TRENDS IN THE NUTRITIONAL STATUS OF RURAL COMMUNITIES IN INDIA
- AN OVERVIEW

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DETERMINANTS OF NUTRITIONAL STATUS

Agro-climatic factors
- Food production
- Land Ownership
- Type of land
- Rainfall
- Geographic conditions
- Agricultural techniques
- Use of hybrid seeds
- Use of fertilizers
- Dairy/poultry/Fisheries
- Animal husbandry

Demographic factors
- Population
- Family Size
- Urbanisation

Socio-economic factors
- Religion
- Community
- Occupation
- Income

Disasters
- Drought/Floods
- Wars

Availability of & participation in developmental programmes
- PDS
- Rural Dev. Prog.
- Employment generation prog.

Socio-cultural factors
- Illiteracy
- Ignorance
- Taboos
- Life Styles

Physiological factors
- Pregnancy
- Lactation
- Breast feeding practices
- Infant & child Feeding practices

Pathological Conditions
- Infections
  - Diarrhoeas
  - Resp. Infections
  - Malaria
  - Others
- Infestations
  - Hook worms
  - Round worms
  - Giardiasis etc.,

Environmental factors
- Environmental sanitation
- Personal hygiene
- Safe drinking water

Health Care
- Availability/Access to Health care facility/services
- Health seeking behaviour

Food Intake

Nutritional Status

Food Security
NUTRITIONALLY VULNERABLE GROUPS

- Infants and Young Children (<5 years)
- Adolescent Girls
- Pregnant & Lactating Women
- Elderly
- Socio-economically deprived Groups
  - Schedule Castes
  - Schedule Tribes
  - Communities in Urban Slum and Chronically drought prone rural areas
- Certain Vital Statistics
CAUSES OF DEATHS AMONG <5 YEAR CHILDREN IN DEVELOPING COUNTRIES

- Malnutrition*: 60%
- Neonatal: 42%
- Pneumonia*: 17%
- HIV/AIDS*: 4%
- Diarrhoea*: 9%
- Tetanus*: 1%
- Measles*: 1%
- Malaria: 7%
- Others: 19%

* Approximately 70% of all childhood deaths are associated with one or more of these five conditions

Source: UNICEF, 2010
Infant Mortality Rate (Per 1000 Live Births) in India and South-east Asian Countries

South-east Asian Countries
Source: WHO/SEARO 2000

India (NNMB States)
Source: SRS, India - 2010
Under-five Mortality Rate (Per 1000 Live Births) in South-east Asian Countries & India

South-east Asian Countries

India (NNMB States)
Source: SRS, India - 2010

* Source: SRS, 2010
Maternal Mortality Ratio (Per 100,000 Live Births) in India and South-east Asian Countries

Source: WHO/SEARO 2000

India (NNMB States)
Registrar General of India, (2007-09, SRS-2011)
Prevalence of Low Birth Weight

South-east Asian Countries

Source: WHO/SEARO 2000

India (NNMB States)

* Source: NFHS3, 2005-06
PERCENT CHILDREN (12-23 MONTHS) COMPLETELY IMMUNIZED

NFHS-3 (2005-06): 43.5
DLHS (2007): 53.5
CES (2009): 61.0
RSOC (2013-14): 65.2
Prevalence (%) of Low Birth weight (<2.5 kg) : RSOC 2013-14

- Total: 18.6% (21.5)
- Urban: 18.3% (19.3)
- Rural: 18.7% (23.3)

* (NFHS-3: 2005-06)

SC: 21.6%
ST: 19.6%
Richest: 15.5%
Poorest: 21.8%
- Infant and Young Child Feeding Practices
Infant and Young Child Feeding Practices in India

- Early Initiation of BF (<1 hour): 25% (NFHS 3) vs. 47% (RSOC 2013-14)
- Exclusive BF upto 6 months: 46% (NFHS 3) vs. 72% (RSOC 2013-14)
- Compl. Feeding among 6-9 months Children: 53% (NFHS 3) vs. 50% (RSOC 2013-14)
- Adequate Frequency: 36% (NFHS 3) vs. 50% (RSOC 2013-14)
- Adequate Diversity: 20% (NFHS 3) vs. 30% (RSOC 2013-14)
Prevalence of Underweight among 6-59 months children according to age* (by SD classification) using WHO Child Growth Standards.
Food & Nutrient Intakes
Average Intake of Foods & Nutrients among Rural Households:
Per CU/Day as % Recommended (ICMR-2010)

