

POLICY IMPERATIVES FOR NCD PREVENTION

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RISING NCD BURDEN: DEVELOPING COUNTRY RESPONSE

REQUIRES RECOGNITION of the

- **Reality of Health Transition**
- **Rapidity of Epidemiologic Transition**
- **Results of High Mid-Life Burdens**
- **Relative Differences in Dynamics of Transition**
- **Relevance of 'Risk Factors' and Risk Reduction**
- **Role of a 'Life Span' approach combining 'population' and 'individual' strategies**

THE POOR *AMONG* COUNTRIES
AND
THE POOR *WITHIN* COUNTRIES
ARE INCREASINGLY THE VULNERABLE VICTIMS
OF
THE ADVANCING GLOBAL NCD EPIDEMICS

Tanzania: Smoking & HT ↑ in low SES; BMI ↑ in High SES Group

(Bovet P, 2002)

China: Smoking, HT, Obesity inversely correlated with years of education in Chinese women

(Zhije Yu, 2000)

India: Higher risk of MI in urban residents with low level of education and income

(Rastogi T, 2004)

Brazil: Obesity rates declining in High SES; Rising in Low SES

(Bell, 2000)

**THE LEVEL OF URBANIZATION
DETERMINES THE
PATTERN OF SOCIAL GRADIENT REVERSAL
FOR NCD RISK FACTORS**

(Reddy KS et al, PNAS, 2007)

SES GRADIENT:ORDER OF REVERSAL FOR CVD RISK FACTORS

Tobacco

Blood Pressure

Plasma Cholesterol

↓ **Physical Activity**

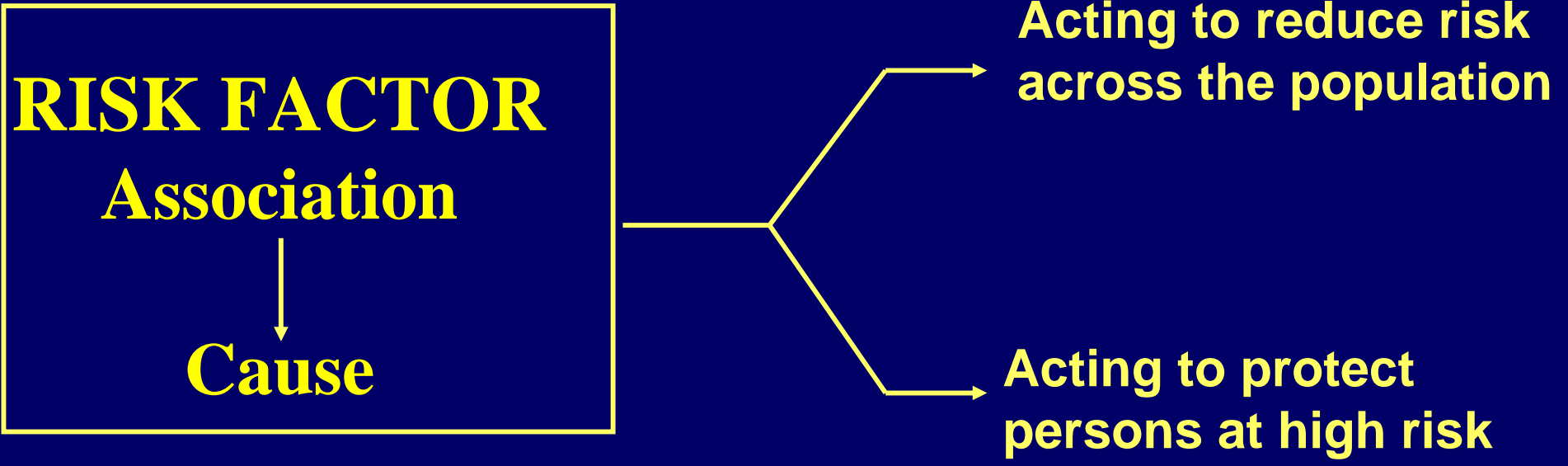
Obesity

Health Transition



WE NEED
AN EFFECTIVE PUBLIC HEALTH RESPONSE
THAT CAN TELESCOPE THE HEALTH TRANSITION
AND AVOID THE HUGE BURDENS
OF MID-LIFE DISEASE, DISABILITY & DEATH
IN LOW AND MIDDLE INCOME COUNTRIES
SPECIALLY IN SOCIO-ECONOMICALLY
DISADVANTAGED GROUPS





PRINCIPLES OF RISK

- **Risk operates in a continuous manner- and not across arbitrary thresholds (BP; Cholesterol; Body weight; Smoking; Blood sugar)**
- **Most adverse events arise in a population in people in the mid-range of a risk factor distribution**
- **When multiple risk factors co-exist, the overall risk is multiplicative**
- **In all populations, majority of the CVD events arise in persons with modest elevation of many risk factors rather than in individuals with high level of a single risk factor.**

PRINCIPLES OF PREVENTION

- **Small reductions in risk factor levels, when achieved *across the whole population*, result in a large reduction of CVD events**
- **Non-drug measures prevent risk across the whole population and reduce it in persons who have already acquired a high risk profile**
- **Drug therapy to reduce risk is most cost-effective in persons who are a high risk of adverse events in the next 10 years.**
- **Best results are achieved through a combination of population based prevention and high risk individual management approaches.**

CVD PREVENTION

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graph TD; A[CVD PREVENTION] --> B[POPULATION BASED]; A --> C[HIGH RISK]; B --- D[Address the bulk of the distribution through small shifts (Population Attributable Risk)]; C --- E[Address the individuals at the highest 'absolute' risk of a CVD event (Comprehensive Cardiovascular Risk)]; D --- F[Widespread Effect = Large Benefits]; E --- G[High Impact = Cost-Effective use of resources]; B --- G; C --- F;
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POPULATION BASED

Address the bulk of the distribution through small shifts
(Population Attributable Risk)

Widespread Effect = Large Benefits

HIGH RISK

Address the individuals at the highest 'absolute' risk of a CVD event
(Comprehensive Cardiovascular Risk)

High Impact = Cost-Effective use of resources

“HIGH” BLOOD PRESSURE OR “HYPERTENSION”?

