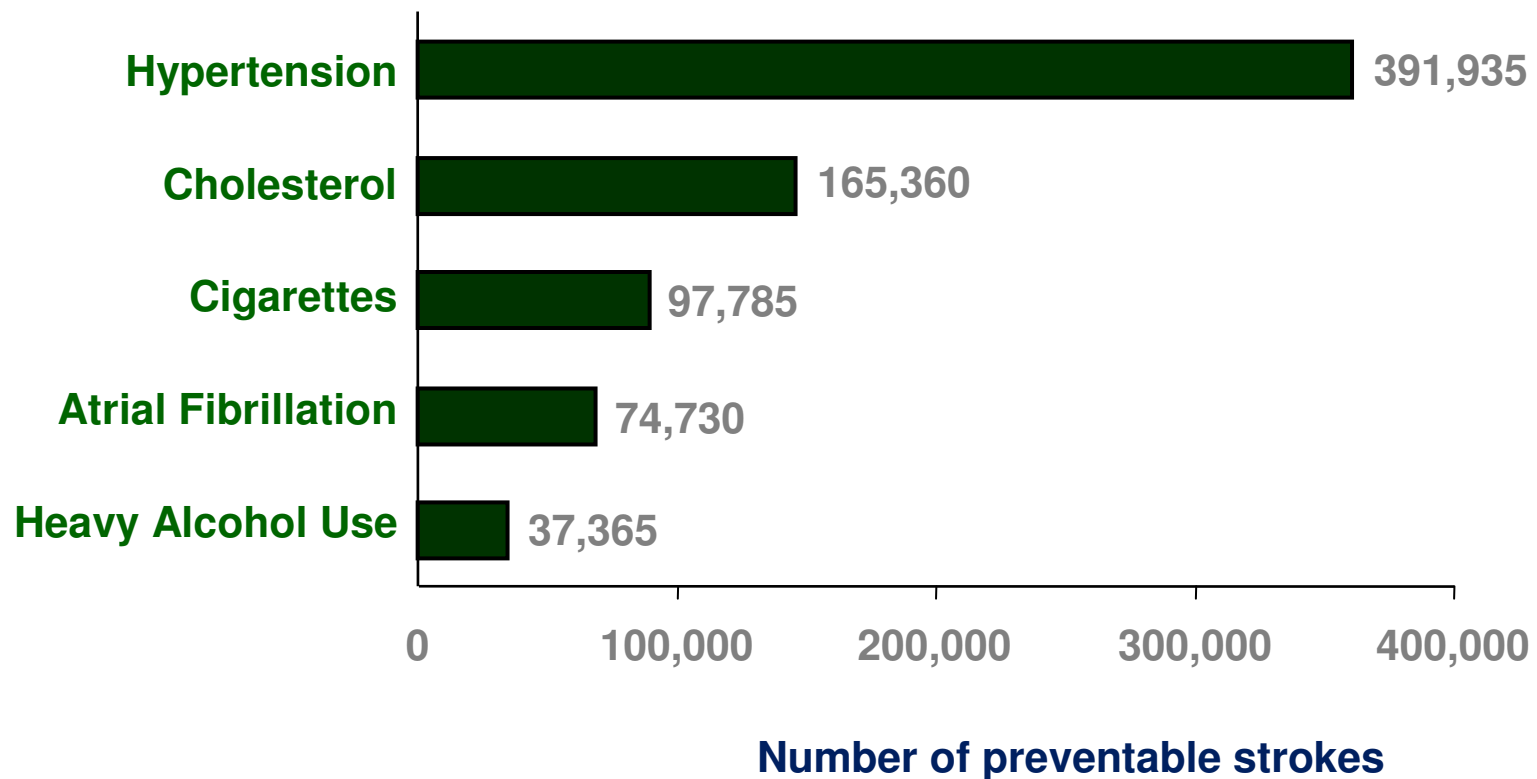
## Which factors drive stroke mortality rates? Only the risk factors?