Mean intakes as % RDI,
(Dietary Guidelines for Indians, 2011)

Median Intakes as % RDA
for Indians  (ICMR – 2010)

Source: NNMB, Tech Rep 26, 2012
Average Daily Foods & Nutrients Intake among 1-6 Yr Children: By Age Group (As % RDI : Balanced Diets – 2011)

- **Cereals**: 174 for 1-3 yrs, 218 for 4-6 yrs
- **Pulses**: 72 for 1-3 yrs, 65 for 4-6 yrs
- **Green Leafy Veg.**: 14 for 1-3 yrs, 20 for 4-6 yrs
- **Other Veg.**: 26 for 1-3 yrs, 23 for 4-6 yrs
- **Roots & Tubers**: 37 for 1-3 yrs, 42 for 4-6 yrs
- **Milk & Milk Prod.**: 60 for 1-3 yrs, 67 for 4-6 yrs
- **Fats & Oils**: 50 for 1-3 yrs, 69 for 4-6 yrs
- **Sugar & Jaggery**: 50 for 1-3 yrs, 72 for 4-6 yrs

**Mean intakes as % RDI**, (Dietary Guidelines for Indians, 2011)

- **Protein**: 139 for 1-3 yrs, 122 for 4-6 yrs
- **Energy**: 77 for 1-3 yrs, 69 for 4-6 yrs
- **Calcium**: 69 for 1-3 yrs, 67 for 4-6 yrs
- **Iron**: 55 for 1-3 yrs, 52 for 4-6 yrs
- **Vitamin A**: 52 for 1-3 yrs, 50 for 4-6 yrs
- **Thiamin**: 100 for 1-3 yrs, 100 for 4-6 yrs
- **Riboflavin**: 67 for 1-3 yrs, 60 for 4-6 yrs
- **Niacin**: 69 for 1-3 yrs, 69 for 4-6 yrs
- **Vitamin C**: 72 for 1-3 yrs, 60 for 4-6 yrs

**Median Intakes as % RDA** for Indians (ICMR – 2010)

Source: NNMB, Tech Rep 26, 2012
Percent Distribution of 1-6 yr Children According to Daily Median Intake of Micronutrients

<table>
<thead>
<tr>
<th>Micronutrient</th>
<th>&lt;50% RDA</th>
<th>50-70% RDA</th>
<th>&gt;=70% RDA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Riboflavin</td>
<td>52</td>
<td>14</td>
<td>34</td>
</tr>
<tr>
<td>Vitamin A</td>
<td>81</td>
<td>7</td>
<td>13</td>
</tr>
<tr>
<td>Iron</td>
<td>46</td>
<td>18</td>
<td>36</td>
</tr>
<tr>
<td>Total Folate</td>
<td>35</td>
<td>18</td>
<td>47</td>
</tr>
</tbody>
</table>

Source: NNMB, Tech Rep 26, 2012
Average intake of Food stuffs (as % of RDI) Among Adolescent Girls: By Age Group

Median intake of Nutrients (as % of RDA) Among Adolescent Girls: By Age Group

Proportion (%) of Adolescent Girls with intake of Nutrients in amounts <70% of RDA – By Age Group

Distribution (%) of Adult Men & Women according to Physical Activity

<table>
<thead>
<tr>
<th>Activity</th>
<th>Men</th>
<th>Women</th>
<th>Pooled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedentary</td>
<td>58.9</td>
<td>44.5</td>
<td>26.8</td>
</tr>
<tr>
<td>Moderate</td>
<td>73.2</td>
<td>41</td>
<td>55</td>
</tr>
<tr>
<td>Heavy</td>
<td>0.5</td>
<td>0.1</td>
<td>0.5</td>
</tr>
</tbody>
</table>

- MEN
- WOMEN
- Pooled
Median intake of Nutrients (as % of RDA) Among ADULT MEN: By Physical Activity Level

Among ADULT MEN:

- **Proteins**
  - Sedentary: 82%
  - Moderate: 89%

- **Energy**
  - Sedentary: 74%
  - Moderate: 80%

- **Calcium**
  - Sedentary: 62%
  - Moderate: 76%

- **Iron**
  - Sedentary: 76%
  - Moderate: 84%

- **Vit. A**
  - Sedentary: 22%
  - Moderate: 21%

Nutrients and their intake levels (% RDA):