- Changing Definitions of “Normal”, “Abnormal”, “Optimal”
(Systolic Blood Pressure: 160 → 140 → 130 → 120 → 115)
- Observational studies ↔ Clinical Trials
(Prevention Norms ↔ Clinical Norms)
- High Risk AND population approach
- Risk Factor ↔ Social cause
- Clinical Medicine ↔ Public Health

“Do we not always find the diseases of the populace traceable to defects in society?”

“If disease is an expression of individual life under unfavourable circumstances, then epidemics must be indicative of mass disturbances.”

- Rudolf Virchow

GLOBAL → NATIONAL → COMMUNITY → FAMILY → INDIVIDUAL



RESPONSE TO HEALTH TRANSITION

POPULATIONS

Demographic and Social Determinants

Low Risk

High Risk

Public Health Interventions

INDIVIDUALS

Biology + Beliefs + Behaviors

Low Risk

High Risk

Clinical + Behavioral Interventions

PUBLIC HEALTH INTERVENTIONS

Policy Interventions

Educational Interventions

**Enabling Environment
(Financial, Social, Physical)**

**Health Beliefs and Behaviours
(Community; Individual)**

**Desired
Change**

POLICY MEASURES AND EDUCATIONAL INTERVENTIONS ARE COMPLEMENTARY BECAUSE

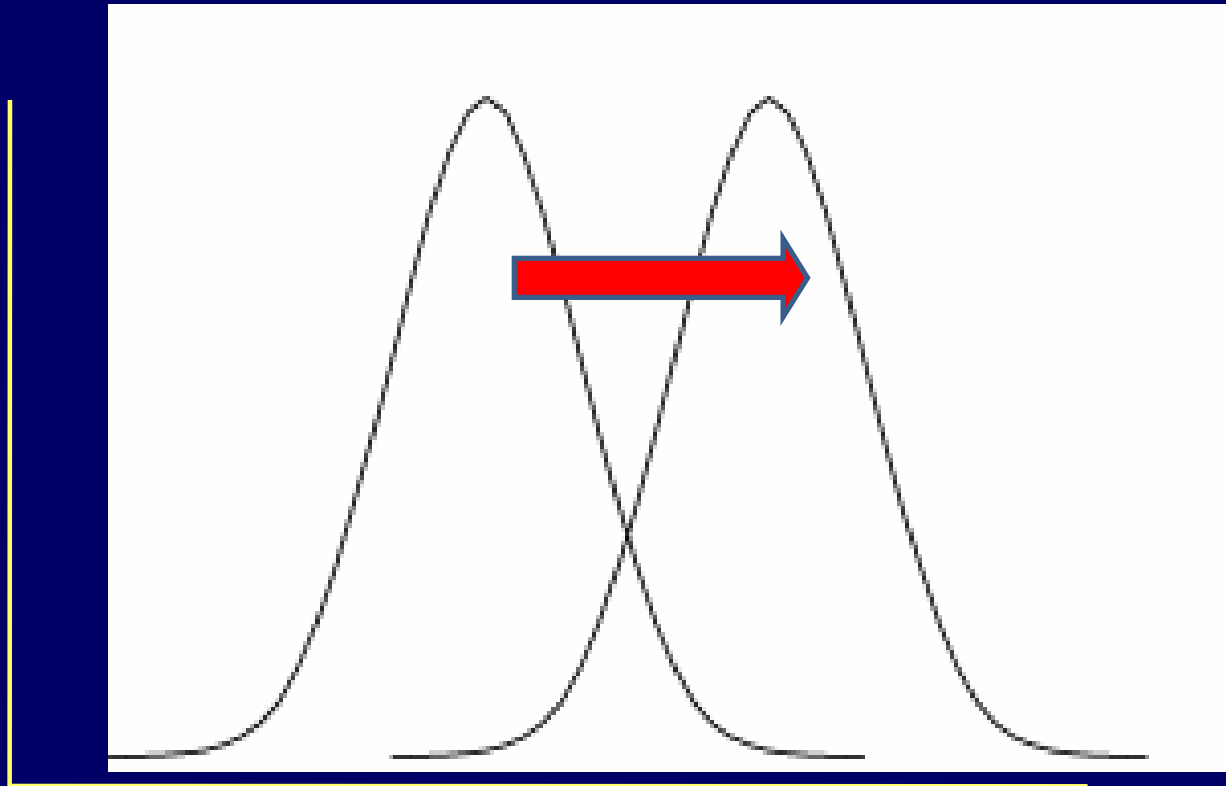
- Policy is made (usually) in response to demands by the community i.e. as a result of social mobilization
- Policy cannot be implemented effectively without acceptance and participation by the community

HOWEVER, POLICY MEASURES ARE NEEDED EVEN AS PRIME MOVERS OF CHANGE BECAUSE

- **A conducive environment is essential to initiate and maintain behavior change**
- **Community based interventions, based mainly on health education, have not been uniformly effective or take a long time to achieve effect**
- **Policy interventions have been demonstrated to effectively reduce population risk in a short time period**

If we plot the global distribution of chronic disease risk factors (e.g. BP, cholesterol, inactivity)

Is the distribution shifting rightwards?



The answer is Probably YES!

**The Rose Principle of Reducing Risk
Across the Population Distribution
Applies to the Global Population Too!**

Global NCD Burdens will not be reduced unless risk factor levels are reduced in LMIC populations

POVERTY POSES A MAJOR CHALLENGE TO PUBLIC HEALTH EVEN IN THE CAUSATION OF CHRONIC DISEASES

- Individuals : - Illusory Choices
(limited availability, affordability and access)
- Information Gaps
(limited health literacy)
- Nations : - Caged Policies (due to debt trap)
- Limited Resources
(inadequate health system response)
- Global : - Trade Policies
(insensitive to public health)

WORLD BANK (2007) & WHO (2003;2005)

RECOMMEND

- POLICY INTERVENTIONS
(Non-Personal)
- SECONDARY PREVENTION
(High Risk Individuals)

**ANNUAL COSTS, EFFECTS AND COST EFFECTIVENESS OF
INTERVENTIONS TO LOWER SBP AND CHOLESTEROL IN SOUTH
ASIA
*ADVANTAGE OF ABSOLUTE RISK APPROACH***

Interventions	Cost/DALY (\$)
Non-personal interventions	17
Personal (P1) SBP>160 mm of Hg	36
(P2) SBP>140 mm of Hg	90
Personal (P3) TC>6.2 mmol/l	47
(P4) TC>5.7 mmol/l	71
P5 (Combination of P2 and P3)	84
P7 (absolute risk>25%)	33
P8 (absolute risk>15%)	48
P9 (absolute risk>5%)	77