	p-value
Mean systolic blood pressure	0.028
Tobacco use	0.041
Weight	0.017
National income	<0.0001



***Links to strengths of health systems and primary care,  
and to poverty***

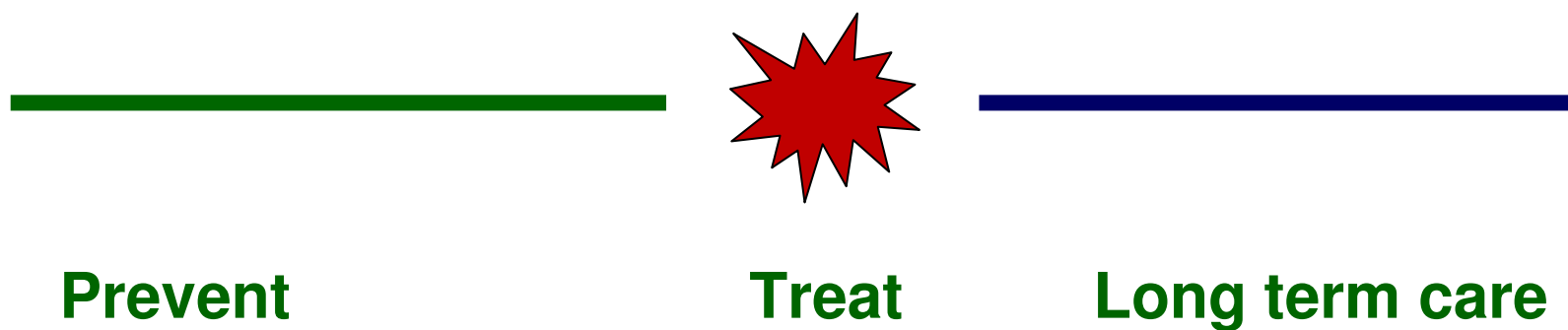
# How Many US Strokes Can Be Prevented by Controlling Risk Factors?



Gorelick PB, et al. *Arch Neurol.* 1995;52:347-355.

Gorelick PB, et al. *Stroke.* 2002;33:862-875.

