CURRENT TRENDS IN THE CONSUMPTION OF FAT, SALT AND SUGAR IN INDIA

Dr. A. LAXMAIAH, MBBS, DPH, MPH, Ph.D, MBA, PGCN, IPHA
Scientist ‘G’ & Head, Division of Public Health Nutrition

ICMR-National Institute of Nutrition
E-mail: avulalaxman@yahoo.com
Dr. Avula Laxmaiah, Scientist G & Head, Division of Public Health Nutrition (PHN), ICMR-NIN-Hyd

1. Dr. Arlappa, M.D., Scientist F
2. Dr. Harikumar, Scientist F
3. Dr. II. Meshram, Scientist E
4. Ms. G. Neeraja, TO
5. Mr. K. Sree Ramakrishna, TO

1-5: Division of PHN-ICMR-NIN-Hyd

Dr. N. Balakrishna, Scientist E
2. Mr. V. Bhaskar, TO

1-2: Division of Biostatistics

1. Office-in-Charges, 16 NNMB Units
2. NNMB Project staff of 16 NNMB Units
3. Technical staff/Supportive staff of NIN
Malnutrition is one of the most important public health problems, arises either from deficiency or excess or imbalance of a single or various nutrients in the body. The following are the nutritional challenges and most of them were detected by diet surveys:

1. Protein energy malnutrition (PEM)
   - Low birth weight (LBW)
   - Chronic energy deficiency (CED)
   - High fat, salt and sugar

2. Micronutrient deficiencies (MND)
   - Vitamin A deficiency (VAD)
   - Iron deficiency anemia (IDA)
   - Iodine deficiency disorders (IDD)
   - Zinc deficiency disorders

3. Diet related chronic non-communicable diseases (NCDs)
   - Overweight and obesity
   - Insulin resistance
   - Type 2 Diabetes
   - Cardiovascular diseases (CVD), Cancers etc.
Determinants → Risk Factors → NCD disease outcomes

**Common Risk Factors**
- Modifiable
  - Unhealthy diet
  - Obesity
  - Dyslipidemia
  - Physical inactivity
  - Tobacco/alcohol consumption
- Non-modifiable
  - Age
  - Gender
  - Genetic

**Intermediate Risk Factors**
- High lipids
- High Bld Pressure
- High Bld Glucose
- Overweight/Obesity

**NCD disease outcomes**
- CVD/Stroke
- Diabetes
- Chronic Resp. Dis.
- Cancers

**Early Treatment**

**Promotion**

**Prevention**
Common Risk Factors
- Diet related Non-communicable diseases

<table>
<thead>
<tr>
<th>Noncommunicable Diseases</th>
<th>Tobacco Use</th>
<th>Unhealthy diets</th>
<th>Physical Inactivity</th>
<th>Harmful Use of Alcohol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiovascular</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>Diabetes</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>Cancer</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>Chronic Respiratory</td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Regardless of who the Father of a disease is, Surely its Mother is IMPROPER DIET

Old Chinese Proverb
Nutrition Transition

- Changes have been observed in the intake of legumes, vegetables, milk, salt, sugar, fats and oils, especially **animal fats**.
- Substitution of millets by more prestigious and often highly polished **cereals** such as rice.
- Reduction in overall **cereal intakes** over a period of time.
- Changes observed in **dietary fat** (n6/n3 ratio) due to higher intake of **cheap commercial vegetable oils** (n6 fatty acids).
- Low fruit and vegetable intake in rural communities.
- Increased intake of **sugar and sweets beverages** in semi-urban and urban areas.
- A significant reduction of physical activities further aggravating problem of obesity, diabetes, CVD.
- With the given context, a special analysis for ‘**Time trends in consumption of fats and oils among different population groups in India**’ was carried out by using the NNMB database (www.nnmbindia.org).
Under the aegis of Indian Council of Medical Research, **National Nutrition Monitoring Bureau (NNMB)** was established in 1972 in 10 major States, subsequently it was extended to 6 more states/UTs in 2012 (16 NMMB state units)

**NNMB OBJECTIVES**

1. To collect diet and nutritional status, on regular a basis among various population groups by using a standard and uniform methodology, and

2. To evaluate ongoing National Nutrition intervention programs, to identify its strengths and weaknesses and recommend for mid-course corrections, if needed.
ORGANIZATIONAL STRUCTURE OF NNMB