Salt Reduction Strategy



- 8.5 Million Deaths

Tobacco Control Strategy



- 5.5 Million Deaths

+

13.8 Million Deaths Averted

**In 23 Low & Middle Income Countries
(During 2006-2015)**

- Asaria P et al, Lancet 2007)

POWER OF POLICY FOR CHRONIC DISEASE PREVENTION

TOBACCO

**Evidence is available from many countries
(including LMIC) that**

- Taxation
- Ad Bans
- Smoke Free Policies
- Health Warnings

ARE EFFECTIVE

48.1% of mortality averted in UK (1981-2000) is attributable to reduced smoking

(Unal B et al. Circulation 2004)

Summary of effectiveness of tobacco-control policies, by region

Region	Change in the number of smokers (million)			Change in the number of deaths (million)		
	10% price increase	NRT that enables 0.5% of smokers to quit	Non-price measures that reduce smoking prevalence by 2%	10% price increase	NRT that enables 0.5% of smokers to quit	Non-price measures that reduce smoking prevalence by 2%
Low-income and middle income	-37.6	-4.7	-18.6	-9.3	-1.1	-4.4
High-income	-4.1	-1.0	-4.0	-1.0	-0.2	-0.9
World	-41.7	-5.7	-22.6	-10.3	-1.3	-5.3

Success of Smoke Free Laws

Improved Air Quality

- **level of indoor air pollution was found to be 89% lower in smoke free places compared to smoking areas (Study of 1200 public places, 24 countries).**
 - International Agency for Research on Cancer; September 2006:
http://www.tobaccofreeair.org/downloads/GAMS%20report.v7_Sept_06.pdf
- **levels of fine particles in bars fell by 80% in Scotland.**
- **Air quality in New York bars has also improved drastically.**
 - Lifting the Smoke Screen: 10 Reasons for a Smoke free Europe (2006). Available online at: http://www.ersnet.org/ers/show/default.aspx?id_attach=13509.
- **83% reduction in air pollution and an 80% reduction in cancer-causing agents in bars and restaurants in Ireland. Air quality in Irish pubs improved as the levels of carbon monoxide decreased by 45%.**
 - The State of Smoke-Free New York City: A One-year Review. March 2004. Available online at: <http://tobaccofreekids.org/pressoffice/NYCReport.pdf>.

Success of Smoke Free Laws

Health Benefits to Bar and Restaurant Workers/Patrons

- In England non-smoking bar staff had levels of carbon monoxide equivalent to smoking 3-5 cigarettes a day. After the smoke free law, the levels were the equivalent to that of a non-smoker.
 - Leicester Mercury, 21 August 2007. at: <http://www.thisisleicestershire.co.uk/displayNode.jsp?nodeId=132384&command=displayContent&sourceNode=133130&contentPK=18155666&folderPk=77458&pNodeId=133088>
- In Scotland, respiratory symptoms among bar workers decreased by 26%.
 - Menzies, D. et. al, (2006) Respiratory symptoms, pulmonary function and markers of inflammation among bar workers before and after a legislative ban on smoking in public places. *JAMA*; 296: 1742-1748. at: <http://jama.ama-assn.org/cgi/reprint/296/14/1742>.
- Ireland found improvements in measured pulmonary function and significant reductions in self reported irritant symptoms in bar workers.
 - *American Journal of Respiratory and Critical Care Medicine*; Vol 175. pp. 840-845. at: <http://ajrccm.atsjournals.org/cgi/content/short/200608-1085OCv1>.
- 57% decrease in complaints of sensory symptoms Among New York bars and restaurants workers
 - *Tobacco Control* 2005 (14):236-241. at <http://tobaccocontrol.bmj.com/cgi/content/abstract/14/4/236>.

Success of Smoke Free Laws

Reduction in Cardiovascular Diseases

- **Scotland saw 17% reduction in heart attacks.**
 - Reduced incidence of admissions for myocardial infarction associated with public smoking ban: British Medical Journal. 328(7446):977-80. at:
<http://www.bmj.com/cgi/content/short/bmj.38055.715683.55v1>.
- **A study found that heart attack rates in Pueblo, Colorado, dropped by nearly 30%.²**
 - <http://www.no-smoke.org/getthefacts.php?id=25> %20
- **A study at Indiana University found a 59% decrease in heart attacks.**
 - <http://www.no-smoke.org/getthefacts.php?id=25> %20
- **A 2007 study at Cork University Hospital found that the number of heart attacks dropped.**
 - <http://www.no-smoke.org/getthefacts.php?id=25> %20

Success of Pictorial Warnings on Tobacco Products

- The results in countries having pictorial warnings show that they are 60 times more effective.
- Global experience has shown that simply the sight of picture warnings can deter those who smoke, and those who are thinking about taking up smoking.
- In Brazil, 54% of smokers changed their opinion on the health consequences of smoking and 67% of smokers said the warnings made them want to quit.

- Costa e Silva, VL. Presentation to EU Commission on enforcement of health warnings in Brazil. Brussels 2002.

Success in Pictorial Warnings on Tobacco Products

- In Australia, there is a 29% increase in the percentage of people who noticed the warnings, and a 7% increase in people forgoing smoking at least once.
 - http://www.treasury.gov.au/documents/790/PDF/Cost_Benefit_Analysis.pdf
- In Canada, about 44% of smokers said they felt like quitting, 58% said they had become more concerned about their health, 27% smoked less at home and 62% thought the graphics made it unpleasant to look at cigarette packets.
 - “Graphic Canadian Cigarette Warning Labels and Adverse Outcomes: Evidence from Canadian Smokers”, David Hammond et al, American Journal of Public Health, August 2004, Vol 94, No. 8 Pp. 1442-1445

Number of Cigarette Smokers (Millions)

POPULATION	BEST CASE SCENARIO			NO PROGRESS SCENARIO	
	2000	2020	2050	2020	2050
Developed	196.5	177.0	134.7	216.4	222.6
Developing Economies in Transition	977.3	1055.2	1093.4	1290.1	1807.2
World	1282.5	1385.1	1341.8	1693.5	2217.9

Lessons from the ECOSOC Report

- Whatever the best practices in the West are –
- The developing countries need to

