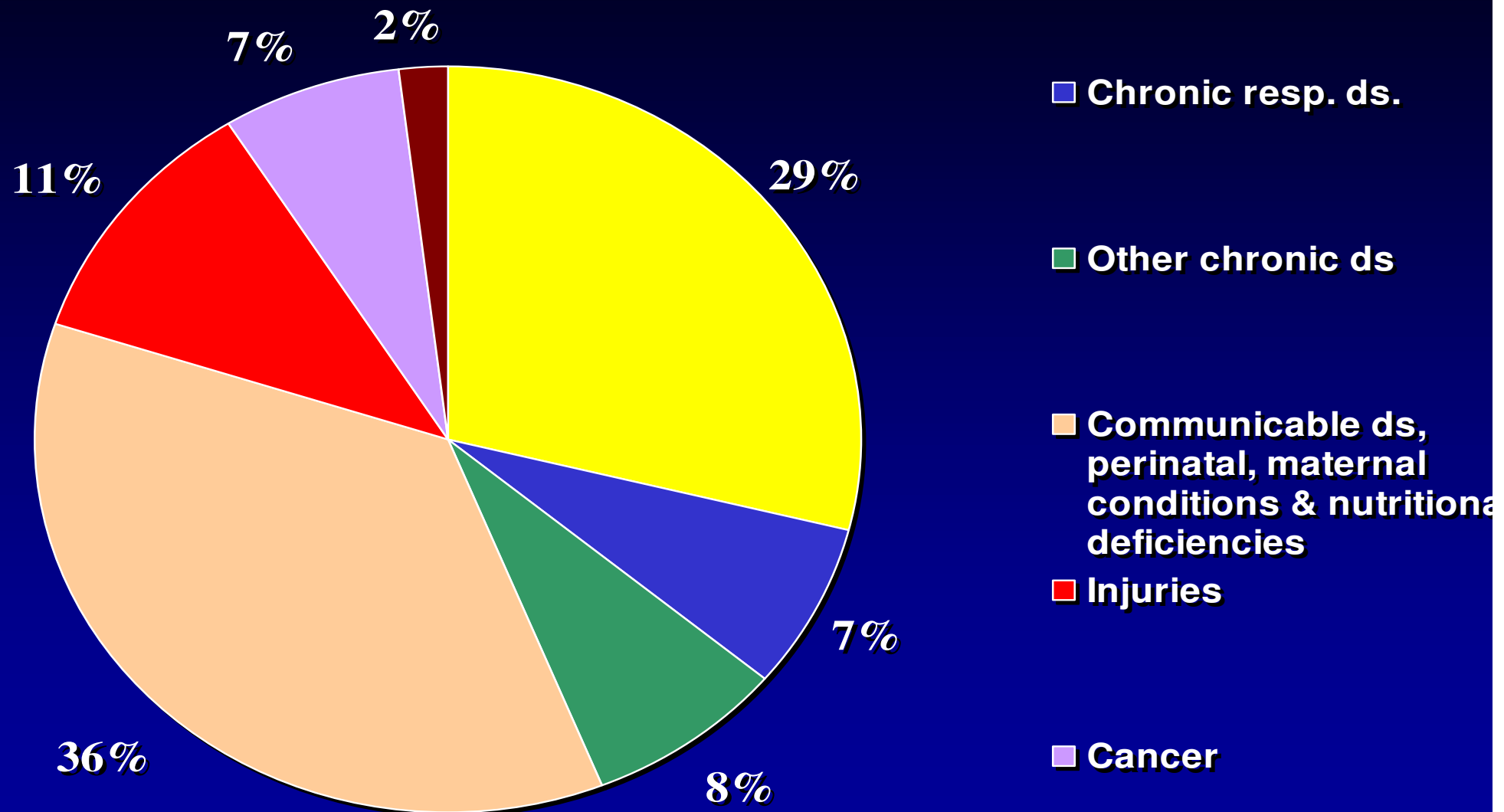


# **Non Communicable Diseases in India: The New Public Health Challenge**

**Prof. K Srinath Reddy  
President  
Public Health Foundation of India**

# Deaths In India (2005)



Source : WHO

# Andhra Pradesh Rural Cause Of Death Study (2004)

- **Godavari Districts** : **45 villages**
- **Population** : **180, 162**
- **Deaths** : **1534 Deaths**
- **Cause of Death** : **Verbal Autopsy (MPWs)  
Assignment (Physicians)**
- **Response Rate for VA** : **98%**
- **Circulatory System Deaths\*** : **32%**  
(CHD = 14%, stroke = 13%)