ICMR

STEERING COMMITTEE

NIN - CRL

16 State Units

STAFF / UNIT
Medical Officer (ARS/Scientist B)
Nutritionist (Research Assistant)
Social Worker (Research Assistant)
Lab. Technician (added later)
Field Attendant
Driver and Vehicle
The results of all these studies have been published as NNMB Technical Reports (1-26) and Research papers. All are hosted on the NNMB website (www.nnmbindia.org).
The Bureau, since its inception, has been carrying out diet and nutrition surveys and repeat surveys (village cohorts) in rural (1975-97, 1980-90, 1996-97, and 2011-12), tribal (1985-87, 1998-99, and 2008-09), urban populations as well as special surveys like micronutrient deficiency (MND), NSSO and NCAER linked surveys.
NNMB SAMPLING PROCEDURE FOR RURAL AND TRIBAL REPEAT SURVEYS

• In each State, 120 villages were surveyed.

• Out of 120 villages, 90 villages were selected from the list of villages, which were already covered in the previous rounds.

• The rest of 30 villages were covered new villages randomly selected from the list of villages available from the Census India, to assess current as well as trends in diet and nutritional status.

• These repeat surveys have been carrying out in 10 major states (representing 86% population of India).

• Investigations carried out:
  - Anthropometry
  - Biochemical
  - Clinical examination
  - 24 hour dietary recall & weighment

• Diet surveys: All age groups were covered: Preschool, school age, adolescents, adults, elderly and all physiological (children, pregnant women & lactating mothers, NPNL women) and activity (sedentary, moderate, heavy activity) groups
All the proposed investigations were covered among the available individuals in all the selected HHs
For the proposed analysis, the dietary data schedules collected by National Nutrition Monitoring Bureau (NNMB) from all the 16 major states was scrutinized.

The dietary data was re-coded recipe wise, the data was re-entered into Ms excel sheets and the master dietary consumption database for all the NNMB states was prepared.

Information on socio-economic and demographic particulars of the individuals, food consumption, including fat, sugar and salt intake was included in the data base.

Mean, median and frequency of consumption of fat, sugar and salt was presented.
RESULTS

FAT CONSUMPTION AND TIME TRENDS DATA
Mean household consumption of fat (g/CU/day) among Tribal population by time trends
TIME TRENDS IN THE CONSUMPTION OF VISIBLE FATS (g/CU/day) AMONG RURAL POPULATION

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Kerala</td>
<td>4</td>
<td>8</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Tamil Nadu</td>
<td>12</td>
<td>10</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>Karnataka</td>
<td>16</td>
<td>13</td>
<td>18</td>
<td>17</td>
</tr>
<tr>
<td>Andhra Pradesh</td>
<td>14</td>
<td>12</td>
<td>19</td>
<td>17</td>
</tr>
<tr>
<td>Maharastra</td>
<td>19</td>
<td>16</td>
<td>19</td>
<td>17</td>
</tr>
<tr>
<td>Gujarat</td>
<td>24</td>
<td>19</td>
<td>21</td>
<td>17</td>
</tr>
</tbody>
</table>
average consumption of Visible Fat (g/day) among urban population in 7 metro cities of India
Average intake of Visible Fat (g/day) by Community

- Others: 34.7 g/day
- ST: 34.5 g/day
- SC: 33.2 g/day
- BC: 27.4 g/day
Average intake of Visible Fat (g/day) by Occupation

- Business: 39.7 g/day
- Professional: 37.3 g/day
- Service: 36.3 g/day
- Labour: 35.6 g/day
- Housewives: 34.0 g/day
- Auto/Taxi driver: 33.7 g/day
- Other Occupations: 30.8 g/day
- Dependents: 27.9 g/day
Average intake of Visible Fat (g/day) by Income Groups

- High Income Group: 36.2
- Middle Income Group: 33.3
- Low Income Group: 30.1
Average intake of Visible Fat through different Recipe Groups
Average intake of Visible fat by level of Education

- Liiterates: 28.1
- 1st - 4th Standard: 28.5
- 5th - 8th Standard: 34
- 9th - 12th Standard: 35.2
- College & above: 35
### Association between levels of energy derived from fat and prevalence of hypertension among rural men and women in 10 states in India