- **Thiamin**
  - Sedentary: 64%
  - Moderate: 109%

- **Riboflavin**
  - Sedentary: 54%
  - Moderate: 64%

- **Niacin**
  - Sedentary: 75%
  - Moderate: 96%

- **Vit. C**
  - Sedentary: 60%
  - Moderate: 75%

- **D. Folate**
  - Sedentary: 53%
  - Moderate: 59%

The data indicates that moderate physical activity levels result in higher nutrient intake compared to sedentary levels, with notable increases in Vit. C, Thiamin, and D. Folate.
Median intake of Nutrients (as % of RDA) Among ADULT WOMEN: By Physical Activity Level

- **Proteins**: Sedentary - 80%, Moderate - 85% RDA
- **Energy**: Sedentary - 80%, Moderate - 88% RDA
- **Calcium**: Sedentary - 49%, Moderate - 55% RDA
- **Iron**: Sedentary - 55%, Moderate - 56% RDA
- **Vit. A**: Sedentary - 20%, Moderate - 19% RDA
- **Thiamin**: Sedentary - 64%, Moderate - 54% RDA
- **Riboflavin**: Sedentary - 59%, Moderate - 60% RDA
- **Niacin**: Sedentary - 75%, Moderate - 60% RDA
- **Vit. C**: Sedentary - 59%, Moderate - 60% RDA
- **D. Folate**: Sedentary - 53%, Moderate - 60% RDA
Proportion (%) of Adult Women with intake of Nutrients in amounts <70% of RDA – By Physiological Status

Distribution (%) of Sedentary Adult Men & Women with Protein Calorie Inadequacy

States Pooled

Source: NNMB, Tech Rep 26, 2012
Food & Nutrient Intakes
-- Time Trends
# Average Household Intake of foodstuffs (g/per CU/day): Time trends – States* Pooled

<table>
<thead>
<tr>
<th>STATES</th>
<th>Period of Survey</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cereals &amp; Millets</td>
<td>505</td>
<td>469</td>
<td>450</td>
<td>368 ↓</td>
<td>375</td>
</tr>
<tr>
<td>Pulses &amp; Legumes</td>
<td>34</td>
<td>32</td>
<td>27</td>
<td>33</td>
<td>75</td>
</tr>
<tr>
<td>Green Leafy Veg.</td>
<td>8</td>
<td>9</td>
<td>15</td>
<td>16</td>
<td>100</td>
</tr>
<tr>
<td>Other Veg.</td>
<td>54</td>
<td>49</td>
<td>47</td>
<td>48</td>
<td>200</td>
</tr>
<tr>
<td>Roots &amp; Tubers</td>
<td>56</td>
<td>41</td>
<td>44</td>
<td>50</td>
<td>200</td>
</tr>
<tr>
<td>Milk &amp; Milk Prod.</td>
<td>116</td>
<td>92</td>
<td>86</td>
<td>95 ↓</td>
<td>300</td>
</tr>
<tr>
<td>Fats &amp; Oils</td>
<td>14</td>
<td>13</td>
<td>12</td>
<td>16</td>
<td>25</td>
</tr>
<tr>
<td>Sugar &amp; Jaggery</td>
<td>23</td>
<td>29</td>
<td>21</td>
<td>14 ↓</td>
<td>20</td>
</tr>
</tbody>
</table>

*KER, TN, KAR, AP, MR, GUJ, ORI (7 States)

Source: NNMB, Tech Rep 26, 2012
### Median Household Intake of Nutrients (per CU/day): Time trends – States* Pooled

<table>
<thead>
<tr>
<th>STATES</th>
<th>Period of Survey</th>
<th>RDA (2011)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proteins (g)</td>
<td>61.5</td>
<td>58.4</td>
</tr>
<tr>
<td>Energy (Kcal)</td>
<td>2349</td>
<td>2283</td>
</tr>
<tr>
<td>Calcium (mg)</td>
<td>606</td>
<td>565</td>
</tr>
<tr>
<td>Iron (mg)</td>
<td>17.2</td>
<td>15.5</td>
</tr>
<tr>
<td>Vitamin A (µg)</td>
<td>246</td>
<td>282</td>
</tr>
<tr>
<td>Thiamin (mg)</td>
<td>1.46</td>
<td>1.33</td>
</tr>
<tr>
<td>Riboflavin (mg)</td>
<td>0.81</td>
<td>0.87</td>
</tr>
<tr>
<td>Niacin (mg)</td>
<td>14.7</td>
<td>14.2</td>
</tr>
<tr>
<td>Vitamin C (mg)</td>
<td>39</td>
<td>37</td>
</tr>
<tr>
<td>Dietary Folate (µg)</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