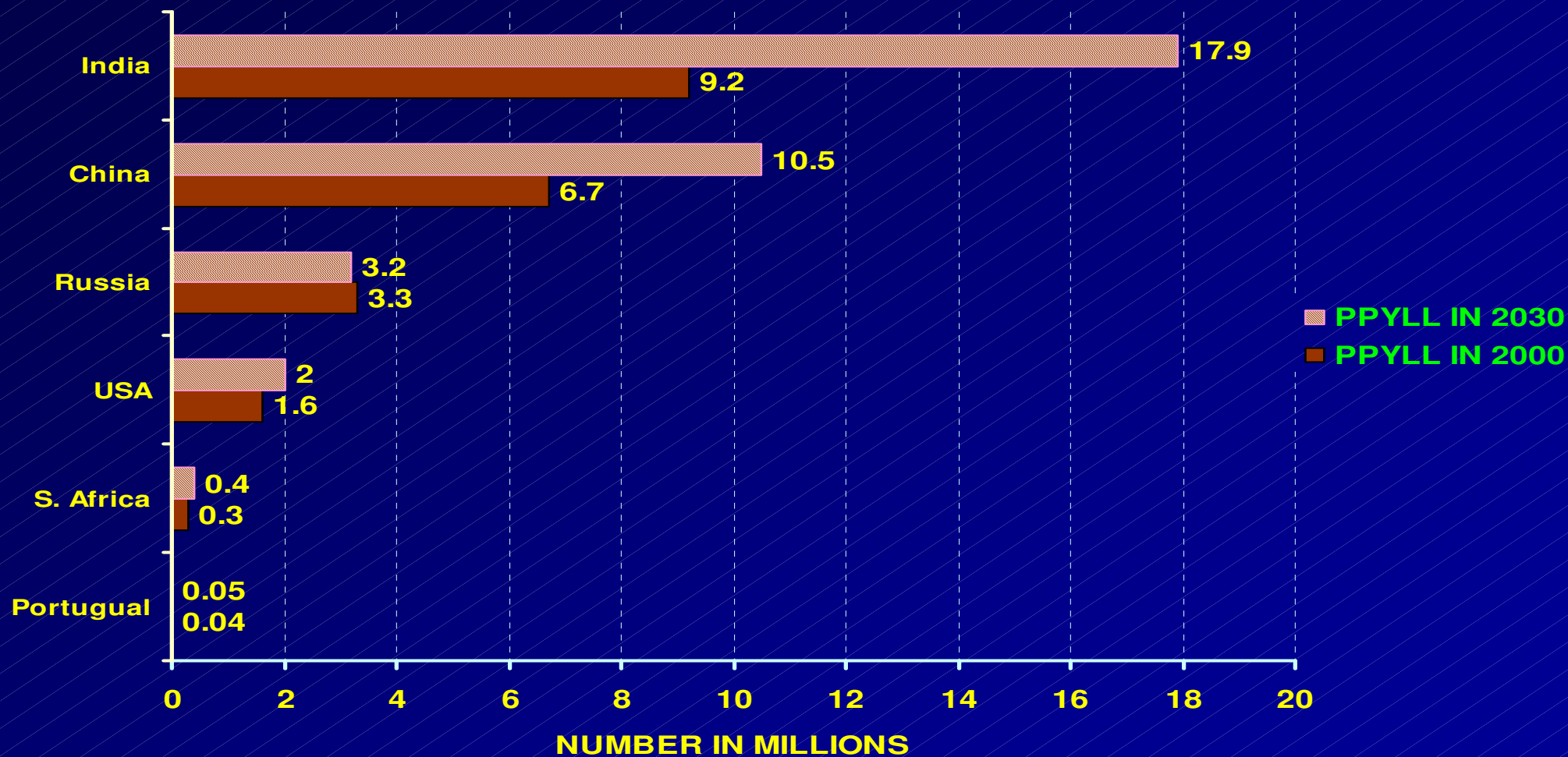
- *Joshi R. et al (IJE 2006)*

\* *27% of these deaths occurred below the age of 60 years*

# Rising Chronic Disease Burdens

	2007	2025
<b>No. of Persons with HYPERTENSION</b>	<b>125 Million</b>	<b>214 Million</b>
<b>No. of Persons with DIABETES</b>	<b>41 Million</b>	<b>69 Million +</b>
<b>No. of Persons Dying from TOBACCO</b>	<b>1 Million</b>	<b>2 Million +</b>