<table>
<thead>
<tr>
<th>Gender</th>
<th>variable</th>
<th>N</th>
<th>% Energy consumed from dietary fat</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>&lt;15E%</td>
<td>15-20E%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Men</strong></td>
<td>Normotensives</td>
<td>8151</td>
<td>80.0</td>
<td>77.7</td>
</tr>
<tr>
<td></td>
<td>Hypertensives</td>
<td>2235</td>
<td>20.0</td>
<td>22.3</td>
</tr>
<tr>
<td><strong>Women</strong></td>
<td>Normotensives</td>
<td>10495</td>
<td>79.1</td>
<td>78.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hypertensives</td>
<td>2812</td>
<td>20.9</td>
<td>20</td>
</tr>
</tbody>
</table>

**Hypertension**

<table>
<thead>
<tr>
<th>Gender</th>
<th>variable</th>
<th>N</th>
<th>% Energy consumed from dietary fat</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>&lt;15E%</td>
<td>15-20E%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Men</strong></td>
<td>CED (BMI &lt;18.5)</td>
<td>3570</td>
<td>36.3</td>
<td>34.3</td>
</tr>
<tr>
<td></td>
<td>Normal</td>
<td>5711</td>
<td>55.4</td>
<td>53.5</td>
</tr>
<tr>
<td></td>
<td>BMI 18.5-&lt;25.0</td>
<td>1066</td>
<td>8.4</td>
<td>12.2</td>
</tr>
<tr>
<td></td>
<td>Overweight/Obesity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(BMI≥25)</td>
<td>1957</td>
<td>11.9</td>
<td>17.5</td>
</tr>
<tr>
<td><strong>Women</strong></td>
<td>CED (BMI &lt;18.5)</td>
<td>4585</td>
<td>37.8</td>
<td>30.8</td>
</tr>
<tr>
<td></td>
<td>Normal</td>
<td>6710</td>
<td>50.3</td>
<td>51.7</td>
</tr>
<tr>
<td></td>
<td>BMI 18.5-&lt;25.0</td>
<td>1957</td>
<td>11.9</td>
<td>17.5</td>
</tr>
</tbody>
</table>
Association between levels of energy derived from fat and prevalence of hypertension among rural men and women in 9 states in India

<table>
<thead>
<tr>
<th>Gender</th>
<th>variable</th>
<th>N</th>
<th>% Energy consumed from dietary fat</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>&lt;15E%</td>
<td>15-20E%</td>
</tr>
<tr>
<td>Men</td>
<td>Abdominal Obesity</td>
<td>8931</td>
<td>89.0</td>
<td>83.6</td>
</tr>
<tr>
<td></td>
<td>Normal</td>
<td>1440</td>
<td>11.0</td>
<td>16.4</td>
</tr>
<tr>
<td>Women</td>
<td>Abdominal Obesity</td>
<td>10194</td>
<td>79.9</td>
<td>73.6</td>
</tr>
<tr>
<td></td>
<td>Normal</td>
<td>3093</td>
<td>20.1</td>
<td>26.4</td>
</tr>
<tr>
<td></td>
<td>Abdominal Obesity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>Central Obesity</td>
<td>5016</td>
<td>48.8</td>
<td>50.4</td>
</tr>
<tr>
<td></td>
<td>Normal</td>
<td>5355</td>
<td>51.2</td>
<td>49.6</td>
</tr>
<tr>
<td>Women</td>
<td>Central Obesity</td>
<td>4851</td>
<td>35.4</td>
<td>38.2</td>
</tr>
<tr>
<td></td>
<td>Normal</td>
<td>8433</td>
<td>64.6</td>
<td>61.8</td>
</tr>
</tbody>
</table>
RESULTS

SUGAR CONSUMPTION AND TIME TRENDS DATA
Average intake of added Sugar (g/day) in metro cities of India

- Mumbai: 26.3
- Ahmedabad: 25.9
- Delhi: 23.2
- Bengaluru: 19.3
- Kolkata: 17.1
- Chennai: 16.1
- Hyderabad: 15.5
- Cities: 15.5
- Pooled: 19.5

NNMB Urban study 2015-16
Percentage of Energy through Added Sugar to the total Energy

- Mumbai: 6.6
- Delhi: 6.1
- Ahmedabad: 5.9
- Hyderabad: 5.4
- Bengaluru: 4.1
- Chennai: 3.9
- Kolkata: 3.5
- Pooled: 5.1