# The International Agenda For Stroke



# The International agenda for stroke

## Prevent

### Healthy lifestyles

tobacco control

salt reduction

diet high in saturated fats and sugar

harmful alcohol use

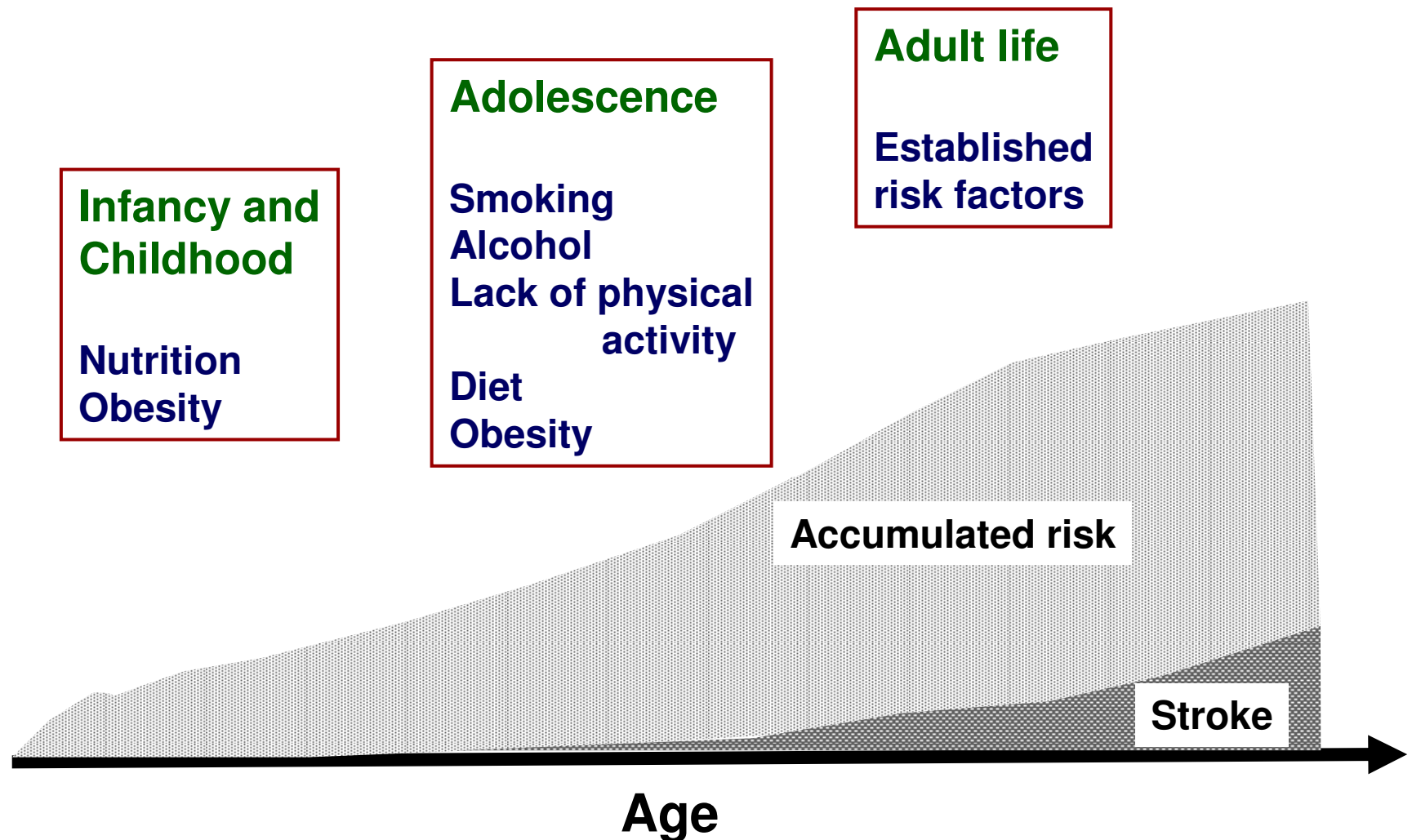
physical inactivity

### Blood pressure control

## Treat

## Long term care

# Stroke prevention – a life course approach



# **The International agenda for stroke**

## **Prevent**

### **Healthy lifestyles**

tobacco control

salt reduction

diet high in saturated fats and sugar

harmful alcohol use

physical inactivity

### **Blood pressure control**

## **Treat**

### **Stroke unit care**

## **Long term care**

# Organized stroke care: stroke units

- **Assessment and monitoring**
- **Early mobilization**
- **Multidisciplinary care**



# Organised inpatient (stroke unit) care for stroke




## Meta-analysis of 31 RCTs (6936 patients)

Death	OR: 0.86	-14 %
Death/institutional care	OR: 0.82	-18 %
Death/Dependency	OR: 0.82	-18 %