*Source: NNMB, Tech Rep 26, 2012

*KER, TN, KAR, AP, MR, GUJ, ORI (7 States)
NUTRITIONAL STATUS
- Anthropometry
Prevalence (%) of Undernutrition Among 0-5 yr Children According to SD Classification (<Median - 2SD) : By Age Group & Gender

Source: NNMB, Tech Rep 26, 2012
Prevalence (%) of Undernutrition among <5 yr Children – By State *

**UNDERWEIGHT**

- KER: 23
- TN: 31
- MR: 35
- AP: 37
- WB: 39
- KAR: 41
- ORI: 45
- GUJ: 52
- MP: 54
- Pooled: 42

**STUNTING**

- T.N.: 19
- Kerala: 21
- MR: 41
- WB: 43
- KAR: 43
- AP: 45
- MP: 48
- ORI: 49
- GUJ: 51
- Pooled: 42

**WASTING**

- MR: 15
- AP: 16
- KER: 18
- ORI: 18
- KAR: 22
- UP: 24
- T.N.: 28
- GUJ: 29
- MP: 35
- Pooled: 23

* Using WHO Child Growth Standards

States Pooled

Source: NNMB, Tech Rep 26, 2012
Distribution (%) of Adolescent Boys & Girls according to Age/sex specific BMI

Boys

Girls

Percent

Undernourished (<Median-2SD)

Normal (Median-2SD to Median+1SD)

Over Weight/Obesity (>=Median+1SD)

Source: NNMB, Tech Rep 26, 2012
Distribution (%) of Adult Men & Women According to Body Mass Index (BMI Grades - Asian Cut-off Levels): By Physical Activity

**Adult Men**

- **X²**: p (<0.001)

**Adult Women**

- **X²**: p (<0.001)

NUTRITIONAL STATUS
- Time Trends
Distribution (%) of <5 Children by Undernutrition and Period of Survey (Using WHO / MGRS Values)

**UNDERNUTRITION (< Median - 2SD)**

- **Underweight**
  - NFHS2 (2001): 43%
  - NFHS3 (2006): 40%
  - NNMB (2011-12): 42%

- **Stunting**
  - NFHS2 (2001): 51%
  - NFHS3 (2006): 45%
  - NNMB (2011-12): 43%

- **Wasting**
  - NFHS2 (2001): 20%
  - NFHS3 (2006): 23%
  - NNMB (2011-12): 22%

States Pooled
Distribution (%) of Adult Men & Women according to BMI Grades by Period of Survey

**Adult Men**

- BMI < 18.5:
  - 1975-79: 52%
  - 1996-97: 48%
  - 2011-12: 51%

- BMI 18.5 – 25.0:
  - 1975-79: 33%
  - 1996-97: 44%
  - 2011-12: 47%

- BMI >=25.0:
  - 1975-79: 3%
  - 1996-97: 7%
  - 2011-12: 16%

**Adult Women**

- BMI < 18.5:
  - 1975-79: 46%
  - 1996-97: 47%
  - 2011-12: 51%

- BMI 18.5 – 25.0:
  - 1975-79: 32%
  - 1996-97: 44%
  - 2011-12: 47%

- BMI >=25.0:
  - 1975-79: 4%
  - 1996-97: 7%
  - 2011-12: 16%
Micronutrient Deficiency Disorders of Public Health significance:

-- Iron Deficiency Anaemia (IDA)
-- Vitamin ‘A’ Deficiency (VAD) and
-- Iodine Deficiency Disorders (IDD)
-- Vitamin D Deficiency
Iron Deficiency Anaemia (IDA)
Prevalence (%) of Anaemia by Age, Gender & Physiological Groups