- ✓ Do it quickly

- ✓ Do it better

BUT ALSO

- ✓ Do More

POWER OF POLICY FOR CHRONIC DISEASE PREVENTION

DIET

- Evidence of preventive potential of policy interventions available from
 - ✎ Mauritius (Price of Edible Oils)
 - ✎ Poland (Import of F-V and Healthy Fats)
 - ✎ Finland (Farming; Marketing; Community Education)

New Initiatives

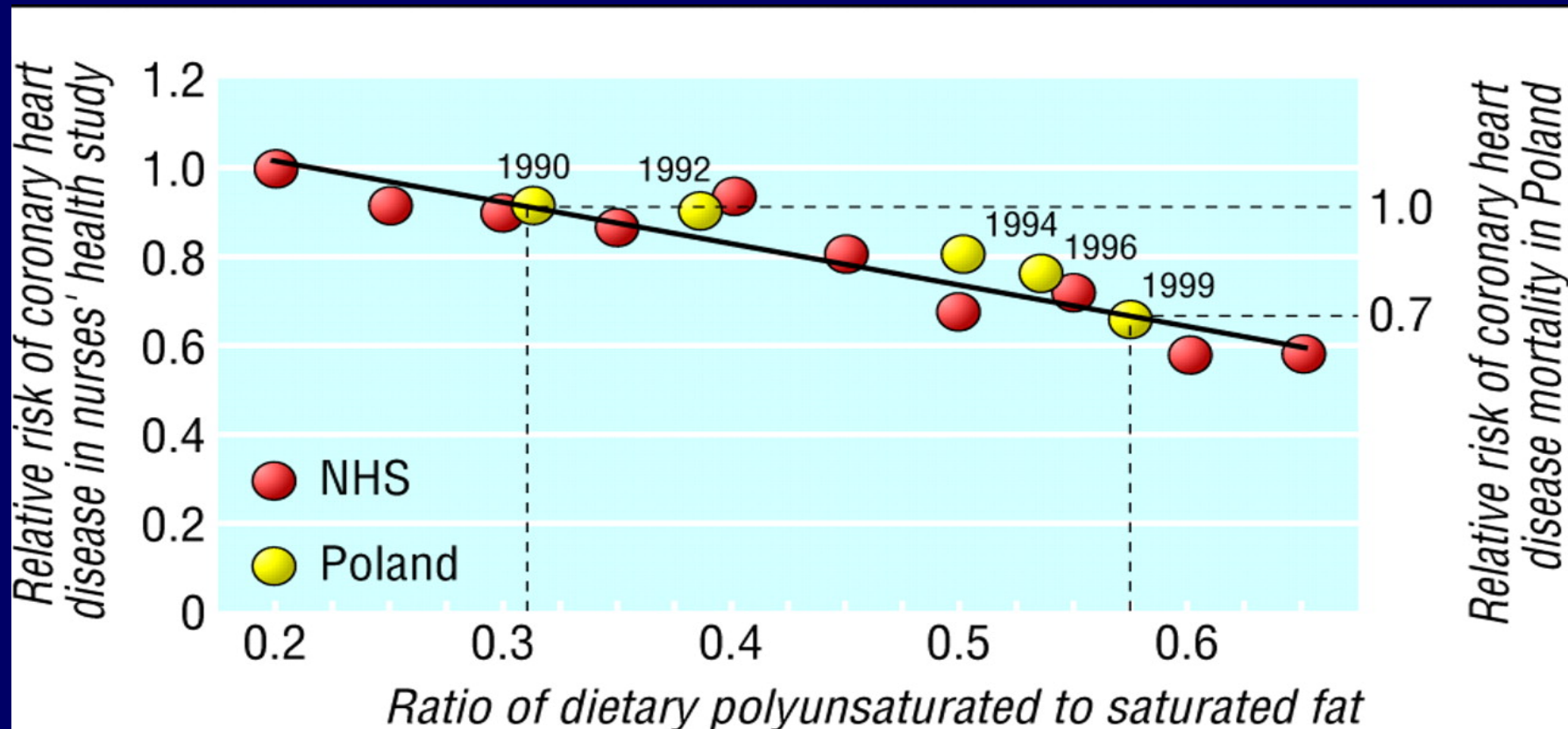
- Food Labeling
- Reduced Salt in Processed Foods
- Ban on Trans-Fats
- Advertising Restrictions

NCD INTERVENTION : MAURITIUS

■ FIVE YEAR HEALTHY LIFESTYLE PROGRAMME

■ CROSS-SECTIONAL CLUSTER SURVEYS (1987-1992):25-74 YEARS.

-RESULTS	MEN	WOMEN
• HT PREVALANCE	15% → 12.1%	12.4% → 10.9%
• CIGARETTE SMOKING	58% → 47.2%	6.9% → 3.7%
• HEAVY ALCOHOL CONSUMPTION	38.2% → 14.4%	2.6% → 0.6%
• MODERATE LTPA	16.9% → 22.1%	1.3% → 2.7%
• MEAN POPULATION SERUM CHOLESTEROL	5.5mmol/l → 4.7mmol/l	
• OVERWEIGHT/OBESITY ↑; GLUCOSE INTOLERANCE	-NS	



Zatonski, W. A et al. *BMJ* 2005;331:187-188

Ratio of dietary polyunsaturated to saturated fat and mortality due to coronary heart disease in Poland (relative to rates in 1990), superimposed on the relation between the fat ratio and coronary risk observed in the nurses' health study. Changes in dietary polyunsaturated to saturated fat in Poland between 1990 and 1999 are predicted to result in a 24% drop in coronary mortality, which is similar to the observed decline

**Incremental Cost-Effectiveness Ratios for Legislation
Substituting 2 Percent of Energy from Trans Fat with
Polyunsaturated Fat by World Bank Region (US\$/DALY averted)**

Region	Intervention Cost	
	US\$0.50/adult	US\$6/adult
East Asia and the Pacific	73	1,583
Europe and Central Asia	65	1,670
Latin America and the Caribbean	40	1,865
Middle East and North Africa	25	2,259
South Asia	38	1,014
Sub-Saharan Africa	53	1,344

Source: Jamison and others 2006a.