Stroke Unit Trialists' Collaboration  
Cochrane Corner. Stroke 2008;39:2402-2403

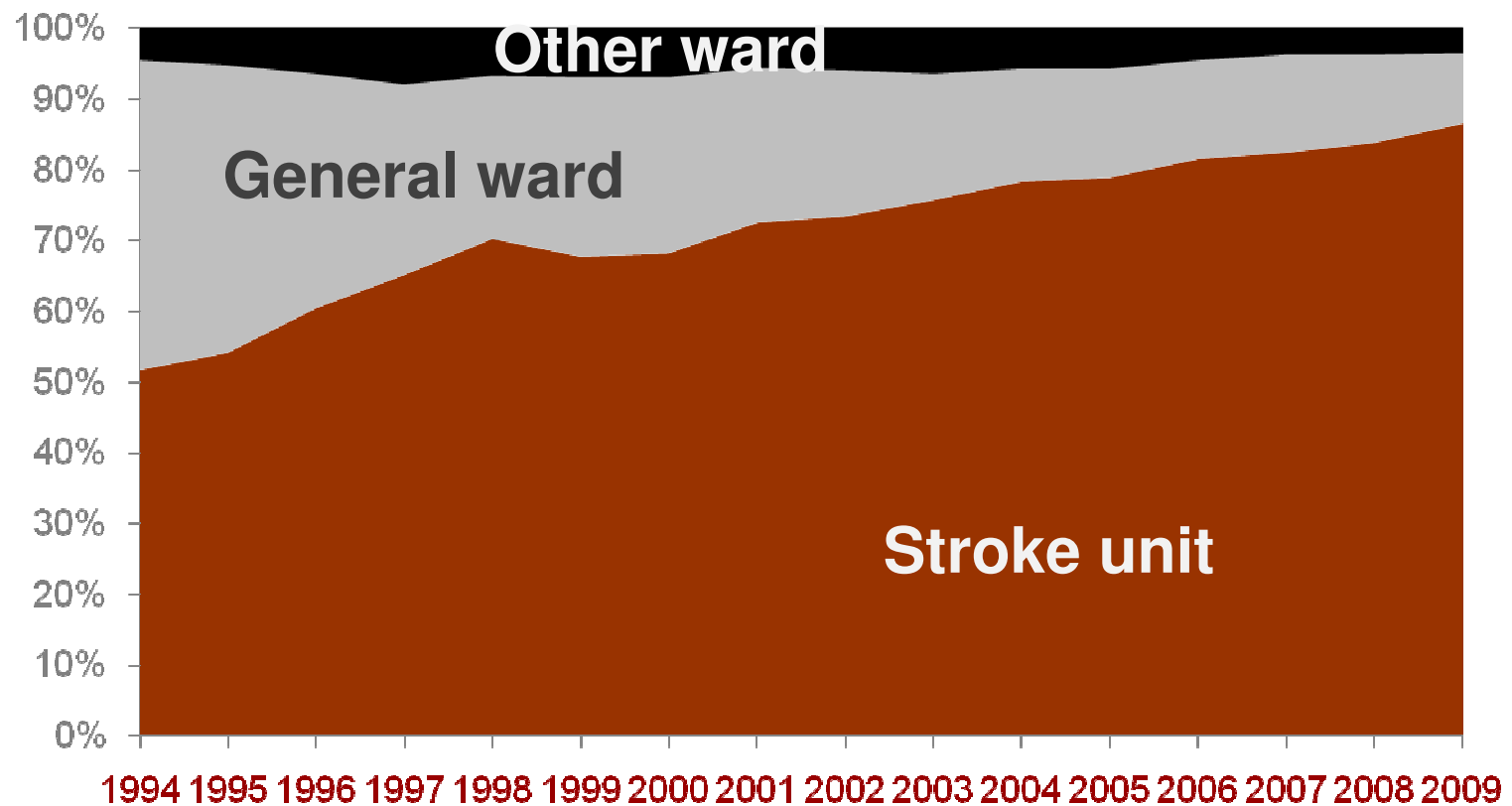
## **Absolute benefits of acute stroke therapies in a 1 million population with 2400 strokes/year**

	<b>NNT</b>	<b>Proportion treated</b>	<b>N of deaths/dep avoided</b>
<b>Aspirin</b>	<b>83</b>	<b>80%</b>	<b>23</b>
<b>Trombolysis</b>	<b>15</b>	<b>10%</b>	<b>15</b>
<b>SU care</b>	<b>18</b>	<b>80 %</b>	<b>107</b> 

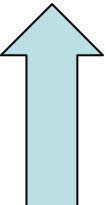
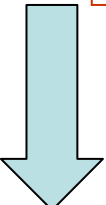
**Warlow et al. Stroke. Lancet 2003;362:1211-24**