<table>
<thead>
<tr>
<th>Group</th>
<th>Normal (≥ 6 months)</th>
<th>Mild (≤ 6 months)</th>
<th>Moderate (≥ 6 months)</th>
<th>Severe (≤ 6 months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-5 yr Boys &amp; Girls</td>
<td>32.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12-14 Yr Girls</td>
<td>31.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15-17 Yr Girls</td>
<td>30.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preg. Women (≥ 6 months)</td>
<td>25.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lact. Women (≤ 6 months)</td>
<td>22.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NPNL. Women</td>
<td>24.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>45.2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: MND-NNMB, Tech Rep 22, 2003
STRATEGIES FOR CONTROL & PREVENTION OF IDA/VAD

Short Term Strategies:

**IDA:**

Distribution of ‘FOLIFER’ (Iron & Folic Acid Tabs.) to Vulnerable groups viz.,

-- Pregnant Women
-- Lactating Women (< 6 months)
-- FP Acceptors
-- 1 to 5 Year Children

@ 1 Tab. Adult/Child per day for 100 days
## Distribution (%) of Beneficiaries according to Receipt of IFA tablets

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pregnant (2053)</td>
</tr>
<tr>
<td>Received IFA tablets</td>
<td>62.2</td>
</tr>
<tr>
<td>No. of tablets received</td>
<td></td>
</tr>
<tr>
<td>10 – 29</td>
<td>2.3</td>
</tr>
<tr>
<td>30 – 59</td>
<td>17.1</td>
</tr>
<tr>
<td>60 – 89</td>
<td>12.8</td>
</tr>
<tr>
<td>≥ 90</td>
<td>29.9</td>
</tr>
</tbody>
</table>

Figures in ( ) indicate numbers

Source: NNMB-MND Survey : 8 States, 2003
Vitamin A Deficiency (VAD)

WHO cut-off level of 0.5% prevalence denotes Public Health significance

Source:
NNMB - MND Surveys in Rural India: 2003 & NNMB RegularSurvey-2012

States Pooled:
NNMB-2003: 0.8
NNMB-2012: (0.2)
STRATEGIES FOR CONTROL & PREVENTION OF IDA/VAD

Short Term Strategies (Contd..):

**VAD:**

Distribution of ‘Massive Dose Vitamin A to 9-60 months children, once in 6 months:

-- First dose of 100 thousand IU at 9 months along with Measles Immunization

-- Second dose 200 thousand IU at 18 months along with DPT/Polio Booster

-- 3rd dose onwards 200 thousand IU every 6 months
Distribution (%) of 1-5 Yr. Children with Blood Vit. A Levels of < 20 μg/dL, Median Dietary Intake of Vit. A (as % RDA) and Extent of Coverage for Suppl. of Massive Dose Vit. A – By State

<table>
<thead>
<tr>
<th>STATES</th>
<th>Blood Vitamin A &lt; 20 μg/dL</th>
<th>Dietary Intake of Vitamin A &lt; 50% of RDA</th>
<th>Receipt of Massive Dose Vitamin A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 or 2 Doses</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>One</td>
</tr>
<tr>
<td>Kerala</td>
<td>79.4</td>
<td>91.8</td>
<td>38.5</td>
</tr>
<tr>
<td>Tamil Nadu</td>
<td>48.8</td>
<td>81.9</td>
<td>50.6</td>
</tr>
<tr>
<td>Karnataka</td>
<td>52.1</td>
<td>90.4</td>
<td>56.6</td>
</tr>
<tr>
<td>AP</td>
<td>61.5</td>
<td>92.9</td>
<td>49.3</td>
</tr>
<tr>
<td>Maharashtra</td>
<td>54.7</td>
<td>88.8</td>
<td>52.1</td>
</tr>
<tr>
<td>MP</td>
<td>88.0</td>
<td>87.4</td>
<td>52.3</td>
</tr>
<tr>
<td>Orissa</td>
<td>57.7</td>
<td>77.5</td>
<td>80.0</td>
</tr>
<tr>
<td>West Bengal</td>
<td>61.2</td>
<td>80.6</td>
<td>50.6</td>
</tr>
<tr>
<td><strong>Pooled</strong></td>
<td><strong>61.8</strong></td>
<td><strong>86.3</strong></td>
<td><strong>55.4</strong></td>
</tr>
</tbody>
</table>

Source: NNMB - MND Surveys in Rural India: 2003
### Distribution (%) of 1-5 Yr. Children according to Coverage for Receipt of Massive Dose Vit. A during the year 2011-12: By State