**“Health leaps out of science
and draws nourishment from
the society around it”**

- Gunnar Myrdal

DIET

- **↓ Unhealthy Fats (SFA; Trans-Fats)**
- **Substitute with Healthy Fats (PUFA; MUFA)**
- **↓ Salt intake**
- **↑ Fruit and vegetable intake**
- **↓ Consumption of simple sugars**

PHYSICAL ACTIVITY: KEY ISSUES

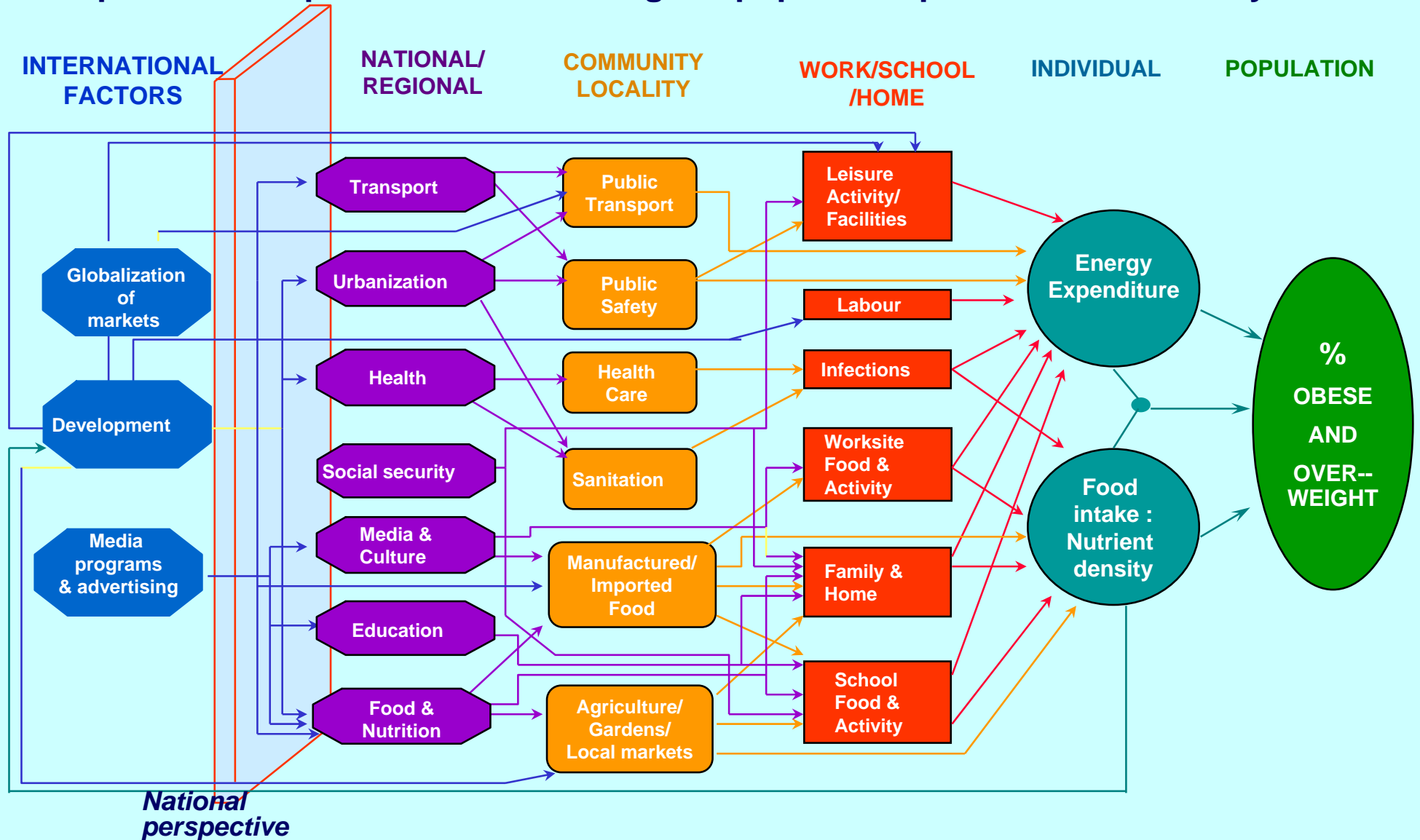
- **Settings** : Schools
Workplace
Communities
- **Urban Design** : Safe Pedestrian Pathways
Protected Cycle Lanes
Green Areas
- **Domains** : Work Related
At Home
Transport Related
Leisure Time Activities

POLICY IMPLICATIONS

- **COMMUNITY EMPOWERMENT**
(awareness; availability; affordability; access)
- local self-sufficiency in the era of globalization
- **FOOD & AGRICULTURE POLICY**
(↑Fruit & Vegetables; ↓ Dairy fats)
- **EDIBLE OILS (↑ MUFA - PUFA):**
Mixed oils; Bio modification; Pricing
- **FISHING**
Food Industry (X Trans-Fats; ↓SFA ; ↓Salt)
- **FOOD LABELING**

IN LOW AND MIDDLE COUNTRIES
NON-PERSONAL POLICY INTERVENTIONS ARE
LIKELY TO HAVE A
POPULATION WIDE IMPACT
IN THE SHORT TERM
BECAUSE THEY CAN INFLUENCE THE
SOCIO-ECONOMIC DETERMINANTS OF
BEHAVIOURS
EVEN AS EDUCATION TAKES TIME TO ACT