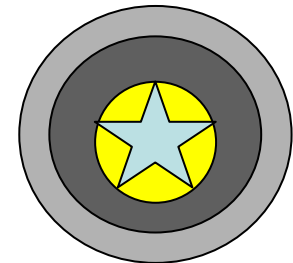


## Proportion of patients treated at stroke units, Sweden 1994 – 2009



# ORGANIZATION OF STROKE SERVICES

- 
- Primary prevention
  - Pre-hospital care
  - Emergency room
  - ***Stroke Unit***
  - Long term care rehabilitation
  - Secondary prevention
- 



# A network of organized stroke care ....



**Educational tools to  
establish stroke units  
in low resource settings**



# Stroke ABC programme



**Launched in CapeTown 2006**

**China 2007**

**Vietnam 2008**

**South Korea 2010**

**Sri Lanka 2011**

**Marocco 2011**

**Interested? Welcome to contact!**

**[bo.norrving@med.lu.se](mailto:bo.norrving@med.lu.se)**

# **The International agenda for stroke**

## **Prevent**

### **Healthy lifestyles**

tobacco control

salt reduction

diet high in saturated fats and sugar

harmful alcohol use

physical inactivity

### **Blood pressure control**

## **Treat**

### **Stroke unit care**

## **Long term care**

### **Strengthen systems for follow up**

# Global burden of disabilities in low – mid-income countries

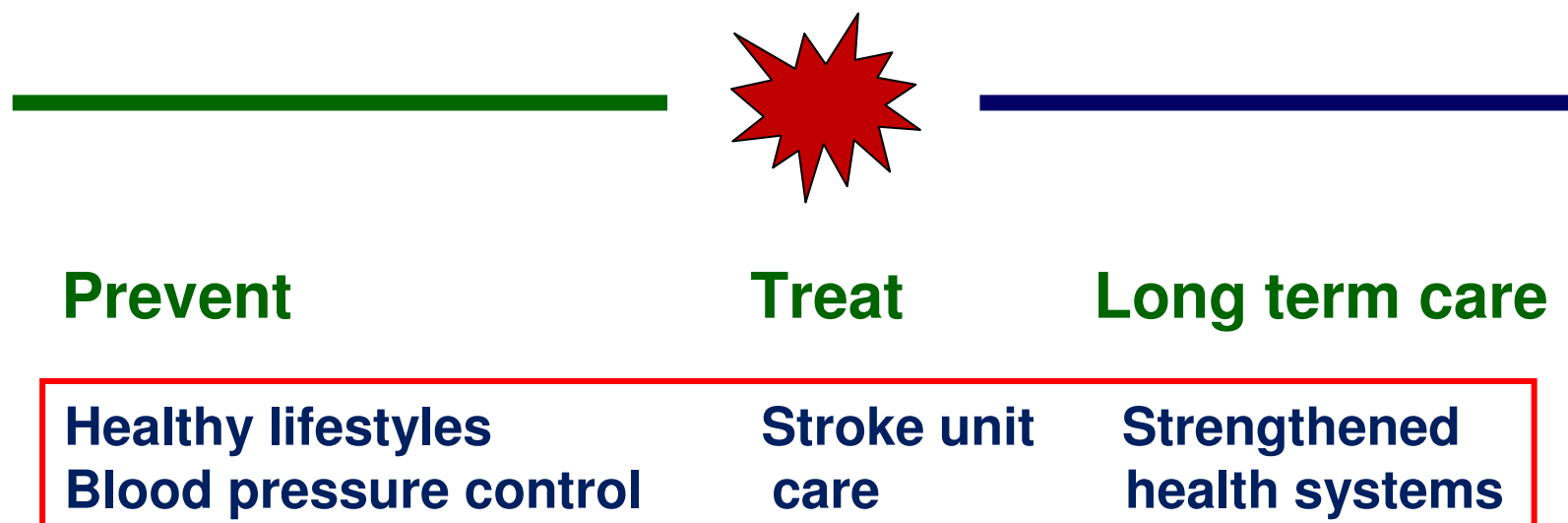
PAPF, population-attributable prevalence fractions