NNMB Urban study 2015-16
Average Intake of Sugar in Metro Cities in India by Gender

NNMB Urban study 2015-16
Average intake of added Sugar (g/day) among urban population in different age groups

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Average Intake (g/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>36-59 Yrs</td>
<td>20.5</td>
</tr>
<tr>
<td>≥ 60 Yrs</td>
<td>20.3</td>
</tr>
<tr>
<td>12-17 Yrs</td>
<td>19.9</td>
</tr>
<tr>
<td>18-35 Yrs</td>
<td>19.4</td>
</tr>
<tr>
<td>5-11 Yrs</td>
<td>17.6</td>
</tr>
<tr>
<td>0-4 Yrs</td>
<td>15.6</td>
</tr>
</tbody>
</table>

NNMB Urban study 2015-16
Average intake of Sugar (g/day) among urban population by Literacy Status

- **5th – 8th Standard**: 20.6
- **Read & Write**: 20
- **9th – 12th Standard**: 20
- **Illiterate**: 19.3
- **1st – 4th Standard**: 18.6
- **College**: 18.3

NNMB Urban study 2015-16
Average intake of Sugar (g/day) among urban population by Occupation Groups

- Housewives: 21.3
- Service: 19.9
- Business: 19.2
- Dependents: 18.4
- Labour: 18.3
- Other Occupations: 17.6
- Auto/Taxi driver: 17.5
- Professional: 15.4

NNMB Urban study 2015-16
Average intake of Sugar (g/day) among urban population by Income Groups

- Low Income: 19.4 g/day
- Middle Income: 19 g/day
- High Income: 18.8 g/day
Average intake of added sugar among urban population of Metro cities of India by type of Diet

- Vegetarian
- Non-Vegetarian

<table>
<thead>
<tr>
<th>City</th>
<th>Vegetarian</th>
<th>Non-Vegetarian</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kolkata</td>
<td>30.6</td>
<td>17.1</td>
</tr>
<tr>
<td>Ahmedabad</td>
<td>28.4</td>
<td>27.1</td>
</tr>
<tr>
<td>Mumbai</td>
<td>23.7</td>
<td>27</td>
</tr>
<tr>
<td>Delhi</td>
<td>23.4</td>
<td>22.5</td>
</tr>
<tr>
<td>Bengaluru</td>
<td>19.9</td>
<td>21.7</td>
</tr>
<tr>
<td>Chennai</td>
<td>19.4</td>
<td>15.9</td>
</tr>
<tr>
<td>Hyderabad</td>
<td>15.7</td>
<td>14.2</td>
</tr>
<tr>
<td>Pooled</td>
<td>18.2</td>
<td></td>
</tr>
</tbody>
</table>
Average intake of Sugar (g) through different recipes

- Sweets: 21 g
- Carbonated Beverages: 17.2 g
- Fruit based: 13.1 g
- Processed fruit juices: 12 g
- Milk based: 11.6 g
- Cereals & Millet: 9.9 g
- Sugar & Jaggery: 8.9 g
- Chocolates: 6.5 g
- Namkeen: 6 g
- Tiffins and snacks: 5.3 g
- Other vegetables: 4.6 g
- Pulses Based Recipes: 4.4 g
- Nuts & Oils seeds: 3.8 g
- Biscuits: 3.8 g
- Leafy vegetables: 3.3 g
- Bakery: 3.2 g
- Kids Food: 3 g
- Condiments & Spices: 2.7 g
- Roots and Tubers: 2.2 g
- Chats Based: 1.6 g
RESULTS

SALT CONSUMPTION DATA
Salt (NaCl) consumption was maximum in the state of Odisha (9.1g/CU/day), followed by Karnataka (7.6g/CU/day) and Uttar Pradesh (6.8g/CU/day), while it was minimum in the state of MP (2.5g/CU/day).