Societal policies and processes influencing the population prevalence of obesity



INTERNATIONAL AGENCIES; TRANS-NATIONAL TRADE AND MEDIA

GLOBAL COVENANTS, COMMERCE & COMMUNICATIONS



NATIONAL POLICY
FRAME WORK



CONSUMER
CONCIOUSNESS



Political, Economic, Social
Motivators

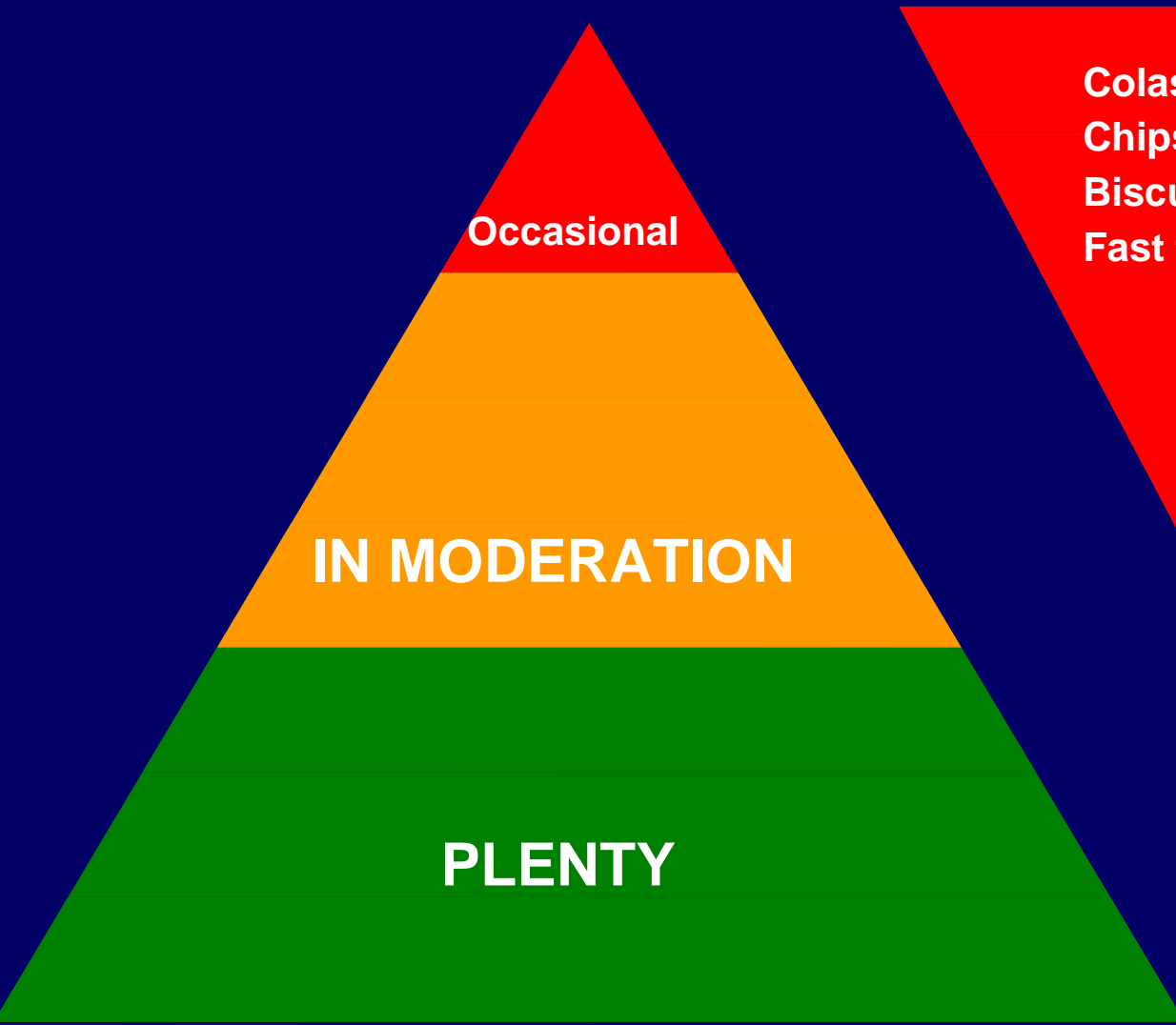
Health Professionals,
Civil Society; Media