# YEARS OF LIFE LOST DUE TO CVD IN POPULATIONS Aged 35-64 Years



*PPYLL = Potentially Productive Years of Life Lost*

# Neglected Chronic Diseases Carry Economic Costs

- 1 In **2005**, it is estimated that India lost **9 billion USD** in national income from premature deaths due to heart disease, stroke and diabetes.
- 1 These losses are expected to cumulatively lead to **237 billion USD** over the **next 10 years**.

*Source: World Health Organization*

# Rising Consumption of Edible Oils in India

	1983	1993	2003
Consumption (in tonnes)	<b>3.9 mill ton</b>	<b>5.8 mill ton</b>	<b>10.5 mill ton</b>
Consumption (Kg/capita/yr)	<b>5</b>	<b>6</b>	<b>9</b>
Consumption (kcal/capita/day)	<b>128</b>	<b>156</b>	<b>240</b>

*Source:* FAOSTAT, Food and Agricultural Organization, The UN, 2008

# Nutrition Transition is Underway in India

§ Available data also indicate that overweight / obesity is a major problem within the urban environment, with estimates of individuals with BMIs  $> 25$  of between 19.2 % and 38 % in major metropolises of India and is also an emerging problem in urban slums.

*Vaz M et al, SAJCN 2005*

§ In A.P there appears to be clear relationship between level of urbanization and percentage of individuals with BMI  $> 24.99$  (7.6 % rural, 22 % town, 24.1 % small city, 36.6 % large city;  $p < 0.0001$  )

*Griffiths & Bentley, J Nutr 2001*

# Prevalence of overweight and obesity in India

## School children in Chennai

- § > 22% HSE group
  - § 15% from MSE groups .
  - § only 4.5% from LSE group
- Urban well-off children : highest risk

*Diabetes Res Clin Pract 2002; 57: 185 -190*

## Affluent Adolescents

### Delhi

31% overweight;  
7.5% obese

*Indian Pediatr 2004; 41: 559-575*

### Pune

24% overweight

*Diabetes Res Clin Pract 2002; 57: 185-190*

# SES Gradient: Order of Reversal for CVD Risk Factors

**Tobacco**

**Blood Pressure**

**Plasma Cholesterol**

↓ **Physical Activity**

**Obesity**

**Health Transition**



# CASE-CONTROL STUDY OF AMI (DELHI - BANGALORE, 1999)\*

350 cases under (75 years of age)

700 controls (matched for age, gender, hospital)

