International Obesity Consortium
INDIAN PERSPECTIVE

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INDIA
Whatever you rightly say about India, the opposite is also true

Joan Robinson

Paradoxes from nutritional perspective in India

• Persisting Low birth weight
• Persisting under-nutrition and increasing obesity in children
• Higher rates of undernutrition and overweight/obesity in women
• Undernutrition declines and overnutrition increases with age in women
Nutritional Status of Women and Men
15-49 Years

WOMEN
- Normal: 52%
- Thin: 36%
- Overweight/obese: 13%

MEN
- Normal: 57%
- Thin: 34%
- Overweight/obese: 9%

Note: Excludes pregnant women and women with a birth in the preceding two months.

NFHS 3, INDIA
Overweight

[Maps showing prevalence of overweight in different regions of India]
# Location and risk of Overweight/Obesity – NFHS 3

<table>
<thead>
<tr>
<th>Place of Residence</th>
<th>Females Odds Ratios (95% CI)</th>
<th>Males Odds Ratios (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Urban*</td>
<td>3.3 (3.1 – 3.4)</td>
<td>2.8 (2.6 – 2.9)</td>
</tr>
<tr>
<td>Town*</td>
<td>2.9 (2.7 – 3.0)</td>
<td>2.5 (2.3 – 2.7)</td>
</tr>
<tr>
<td>Small city*</td>
<td>3.2 (3.0 – 3.4)</td>
<td>2.7 (2.5 – 2.9)</td>
</tr>
<tr>
<td>Capital city*</td>
<td>3.8 (3.6 – 4.0)</td>
<td>3.2 (2.9 – 3.4)</td>
</tr>
</tbody>
</table>

* OR adjusted for age
Factors

- Good physical activity
- Healthy living (avoiding health risk behavior)
- Avoiding stress

- Rural migration to slums
- High intake of low MN foods
  - Salt, Sugar, Fat, Alcohol

- Low activity
- Crowding
- Stress
## Risk of overweight/Obesity in migrants – NFHS 3

<table>
<thead>
<tr>
<th>Migration Patterns</th>
<th>Odds Ratios (95% CI) adj for age</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Females</td>
</tr>
<tr>
<td>Urban to Urban *</td>
<td>1.4 (1.3 – 1.5)</td>
</tr>
<tr>
<td>Urban to Rural *</td>
<td>0.6 (0.6 – 0.7)</td>
</tr>
<tr>
<td>Rural to Urban #</td>
<td>2.8 (2.5 – 3.0)</td>
</tr>
<tr>
<td>Rural to Rural #</td>
<td>1.1 (1.1 – 1.3)</td>
</tr>
</tbody>
</table>

* - Reference category - Always lived in urban areas
# - Reference category - Always lived in rural areas
A comparison of urban slums with urban / rural data

<table>
<thead>
<tr>
<th></th>
<th>PURE Study</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RURAL</td>
</tr>
<tr>
<td>Activity (Occup mets)</td>
<td>1005</td>
</tr>
<tr>
<td>Sedentary %</td>
<td>30.2</td>
</tr>
<tr>
<td>Overweight %</td>
<td>4.9</td>
</tr>
<tr>
<td>Obese %</td>
<td>0.6</td>
</tr>
<tr>
<td>Diabetes %</td>
<td>4.2</td>
</tr>
<tr>
<td>Hypertension %</td>
<td>14.9</td>
</tr>
<tr>
<td>Sugar Intake g/d</td>
<td>5.2</td>
</tr>
<tr>
<td>Fat intake g/d</td>
<td>23.2</td>
</tr>
</tbody>
</table>
## Fiber Intake

<table>
<thead>
<tr>
<th>Amount</th>
<th>Serving</th>
<th>Fiber (g)</th>
<th>Food Groups</th>
<th>Amount</th>
<th>Serving</th>
<th>Fiber (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 cup</td>
<td>4</td>
<td>0.2</td>
<td>Cooked Rice</td>
<td>4 cup</td>
<td>8</td>
<td>0.4</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>1</td>
<td>Chapatti</td>
<td>1</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>1 cup</td>
<td>2</td>
<td>4</td>
<td>Ragi ball</td>
<td>1 cup</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>1 cup</td>
<td>2</td>
<td>4</td>
<td>Cooked Veg/ Green leafy Veg</td>
<td>1 cup</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>1 cup</td>
<td>2</td>
<td>4</td>
<td>Raw Salad</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>4</td>
<td>Fruit</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1 cup</td>
<td>2</td>
<td>1</td>
<td>Dhal</td>
<td>½ cup</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>1 cup</td>
<td>2</td>
<td>3</td>
<td>Whole Gram</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Total Fiber Intake:**