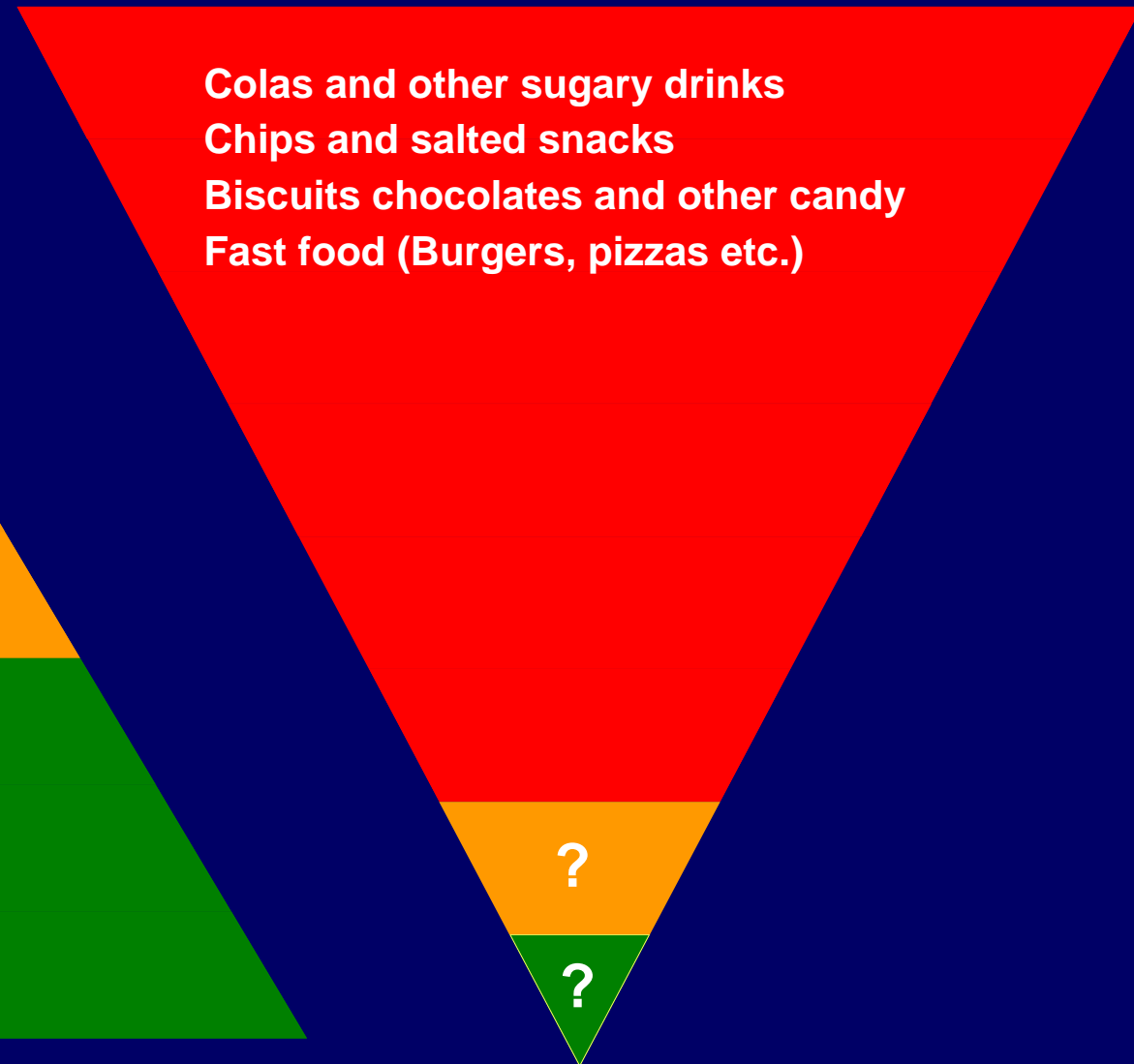
INDUSTRY PRACTICES

Private-Public Partnerships; Health Dividend

COMMUNICATION TO CONSUMERS; MIS-MATCH BETWEEN SCIENCE AND COMMERCE



NUTRITION PYRAMID



ADVERTISING PYRAMID

**There are two things which one should
not watch when they are being made –**

SAUSAGES and PUBLIC POLICY

- Bismarck

Policy Needs: Interdisciplinary Research



EVIDENCE *FOR* POLICY & EVIDENCE *ON* POLICY

- Sufficient Scientific Evidence Available
Needs to be Translated Into
Evidence Based, Context Relevant, Resource Sensitive

RECOMMENDATIONS FOR POLICY

- Nature of Evidence Needed to Show
Whether Policy Interventions Work?
 - Likely To Be Population Based (Ecologic) For
Macro Level Policy Changes
 - Micro Level Policy Changes Can Be Evaluated
By Controlled Community Trials

POLICY STRATEGIES: TAXES

Two benefits

- **Pay for infrastructure**
- **Direct effect on behavior**

- **Earmark existing and/or new revenues**
- **Tobacco excise taxes (fund quit lines)**
- **Food subsidies (reduce prices on healthful foods)**
- **Highway trust fund (sidewalks, biking & walking trails)**

**The compass of research
must extend from**

MOLECULES

to

MARKETS

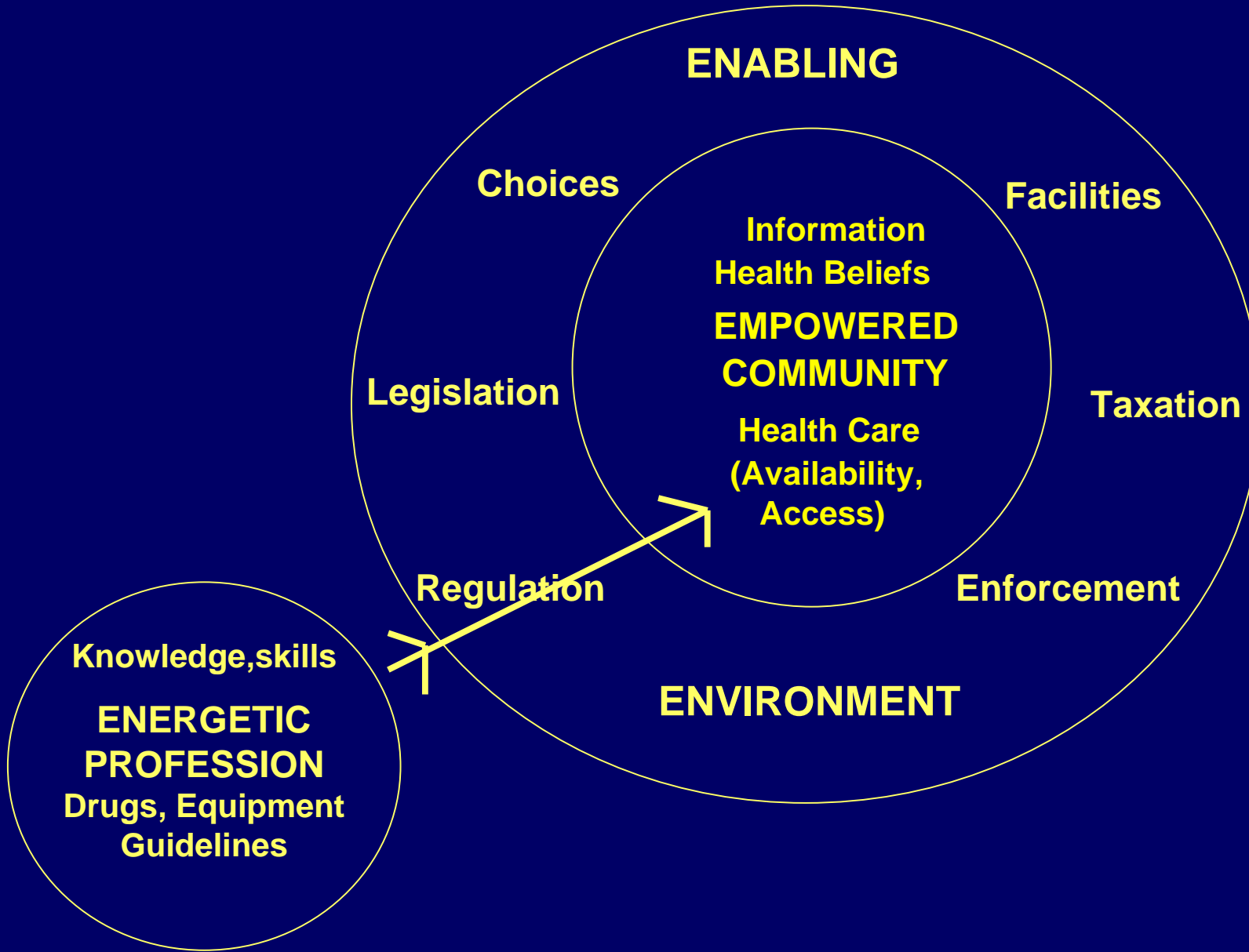
**The arena of advocacy and
action must expand from**

RISK FACTORS

to

HUMAN RIGHTS

CAPACITY FOR CONTROL OF NCD



CONVERGENCE IN RECOMMENDATIONS

- Chronic Disease Prevention
- Protection of Environment

Sustainable Development Needs

- Urban environments which reduce vehicular congestion, promote physical activity and energy efficiency
- Diets which promote appropriate nutrient intake through sustainable consumption patterns at the population level
- Removal/Reduction of pollutants & toxic chemicals from the environment