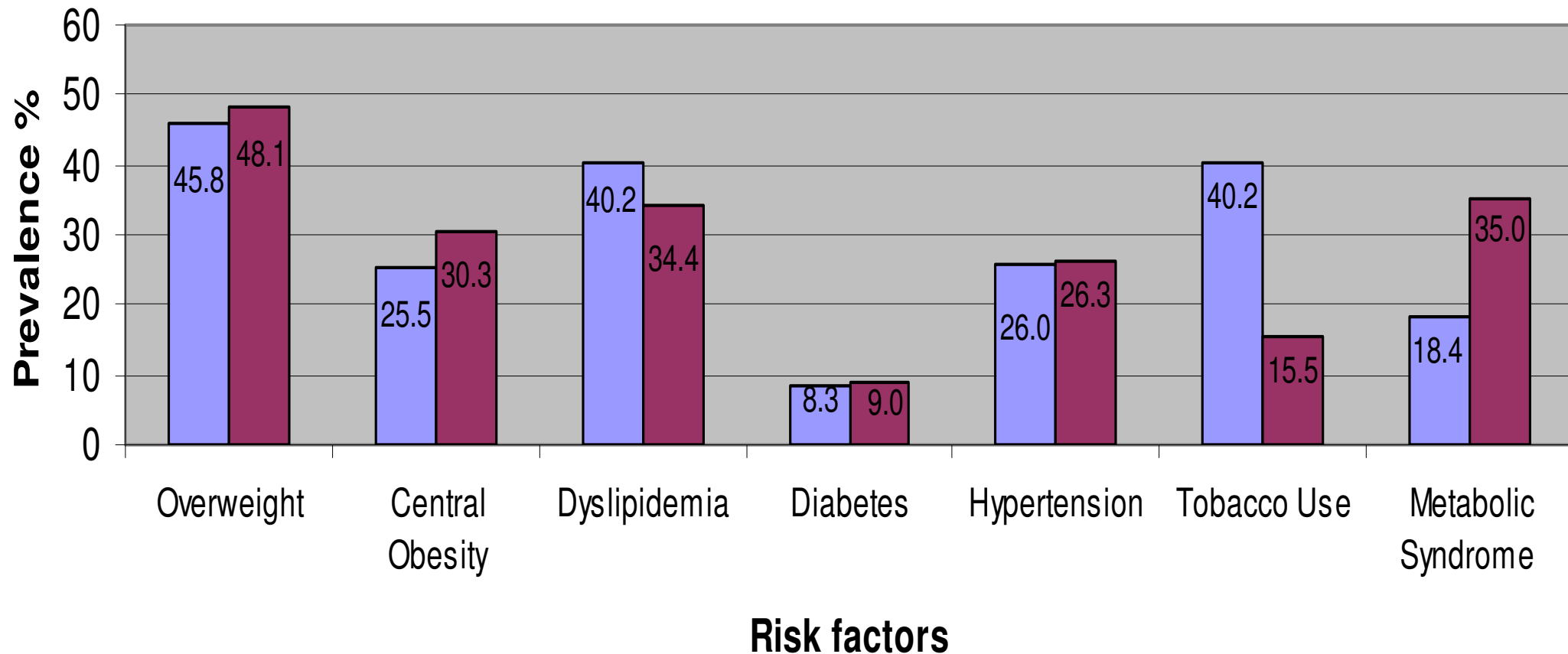
Variable	Age & Sex Adjusted RR	Multivariate RR
Education (none vs. highest level)	2.0	2.2
Household income (<3000 vs. > 10,000)	1.6	1.5

\* Source: Rastogi T. et al, Am J Clin Nutr, 2004

# Worksite Wellness Programme

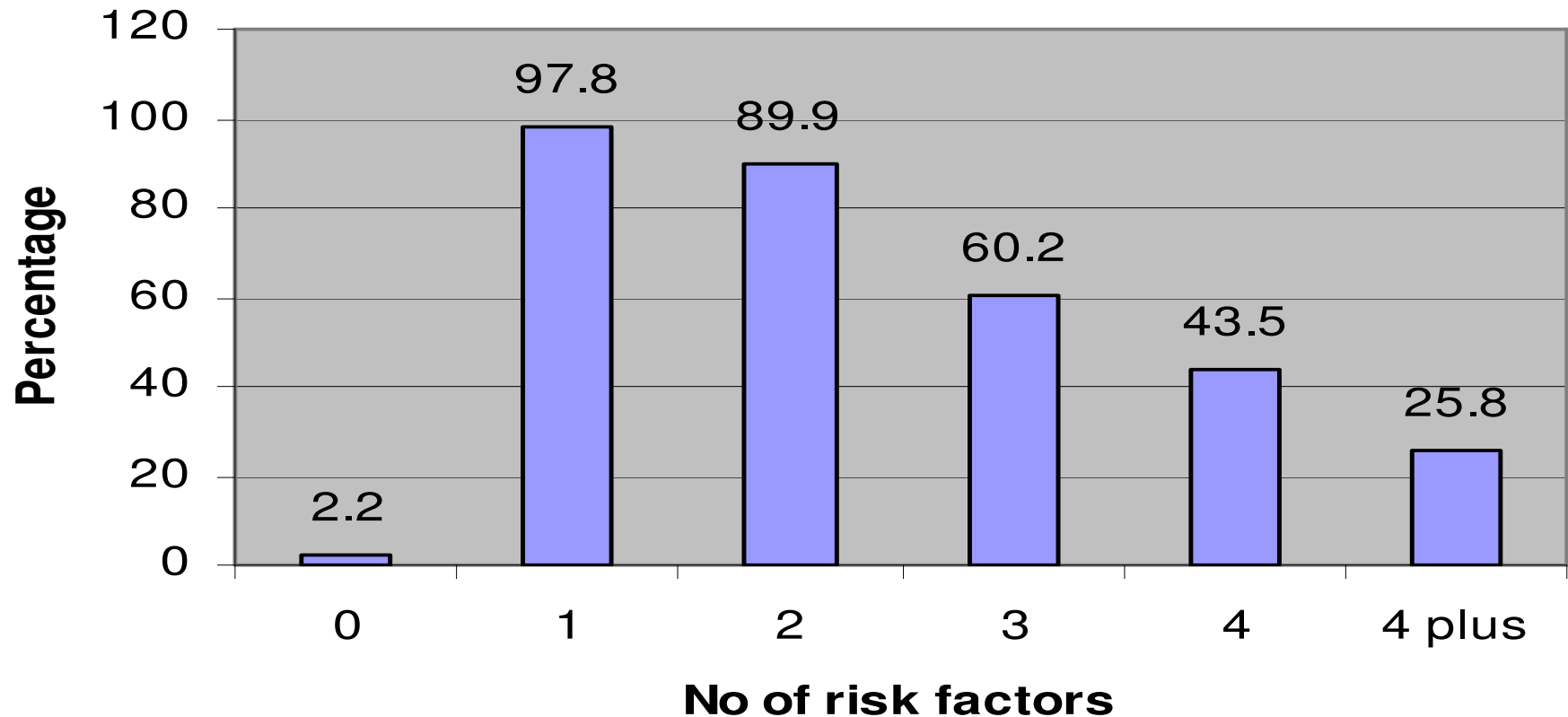
Age adjusted prevalence of risk factors 2002-2003