<table>
<thead>
<tr>
<th>STATES</th>
<th>Receipt of Massive Dose Vitamin A</th>
<th>No. of Doses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Received</td>
<td>One</td>
</tr>
<tr>
<td>Kerala</td>
<td>81.1</td>
<td>49.3</td>
</tr>
<tr>
<td>Tamil Nadu</td>
<td>66.0</td>
<td>30.2</td>
</tr>
<tr>
<td>Karnataka</td>
<td>94.4</td>
<td>40.6</td>
</tr>
<tr>
<td>Andhra Pradesh</td>
<td>90.6</td>
<td>36.2</td>
</tr>
<tr>
<td>Maharashtra</td>
<td>94.4</td>
<td>38.6</td>
</tr>
<tr>
<td>Gujarat</td>
<td>91.9</td>
<td>35.2</td>
</tr>
<tr>
<td>Madhya Pradesh</td>
<td>95.6</td>
<td>45.1</td>
</tr>
<tr>
<td>Orissa</td>
<td>93.1</td>
<td>39.5</td>
</tr>
<tr>
<td>West Bengal</td>
<td>89.8</td>
<td>32.5</td>
</tr>
<tr>
<td>Uttar Pradesh</td>
<td>57.8</td>
<td>26.7</td>
</tr>
<tr>
<td><strong>Pooled</strong></td>
<td><strong>85.0</strong></td>
<td><strong>36.5</strong></td>
</tr>
</tbody>
</table>

Source: NNMB, Tech Rep 26, 2012
Iodine Deficiency Disorders (IDD)
Prevalence (%) of IDD among 6 – 11 Year Children

Source: MND-NNMB, Tech Rep 22, 2003
## Prevalence of Total Goitre (%) in Select Districts (8Dist. /Region) of Different Regions of the Country

<table>
<thead>
<tr>
<th>Districts</th>
<th>Northern</th>
<th>North-Eastern</th>
<th>Eastern</th>
<th>Central</th>
<th>Southern</th>
</tr>
</thead>
<tbody>
<tr>
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<td>PREV.</td>
<td>Current</td>
<td>PREV.</td>
<td>Current</td>
<td>PREV.</td>
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<td>41.6</td>
<td>10.4</td>
<td>65.8</td>
<td>5.4</td>
<td>35.2</td>
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<td>2</td>
<td>41.2</td>
<td>9.6</td>
<td>40.2</td>
<td>4.6</td>
<td>33.2</td>
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<tr>
<td>3</td>
<td>27.4</td>
<td>8.5</td>
<td>26.5</td>
<td>8.4</td>
<td>64.3</td>
</tr>
<tr>
<td>4</td>
<td>44.7</td>
<td>17.2</td>
<td>68.6</td>
<td>4.8</td>
<td>20.9</td>
</tr>
<tr>
<td>5</td>
<td>45.7</td>
<td>14.4</td>
<td>68.6</td>
<td>5.2</td>
<td>37.8</td>
</tr>
<tr>
<td>6</td>
<td>30.0</td>
<td>6.9</td>
<td>50.2</td>
<td>8.6</td>
<td>37.8</td>
</tr>
<tr>
<td>7</td>
<td>52.3</td>
<td>20.6</td>
<td>25.9</td>
<td>5.0</td>
<td>21.6</td>
</tr>
<tr>
<td>8</td>
<td>24.5</td>
<td>19.3</td>
<td>25.9</td>
<td>6.5</td>
<td>30.3</td>
</tr>
</tbody>
</table>