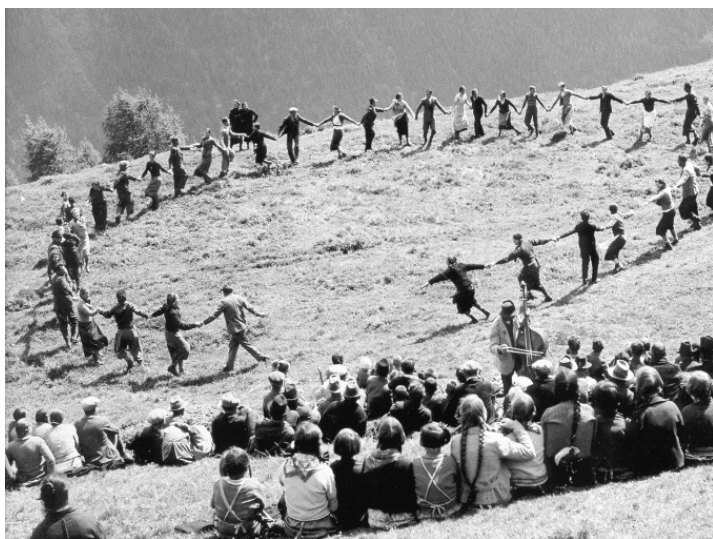


	YLD ( $\times 10^6$ ) (contribution to total chronic-disease YLDs [%])	Rank order (by YLD)	PAPF*	Rank order (by PAPF)
Dementia	8.3 (10.2%)	3	25.1%	1
Cerebrovascular diseases	3.5 (4.3%)	8	11.4%	2
Musculoskeletal diseases	7.2 (8.9%)	4	9.9%†	3
Neuropsychiatric diseases (other than dementia)	5.9 (7.3%)	6	8.3%	4
Eye diseases	27.5 (33.9%)	1	6.8%	5
Digestive diseases	1.6 (1.9%)	11	6.5%	6
Diabetes mellitus	2.1 (2.5%)	10	4.1%	7
Respiratory conditions	4.3 (5.3%)	7	3.3%‡	8
Hearing loss	9.2 (11.3%)	2	2.2%	9
Skin conditions	0.5 (0.6%)	15	2.1%	10
Heart disease	6.1 (7.5%)	5	0.8%§	11
Oral conditions	2.6 (3.3%)	9	Not assessed	--
Malignant neoplasm	0.9 (1.1%)	12	Not assessed	--
Endocrine disorders	0.8 (1.0%)	13	Not assessed	--
Genitourinary diseases	0.6 (0.7%)	14	Not assessed	--
Total chronic disease burden	81.1 (100%)	--	--	--

Sousa et al. Lancet 2009;374:1821-30

# The International Agenda For Stroke





**Collaboration is the key**

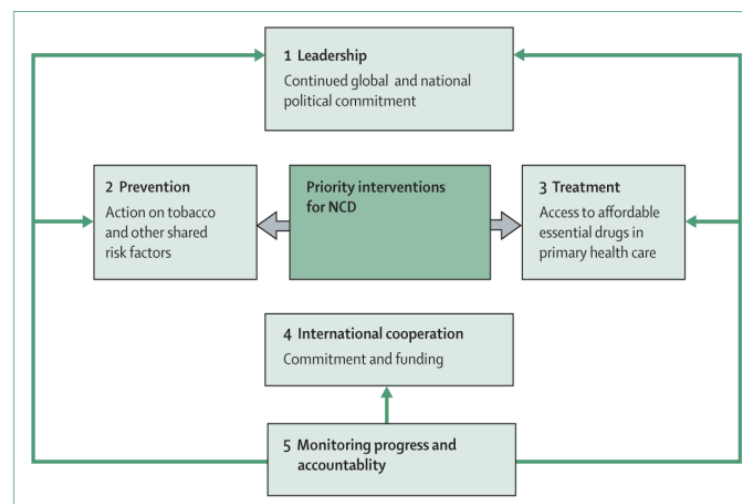


Figure 2: Five priority actions by countries and international agencies for the non-communicable disease (NCD) crisis