Men  
Women



*KS Reddy et al WHO Bulletin 2006*

## Coexistence of multiple risk factors (SSIP 20-69 yrs)



Age>50, Current regular use of tobacco, SBP $\geq$ 120 to <140,  
PG 100-125.9 mg/dl, Tg>150 mg/dl, Tc/HDL  $\geq$ 4.5, HDL <40 (m)/HDL<50 (f)  
BMI>23, WC >80 (f), or WC>90 (m) and Family history of CVD

## CVD Risk Factor Survey in 10 Industries

### Risk Factors by Educational Status in Men

Risk Factors	ES I (%) OR	ES II (%) OR	ES III (%) OR	ES IV (%) OR	P for trend
Tobacco Use	19.8 1	26.5 1.4 (1.2-1.7)	40.2 2.7 (2.4-3.1)	77.3 13.8 (11.7-16.2)	<0.001
Smoking	15.2 1	16.7 1.1 (0.9-1.3)	24.4 1.8 (1.5-2.1)	21.8 1.5 (1.3-1.8)	0.04
Regular Physical Activity	41.6 1	40.0 0.9 (0.8-1.1)	34.7 0.7 (0.6-0.8)	13.2 0.2 (0.18-0.25)	<0.001
Diabetes	8.4 1	10.4 1.2 (0.95-1.6)	13.3 1.6 (1.3-2.1)	7.6 0.9 (0.6-1.3)	0.056
Hypertension	27.2 1	29.9 1.1 (0.99-1.3)	28.6 1.1 (0.9-1.2)	32.6 1.3 (1.1-1.4)	0.05
Metabolic Syndrome	19.2 1	20.9 1.1 (0.9-1.4)	20.6 1.1 (0.9-1.3)	24.9 1.3 (1.1-1.7)	0.05

ES I: Post Graduate; ES II: Graduate; ES III: Secondary or High School; ES IV : Primary or Illiterate

(Ongoing Indian Industrial Surveillance Study; Baseline Survey in 2002-03)

# 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**

```
graph TD; A[PUBLIC HEALTH INTERVENTIONS] --> B[Policy Interventions]; A --> C[Educational Interventions]; B --> D["Enabling Environment (Financial, Social, Physical)"]; C --> E["Health Beliefs and Behaviours (Community; Individual)"]; D --> F[Desired Change]; E --> F;
```

The diagram is a flowchart on a dark blue background. At the top, a white-bordered box contains the text 'PUBLIC HEALTH INTERVENTIONS' in yellow. A vertical cyan line descends from this box and splits into two diagonal cyan lines. The left diagonal line points to the text 'Policy Interventions' in white. The right diagonal line points to the text 'Educational Interventions' in white. From 'Policy Interventions', a vertical cyan arrow points down to the text 'Enabling Environment (Financial, Social, Physical)' in white. From 'Educational Interventions', a vertical cyan arrow points down to the text 'Health Beliefs and Behaviours (Community; Individual)' in white. From both of these lower-level boxes, diagonal cyan lines converge on a central white-bordered box at the bottom containing the text 'Desired Change' in yellow.