PREV. = Previous Year
Current = Current Year

50
Percent of HHs consuming adequately iodised (≥15 ppm) Salt

Coverage Evaluation Survey: UNICEF - MoH&FW (GoI) 2009

Per cent

STATES

KER  AP  ORI  MP  TN  WB  KAR  MP  -  Urban  Rural  Pooled

89  64  64  63  57  51  36  63  83  66  71

INDIA
Vitamin - D Deficiency
## Prevalence of VDD - Indian studies

<table>
<thead>
<tr>
<th>Studies</th>
<th>Cut off point</th>
<th>Prevalence %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delhi, Madhava Rao, Goswami, Adults-2006</td>
<td>&lt; 20 ng/ml</td>
<td>94.3%</td>
</tr>
<tr>
<td>Seema Puri et al Adolescent girls</td>
<td>&lt; 20 ng/ml</td>
<td>90.8%</td>
</tr>
<tr>
<td>Pregnancy, Term NIN study, 2008</td>
<td>&lt; 20 ng/ml</td>
<td>51.8%</td>
</tr>
<tr>
<td>Cord blood, NIN, 2008</td>
<td>&lt; 20 ng/ml</td>
<td>91%</td>
</tr>
<tr>
<td>Alok sachan et al pregnancy</td>
<td>&lt; 10 ng/ml</td>
<td>42.5%</td>
</tr>
<tr>
<td>Harinarayan et al Tirupati, children</td>
<td>&lt; 20 ng/ml</td>
<td>75%</td>
</tr>
</tbody>
</table>
Prevalence of VDD in Tirupati, South India

Harinarayan et al, IJMR, 2008
Prevalence of vitamin D deficiency (< 50 nmol/l) among Urban adult women (>=30 yrs) by income Category (ICMR task force study- Hyderabad arm: 2008)
Overweight, Obesity, Hypertension & Diabetes Mellitus
Prevalence (%) of Obesity according to BMI/WHR/WC and HTN among ADULT MEN – By State

**BMI (≥23.0)**

- Kerala: 35
- T.N.: 30
- A.P.: 25
- Mahara.: 21
- Karnat.: 21
- Guj.: 17
- Orissa: 14
- W.B.: 14
- U.P.: 12
- M.P.: 10
- Pooled: 20

**WHR (≥0.90)**

- KER: 66
- U.P: 60
- ORI: 57
- W.B: 55
- T.N: 52
- A.P.: 52
- M.P.: 50
- KAR: 45
- GUJ: 40
- M.R: 40
- Pooled: 51

**WC (≥90 cm)**

- KER: 23
- T.N.: 23
- A.P.: 16
- GUJ: 15
- KAR: 14
- MR: 14
- ORI: 9
- M.P: 9
- W.B: 8
- U.P: 5
- Pooled: 14

**HTN (SBP≥ 140 and/or DBP ≥/90 mm Hg)**

- KER: 30
- W.B: 30
- M.R: 26
- ORI: 24
- T.N: 21
- ORI: 22
- GUJ: 21
- KAR: 20
- T.N: 17
- A.P: 17
- U.P: 17
- M.P: 14
- Pooled: 22

Source: NNMB, Tech Rep 26, 2012
Prevalence (%) of Obesity according to BMI/WHR/WC and HTN among ADULT WOMEN – By State

BMI (≥23.0)

<table>
<thead>
<tr>
<th>State</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>KER</td>
<td>47</td>
</tr>
<tr>
<td>T.N.</td>
<td>36</td>
</tr>
<tr>
<td>A.P.</td>
<td>24</td>
</tr>
<tr>
<td>KAR</td>
<td>21</td>
</tr>
<tr>
<td>M.R.</td>
<td>20</td>
</tr>
<tr>
<td>GUJ</td>
<td>19</td>
</tr>
<tr>
<td>W.B.</td>
<td>19</td>
</tr>
<tr>
<td>U.P.</td>
<td>16</td>
</tr>
<tr>
<td>ORI</td>
<td>14</td>
</tr>
<tr>
<td>M.P.</td>
<td>12</td>
</tr>
<tr>
<td>Pooled</td>
<td>23</td>
</tr>
</tbody>
</table>

WHR (≥0.80)

<table>
<thead>
<tr>
<th>State</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>KER</td>
<td>88</td>
</tr>
<tr>
<td>TN</td>
<td>73</td>
</tr>
<tr>
<td>M.P.</td>
<td>72</td>
</tr>
<tr>
<td>W.B.</td>
<td>70</td>
</tr>
<tr>
<td>ORI</td>
<td>65</td>
</tr>
<tr>
<td>U.P.</td>
<td>65</td>
</tr>
<tr>
<td>A.P.</td>
<td>62</td>
</tr>
<tr>
<td>KAR</td>
<td>53</td>
</tr>
<tr>
<td>GUJ</td>
<td>46</td>
</tr>
<tr>
<td>M.R.</td>
<td>44</td>
</tr>
<tr>
<td>Pooled</td>
<td>64</td>
</tr>
</tbody>
</table>

WC (≥80 cm)