Half of the population (53.2%) was consuming salt <5g/CU/day as suggested by the WHO. However, the proportion of population consuming salt 7-10g/CU/day was maximum in the state of Odisha (30.6%) and Karnataka (26.6%).
Mean Consumption of Salt and Sodium (Na) through Dietary consumption and invisible salt in the foods in Hyderabad, Vijayawada & Guwahati cities

<table>
<thead>
<tr>
<th>State &amp; City</th>
<th>N</th>
<th>Salt (NaCl) (g)</th>
<th>Mean Sodium (Na) through added salt (mg)</th>
<th>Mean Na Through food (mg)</th>
<th>Total Na through added salt and food (invisible)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telangana-Hyderabad</td>
<td>160</td>
<td>8.4</td>
<td>3276</td>
<td>0.51</td>
<td>3276.51</td>
</tr>
<tr>
<td>Andhra Pradesh-Vijayawada</td>
<td>67</td>
<td>7.2</td>
<td>2808</td>
<td>0.49</td>
<td>2808.49</td>
</tr>
<tr>
<td>Assam - Guwahati</td>
<td>40</td>
<td>12.8</td>
<td>4992</td>
<td>0.77</td>
<td>4992.77</td>
</tr>
<tr>
<td>Total</td>
<td>267</td>
<td>8.8</td>
<td>3416</td>
<td>0.54</td>
<td>3416.54</td>
</tr>
</tbody>
</table>

Mean salt (NaCl) intake through diet was maximum in the city of Guwahati (12.8g/person/day), followed by Hyderabad (8.4g/day) and Vijayawada (7.2g/day).

- The mean excretion of sodium (Na) in the spot urine samples was 3.4g/day.
- It was ranged from a low 2.8g/day in Vijayawada to a high 5.0g in Guwahati city and Hyderabad (3.3g/day).
Mean household consumption of Salt (g/CU/day) among Rural population by time trends
CONCLUSION

• The average daily intake of visible fat among urban population in 7 metro cities was 33g/day, which was higher than the recommended levels of ICMR (20g/CU/day).

• Overall, 18% of the total energy intake was obtained from visible fats.

• In general, adults and elderly people consumed more visible fat than of the other age groups.

• The intake of visible fat was highest in the urban population belonging to ‘other forward communities’ (34.7g) and surprisingly by scheduled tribes (34.5g), who migrated to urban towns.

• The overall consumption of visible fat was higher in the literate population than the illiterates.

• The intake of visible fat was found to be higher among individuals engaged in business (39.7g), professionals (37.3g) and service men (36.3g) and low among housewives (34g/day).

• The highest consumption of visible fat was observed among high income group (36.2g), followed by middle income (33.3g) and lower income groups (30.1g).
CONCLUSION

• The total sugar consumption levels were within the suggested levels of ICMR (30g/CU/day).

• The population of Mumbai (26.3g/day) and Ahmedabad cities (25.9g/day) were consuming more added sugar than the other 5 cities.

• Overall, the percent (%) of energy from added sugar, to the total energy was about 5%.

• Older adults (35-59years) and elderly urban population were consuming more added sugars compared to other age groups.

• The intake of added sugar was high in the low educated population than in the higher educated population.

• It was surprising to find that intake of added sugar was higher among laborers (18.3g) compared to professionals.

• The intake of sugar was high from the recipes such as wheat gruel, rice/corn flakes with milk and oats with milk.

• More amounts of sugar was consumed along with masala Tea/Tea, Coffee, Milk Shakes, Lassi etc. were consumed with.
CONCLUSION

• The maximum salt consumption was observed in the state of Orissa (18.3 g/CU/day, followed by Karnataka (11.3 g/CU/day) and Tamil Nadu (10.5 g/CU/day), whereas the minimum was observed in the state of Maharashtra (7 g/CU/day) during 1996-97.

• The Salt consumption was maximum in Orissa (9.1g/CU/day), whereas it was minimum in West Bengal (3.8 g/CU/day) during 2011-12.

• The proportion of population consuming 7-10 g/CU salt per day was maximum in the state of Orissa (30.6%) followed by Karnataka (26.6%) and the minimum was observed in Madhya Pradesh (0.4%).

• The proportion of population consuming >10 g/CU salt per day was maximum in the state of Orissa (35.5%) followed by Karnataka (22.2%).

• Overall, mean Salt consumption was high (10.8 g/CU/day) during 1996-97 and low (5.6 g/CU/day) during 2011-12.

• FSSAI/NIN – RECOMMENDATION

• THODA KAM FAT, SUGAR AND SALT
TAKEHOME MESSAGE

- Fats
- Sugars
- Salt
- Fruit and vegetables
- Dietary Fibre
- Physical activity
- Drink plenty of water
WISH YOU HEALTHY LIFE

THANK YOU

Journey has just begun.
Miles to go...