- **Recommended:** 21.2 g
- **Actual Consumption:** 9.4 g
<table>
<thead>
<tr>
<th></th>
<th>Bangalore</th>
<th>Mysore</th>
<th>Pune</th>
<th>Southampton</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>179</td>
<td>589</td>
<td>162</td>
<td>114</td>
</tr>
<tr>
<td>Gest Age</td>
<td>273</td>
<td>273</td>
<td>279</td>
<td>278</td>
</tr>
<tr>
<td>Birth Wt</td>
<td>3040</td>
<td>2950</td>
<td>3008</td>
<td>3066</td>
</tr>
<tr>
<td>SSF (mm)</td>
<td>4.0</td>
<td>4.4</td>
<td>4.6</td>
<td>4.1</td>
</tr>
</tbody>
</table>
Smaller in height – bigger in waist

MALE - WAIST 50th PERCENTILE

FEMALE – WAIST 50th PERCENTILE

S. Indian
UK
Iran
Chinese
PEACH ≤ 10 yrs

Kuriyan et al
Indian Pediatrics (2011)
PEACH ≥ 10 yrs

- Snacks between meals
- Eating in front of TV
- SBF
- Sweets
- Egg
- Bakery
- Chicken
- Fish
- Meal with Family
- FF
- SD
- FJ
- C

BMI:
- MBMI
- FBMI

Activities:
- Games
- Sleep
Barriers for inability to achieve optimal exercise regime

Males (193)
- Lack of motivation: 9%
- Lack of facilities: 26.4%
- Lack of time: 53.4%
- Work pressures: 2.1%
- Health Problems: 9.8%

Females (208)
- Lack of motivation: 1.9%
- Lack of facilities: 22.1%
- Lack of time: 68.3%
- Work pressures: 10.1%
- Health Problems: 8.2%

401 subjects- between 25-58 years
Employees from school, colleges, IT

Vaz et al 2000, IHJ
MARG – THE PATH

“MARG” to Good Health
Eat Right
Stay Light &
Be Bright

Project “MARG” : The Path
Medical Education for Children: Solutions for Effective Prevention of Obesity and Diabetes and for Healthy Eating
(A Health Awareness Program for the Prevention of Obesity & Diabetes through Healthy Eating and Active Lifestyle)
Promoted By: Diabetes Foundation (India)
Funded By: World Diabetes Foundation (Denmark)
Objective

- Organize activities to focus on
  - Changing the individual
    - Children, family and teachers
  - Changing the environment
    - Home, school
Diabetes and Obesity Awareness for Children/Adolescents & Adults

A 50 city country wide awareness and education program

Initiative of National Diabetes, Obesity, and Cholesterol Diseases Foundation

March 5, 2011
Objective

• To create awareness about obesity and diabetes ad improve lifestyle and prevent diseases
• Across 50 cities in India
• Awareness
• School Health Camps
• Public Awareness Campaign
“TEACHER”

Trends in Childhood Nutrition and Lifestyle Factors in India

A 6 City Countrywide Project of

Diabetes Foundation (India)
Socio-ecological approach
- Social
- Ecological
- Economic
- Cultural
- Political
- Equity

Lifestyle approach
- Change risk factors for population
- Equitable intervention for populations
- Education

Biological approach
- Individualized risk reduction
- Functional / fortified foods
- Screening plus targeted intervention for individuals

Integrated Approaches
St. Johns Research Institute
Facilities

• Division of Nutrition
  ➢ IAEA collaborating center
  ➢ Performing stable isotope research since 1990
  ➢ Energy expenditure and body composition
  ➢ IRMS and FTIR
  ➢ Provided data for the WHO 2007 amino acid requirement
Facilities

- Clinical Nutrition Unit
  - Located at St. John’s Hospital
  - Provides Nutrition & Lifestyle Counseling
  - Fully equipped Body Composition lab
  - Research - 4 compartment method (IAEA)
    » Adiposity in Children (IMCR)
Thank You