**Policy Interventions**

**Educational Interventions**

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

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

**Desired  
Change**

# Worksite Wellness Programme Intermediate changes (2004-2005)

Behavioral changes	% changes
Physical activity levels	↑ 17.1%
Fruits and vegetable consumption	↑ 36.3%
Conscious effort to decrease oil/ghee/butter consumption	↑ 31.3%

# Trends in mean levels of variables in Men (six centre data)

Variable	Baseline:2002 n=6428	First Annual Surveillance: 2004 n=1236	Final survey: 2006 n=4698
SBP	128.4 (16.7)	127.1 (16.8)	123.4 (16.7)
DBP	79.9 (10.8)	78.4 (10.5)	74.7 (10.5)
Weight	62.2 (12.6)	61.8 (12.3)	61.7 (11.8)
WC	84.0 (11.1)	81.8 (11.0)	81.0 (10.3)
PG	92.1 (29.0) n=2894	90.1 (30.5) n=1207	83.6 (31.8) n=4062
TC	176.5 (43.0)	173.1 (42.2)	165.7 (43.8)
TG	132.9 (76.1)	132.0 (80.1)	135.5 (80.9)
HDL	43.2 (11.6)	45.8 (11.5)	49.5 (10.3)

Classes VI-VIII

AT SCHOOL LEVEL

Classes IX-XII

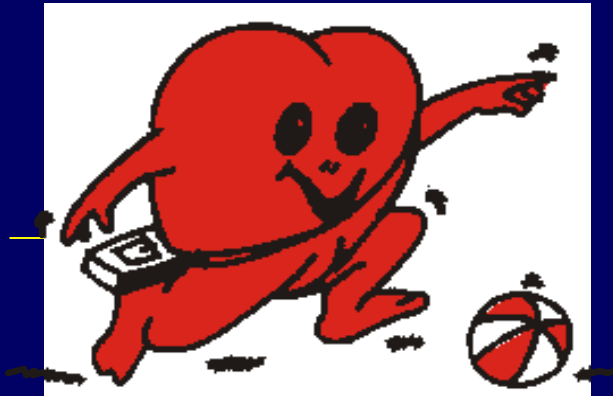
LEARNING THE FACT

LEARNING TO ACT

HRIDAY

AT COLLEGE LEVEL  
(3 Years)