COALITION BUILDING



CARDIOLOGISTS
PHYSICIANS
DIABETOLOGISTS
ONCOLOGISTS
NURSES
NUTRITIONISTS
**BEHAVIOURAL
SCIENTISTS**
HEALTH NGOs

**NATIONAL
AND
INTERNATIONAL
NETWORKS**

SOCIOLOGISTS
ECONOMISTS
ENVIRONMENTALISTS
**COMMUNICATION
SPECIALISTS**
DEVELOPMENT NGOs
**COMMUNITY
REPRESENTATIVES**

RESARCHERS
Accurate & Non-Trivial
SCIENTIFIC INFORMATION

EVIDENCE

(Causation; Efficacy; Effectiveness) →

POLICY MAKERS

Causes

Economics
(Cost of Neglect;
Cost of Action;
Cost-Effectiveness;
Affordability;
Sustainability)

Agents

Consequences

Costs

Prevention

Concern

Fear

Outrage

Community
Mobilization

Demand For Action

Treatment

MEDIA
CIVIL SOCIETY &
PUBLIC

VALUE FOR HEALTH AS A HUMAN RESOURCE & HUMAN RIGHT

**ACQUISITION
OF RISK**

**ELEVATED RISK
FACTORS**

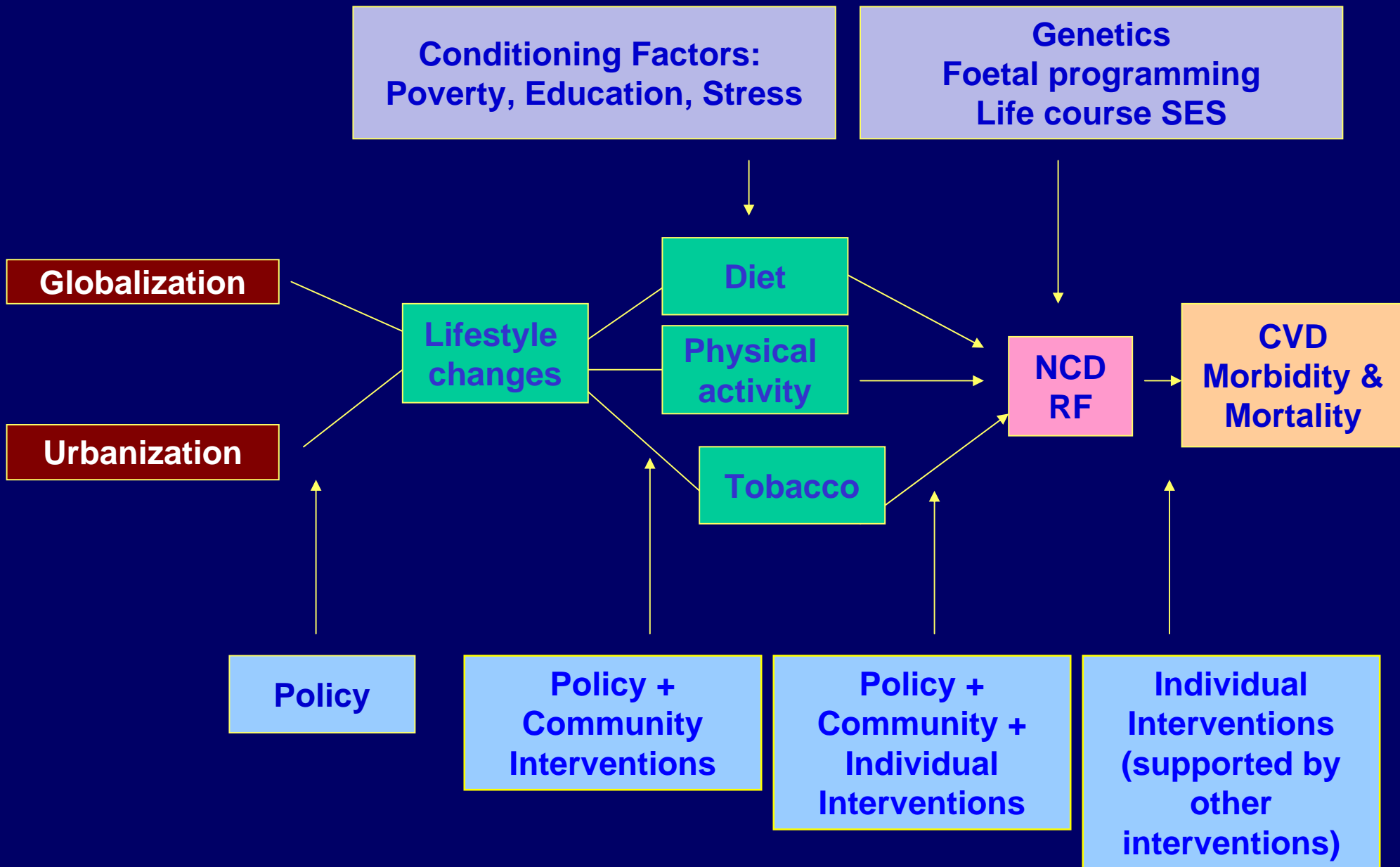
**ESTABLISHED
DISEASE**

**INTERVENTIONS
WITH A
SOCIO-ECONOMIC FOCUS
(Population)**

**INTERVENTIONS
WITH A
PREVENTIVE FOCUS
(High Risk)**

**INTERVENTIONS
WITH A
CLINICAL FOCUS**





WIDE ANGLE AND/OR SHARP FOCUS?

•19th Century:	Societal Factors Considered Important But Role in Causation Fuzzily Understood
•20th Century:	Germ Theory + Laboratory Methods + Risk Factor Epidemiology + Genetics Focused Attention on Individuals: Organs, Tissues, Cells and Sub-cellular structures and Their Functions
•21st Century:	Back to Societal Factors But with Better Understanding of Causation (Environmental To Epigenetics) and new challenges (Climate Change and Zoonotic Diseases)

“Should medicine ever fulfill its great ends, it must enter into the larger political and social life of our time; it must indicate the barriers which obstruct the normal completion of the life cycle and remove them. Should this ever come to pass, Medicine, whatever it may then be, will become the common good of all”

**- Rudolf Virchow
(1821-1902)**