<table>
<thead>
<tr>
<th>State</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kerala</td>
<td>54</td>
</tr>
<tr>
<td>T.N.</td>
<td>30</td>
</tr>
<tr>
<td>M.P.</td>
<td>24</td>
</tr>
<tr>
<td>U.P.</td>
<td>19</td>
</tr>
<tr>
<td>W.B.</td>
<td>19</td>
</tr>
<tr>
<td>A.P.</td>
<td>18</td>
</tr>
<tr>
<td>KAR</td>
<td>18</td>
</tr>
<tr>
<td>M.R.</td>
<td>17</td>
</tr>
<tr>
<td>GUJ</td>
<td>16</td>
</tr>
<tr>
<td>ORI</td>
<td>10</td>
</tr>
<tr>
<td>Pooled</td>
<td>23</td>
</tr>
</tbody>
</table>

HTN (SBP≥ 140 and/or DBP ≥/90 mm Hg)

<table>
<thead>
<tr>
<th>State</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>W.B.</td>
<td>29</td>
</tr>
<tr>
<td>ORI</td>
<td>28</td>
</tr>
<tr>
<td>KER</td>
<td>28</td>
</tr>
<tr>
<td>M.R.</td>
<td>25</td>
</tr>
<tr>
<td>T.N</td>
<td>20</td>
</tr>
<tr>
<td>KAR</td>
<td>20</td>
</tr>
<tr>
<td>GUJ</td>
<td>17</td>
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<tr>
<td>A.P.</td>
<td>17</td>
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<tr>
<td>M.P.</td>
<td>17</td>
</tr>
<tr>
<td>U.P.</td>
<td>15</td>
</tr>
<tr>
<td>Pooled</td>
<td>22</td>
</tr>
</tbody>
</table>

Source: NNMB, Tech Rep 26, 2012
Prevalence (%) of Hypertension (JNC-VII) Among Rural Adult Men & Women: By Physical Activity Level

**MEN**

\[ X^2 : p < 0.001 \]

**WOMEN**

\[ X^2 : p < 0.001 \]

Prevalence (%) of Diabetes Mellitus – By State

(Fasting Blood Glucose >= 126mg/dL)

Source: NNMB, Tech Rep 26, 2012
Prevalence (%) of Diabetes Mellitus Among Rural Adult Men & Women: By Physical Activity Level

**MEN**

$X^2 : p (<0.001)$

**WOMEN**

$X^2 : p (<0.001)$

Strategies for Control & Prevention
SHORT TERM

- Strengthening supplementary feeding Programmes (eg. ICDS), in terms of:
  - Quantity and quality of Supplement
  - Regularity
  - Coverage of target population and monitoring

- National Programme for Control & Prevention of IDA:
  - Distribution of IFA Tablets to target population,

- National Programme for prevention of Nutritional Blindness:
  - Massive dose Vitamin A Supplementation,
Long Term Strategies

- Health & Nutrition Education
- Dietary Diversification – B. C. Commn.
- Development of Kitchen Gardens
- Agro-biodiversity, Bio-fortification,
- GM Foods
- Environmental Sanitation & Personal Hygiene
- Provision of Safe Drinking water
- Immunization
- Prompt treatment of Infections
- Income generating activities
- Improvement in HH food Security
- Promotion of Healthy Life style Practices
- . . . Population Control
Medium Term Strategies

Fortification of Foods with micronutrients
- Milk (Vit. A & Vit. D)
- Salt (Iodine, Iron)
- Cooking oils (Vit. A & Vit. D)
- Wheat Flour (Iron, Vit. A, Folic Acid)
- Rice (Iron, Ultra Rice [PATH])
- Supplementary foods under ICDS/MDM
- Ready to eat convenience foods
## Advantages & Disadvantages of Various Strategies

<table>
<thead>
<tr>
<th>STRATEGY</th>
<th>ADVANTAGES</th>
<th>LIMITATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Short Term</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Very Effective, if properly implemented.</td>
<td></td>
</tr>
<tr>
<td><strong>Long Term</strong></td>
<td>Desirable, Sustainable, No cost involved.</td>
<td>Difficult to achieve, Time consuming.</td>
</tr>
<tr>
<td>(Nutrition Education/Dietary Diversification)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Medium Term</strong></td>
<td>Easy, Cost effective, Good compliance, Sustainable, Easy to Regulate.</td>
<td>Risk due to several foods being fortified</td>
</tr>
<tr>
<td>(Food Fortification)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Thank you