SHAN



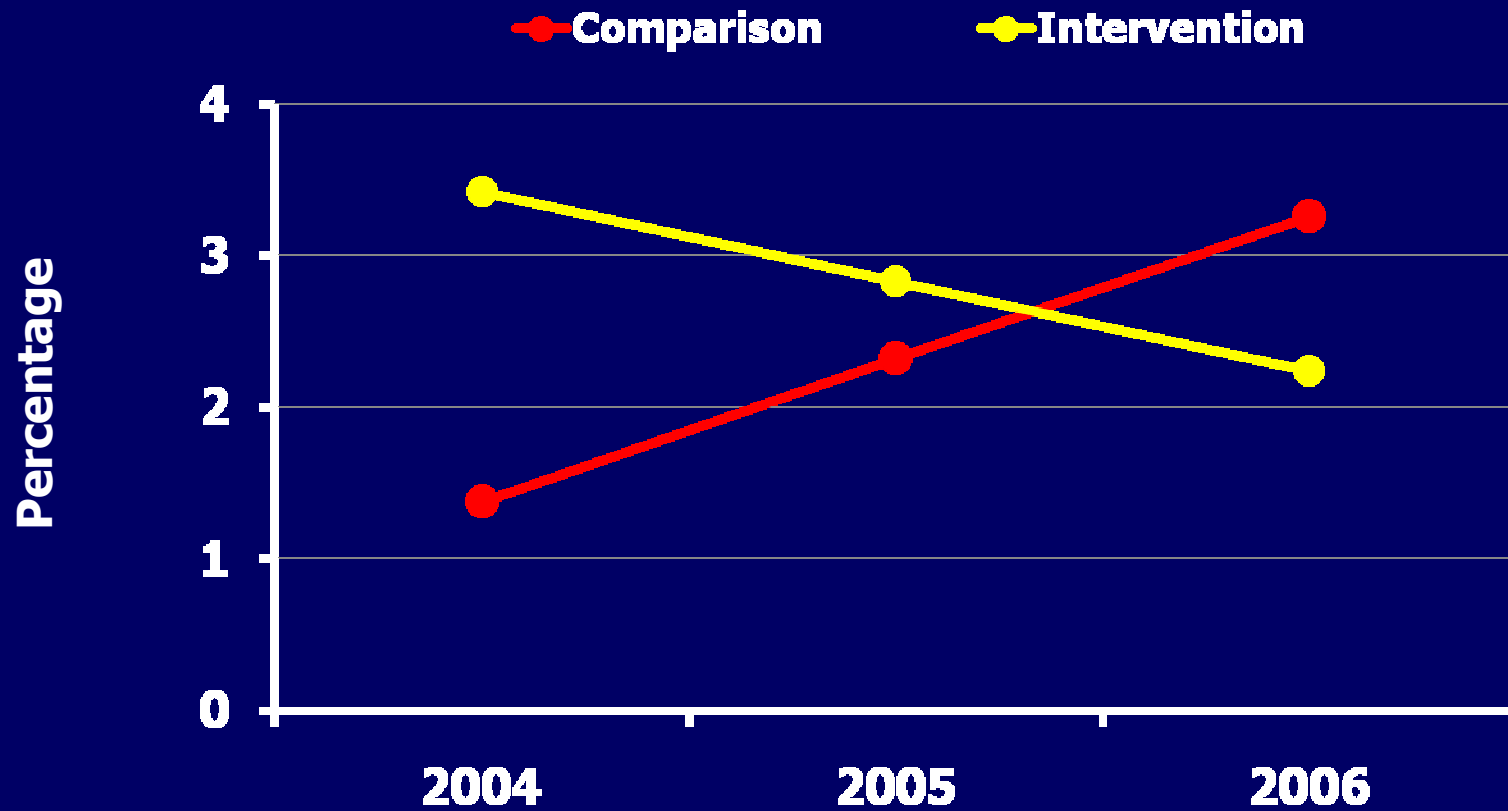
“Let’s Talk Health”



“Debate the Present to Define the Future”

