Non Communicable Diseases in India: The New Public Health Challenge

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President
Public Health Foundation of India
Deaths In India (2005)

- CVD: 29%
- Chronic resp. ds.: 7%
- Other chronic ds.: 11%
- Communicable ds., perinatal, maternal conditions & nutritional deficiencies: 36%
- Injuries: 8%
- Cancer: 2%

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%)

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

- Joshi R. et al (IJE 2006)
<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2025</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Persons with HYPERTENSION</td>
<td>125 Million</td>
<td>214 Million</td>
</tr>
<tr>
<td>No. of Persons with DIABETES</td>
<td>41 Million</td>
<td>69 Million +</td>
</tr>
<tr>
<td>No. of Persons Dying from TOBACCO</td>
<td>1 Million</td>
<td>2 Million +</td>
</tr>
</tbody>
</table>
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.

2. 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

<table>
<thead>
<tr>
<th></th>
<th>1983</th>
<th>1993</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumption (in tonnes)</td>
<td>3.9 mill ton</td>
<td>5.8 mill ton</td>
<td>10.5 mill ton</td>
</tr>
<tr>
<td>Consumption (Kg/capita/yr)</td>
<td>5</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>Consumption (kcal/capita/day)</td>
<td>128</td>
<td>156</td>
<td>240</td>
</tr>
</tbody>
</table>

*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

Pune
24% overweight

Indian Pediatr 2004; 41: 559-575

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**
** (DELFHI - BANGALORE, 1999)**

350 cases under (75 years of age)

700 controls (matched for age, gender, hospital)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Age &amp; Sex Adjusted RR</th>
<th>Multivariate RR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td>2.0</td>
<td>2.2</td>
</tr>
<tr>
<td>(none vs. highest level)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Household income</td>
<td>1.6</td>
<td>1.5</td>
</tr>
<tr>
<td>(&lt;3000 vs. &gt; 10,000)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Source: Rastogi T. et al, Am J Clin Nutr, 2004*
Age adjusted prevalence of risk factors 2002-2003

Risk factors

Overweight
Central Obesity
Dyslipidemia
Diabetes
Hypertension
Tobacco Use
Metabolic Syndrome

Prevalence %

Men
Women

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

Age>50, Current regular use of tobacco, SBP>=120 to <140, PG 100-125.9 mg/dl, Tg>150 mg/dl, Tc/HDL >=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

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

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

(On-going Indian Industrial Surveillance Study; Baseline Survey in 2002-03)
RESPONSE TO HEALTH TRANSITION

**POPULATIONS**

Demographic and Social Determinants

**INDIVIDUALS**

Biology + Beliefs + Behaviors

Clinical + Behavioral Interventions

Low Risk ➔ High Risk

High Risk ➔ Low Risk
PUBLIC HEALTH INTERVENTIONS

Policy Interventions

Enabling Environment (Financial, Social, Physical)

Educational Interventions

Health Beliefs and Behaviours (Community; Individual)

Desired Change
## Worksite Wellness Programme
### Intermediate changes (2004-2005)

<table>
<thead>
<tr>
<th>Behavioral changes</th>
<th>% changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical activity levels</td>
<td>↑ 17.1%</td>
</tr>
<tr>
<td>Fruits and vegetable consumption</td>
<td>↑ 36.3%</td>
</tr>
<tr>
<td>Conscious effort to decrease oil/ghee/butter consumption</td>
<td>↑ 31.3%</td>
</tr>
</tbody>
</table>
## Trends in mean levels of variables in Men (six centre data)

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>SBP</td>
<td>128.4 (16.7)</td>
<td>127.1 (16.8)</td>
<td>123.4 (16.7)</td>
</tr>
<tr>
<td>DBP</td>
<td>79.9 (10.8)</td>
<td>78.4 (10.5)</td>
<td>74.7 (10.5)</td>
</tr>
<tr>
<td>Weight</td>
<td>62.2 (12.6)</td>
<td>61.8 (12.3)</td>
<td>61.7 (11.8)</td>
</tr>
<tr>
<td>WC</td>
<td>84.0 (11.1)</td>
<td>81.8 (11.0)</td>
<td>81.0 (10.3)</td>
</tr>
<tr>
<td>PG</td>
<td>92.1 (29.0) n=2894</td>
<td>90.1 (30.5) n=1207</td>
<td>83.6 (31.8) n=4062</td>
</tr>
<tr>
<td>TC</td>
<td>176.5 (43.0)</td>
<td>173.1 (42.2)</td>
<td>165.7 (43.8)</td>
</tr>
<tr>
<td>TG</td>
<td>132.9 (76.1)</td>
<td>132.0 (80.1)</td>
<td>135.5 (80.9)</td>
</tr>
<tr>
<td>HDL</td>
<td>43.2 (11.6)</td>
<td>45.8 (11.5)</td>
<td>49.5 (10.3)</td>
</tr>
</tbody>
</table>
LEARNING THE FACT

AT SCHOOL LEVEL

Classes VI-VIII

LEARNING THE FACT

AT COLLEGE LEVEL (3 Years)

Hriday

“Let’s Talk Health”

Classes IX-XII

LEARNING TO ACT

Shan

“Debate the Present to Define the Future”
Change in Tobacco Use Behaviour

Any tobacco use (current use)

- **Comparison**
- **Intervention**

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

EDUCATION
People
Professionals

GUIDELINES
(Diagnostic Algorithms)

GUIDELINES
(Management Algorithms)

Self-Referral

Opportunistic Screening

HBP, Overweight, Tobacco,
Physical Inactivity, Diet, Age,
Gender, Personal/Family History

Risk stratification (Step I)
Targeted Screening

Diabetes, Dyslipidemia,
Assessment for CVD

Risk Stratification (Step II)
Appropriate Therapy

Lifestyle Measures ± Drugs
Age <40 years & No Abd Obesity

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

Age 40-49 years & HBP or Abd Obesity

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

Age >49 years & HBP & Abd Obesity

LOW RISK
DM-2%, MS-4%

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

AVERAGE RISK
DM-13%, MS-40%

HIGH RISK
DM-20%, MS-51%

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)
2. Strengthening of Medical Colleges (140)
3. Integrated NCD Clinics in Medical Colleges and District Hospitals
4. School Based Programs
5. Worksite Wellness Programs
6. IEC Activities for Mass Education
7. NGO Partnership