# Change in Tobacco Use Behaviour

## Any tobacco use (current use)



# PREVENTION & CONTROL OF CVD & DIABETES

## HEALTH PROMOTION

Health Education + Enabling Policy Measures

## EARLY DETECTION OF PERSONS AT RISK

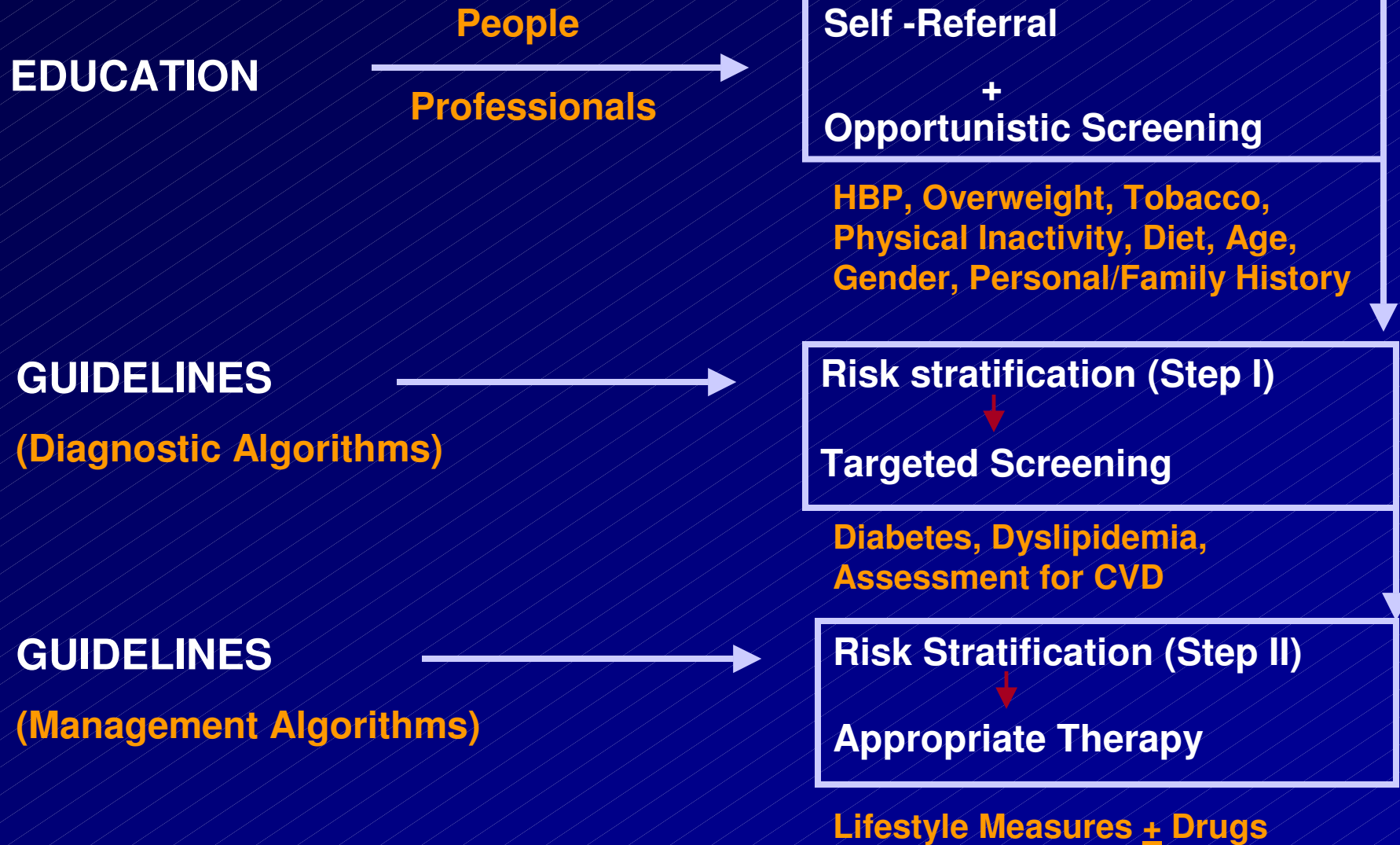
Opportunistic + Targeted screening; Technology for  
Non-fasting Blood Chemistry (? Non-HDL cholesterol ? HbA1C)

## EFFECTIVE THERAPIES FOR RISK REDUCTION

Diet; Physical Activity; Tobacco Avoidance; Aspirin;  
BP and Cholesterol lowering medicines; Anti-Diabetics; ? PolyPill

# PRIMARY PREVENTION OF CVD

## Risk Detection + Risk Reduction in Individuals



**Age <40 years & No Abd Obesity**



**LOW RISK**  
DM-2%, MS-4%

**Age <40 years & Abd Obesity  
OR  
Age >39 years &  
No HBP or Abd obesity**



**LOW- AVERAGE  
RISK**  
DM-8%, MS-7%

**Age 40-49 years &  
HBP or Abd Obesity**



**AVERAGE RISK**  
DM-13%, MS-40%

**Age 40-49 years &  
HBP AND Abd Obesity  
OR  
Age >49 years &  
HBP OR Abd Obesity**



**HIGH RISK**  
DM-20%, MS-51%

**Age >49 years &  
HBP & Abd Obesity**



**VERY HIGH RISK**  
DM-28%, MS-85%

# WHAT CAN BE DONE AT PHC LEVEL?

- Health Education
- High Blood Pressure Detection and Management
- Diabetes Detection and Management
- Detection of tobacco habit and cessation

**Integrate with National Rural Health Mission**

**NATIONAL PROGRAMME FOR  
PREVENTION AND CONTROL OF  
DIABETES, CARDIOVASCULAR  
DISEASES & STROKE**

**Pilot : 2008 (10 Districts)**

**National Upscaling : 2009**

# Key Components

- 1 **District Health Promotion Services (608)**
- 1 **Strengthening of Medical Colleges (140)**
- 1 **Integrated NCD Clinics in Medical Colleges and District Hospitals**
- 1 **School Based Programs**
- 1 **Worksite Wellness Programs**
- 1 **IEC Activities for Mass Education**
- 1 **NGO Partnership**