World Foods Conferences 1974
* Food production and consumption trends
* Global Situation
  - Poverty
  - Undernutrition
  - Micronutrient Deficiencies
  - Over-nutrition and Chronic Diseases
* Economic costs of malnutrition
* Food production and consumption trends
* Food-based strategies towards Nutrition & Health

Outline

- Global commitment in food and nutrition
- Global Situation
  - Poverty
  - Undernutrition
  - Micronutrient Deficiencies
  - Over-nutrition and Chronic Diseases
- Economic costs of malnutrition
- Food production and consumption trends
- Food-based strategies towards Nutrition & Health

Millennium Development Goals

1. Eradicate extreme poverty and hunger
2. Achieve universal primary education
3. Promote gender equality and empower women
4. Reduce child mortality
5. Improve maternal health
6. Combat HIV/AIDS, malaria, other diseases
7. Ensure environmental sustainability
8. Global partnership for development

Millennium Summit, Sep. 2000

Global population will continue to rise

The number of poor continues to grow

<table>
<thead>
<tr>
<th>Region</th>
<th>1997</th>
<th>1990</th>
<th>1980</th>
</tr>
</thead>
<tbody>
<tr>
<td>East Asia</td>
<td>100</td>
<td>120</td>
<td>140</td>
</tr>
<tr>
<td>Latin America</td>
<td>130</td>
<td>150</td>
<td>170</td>
</tr>
<tr>
<td>Middle East</td>
<td>110</td>
<td>130</td>
<td>150</td>
</tr>
<tr>
<td>South Asia</td>
<td>90</td>
<td>110</td>
<td>130</td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>110</td>
<td>130</td>
<td>150</td>
</tr>
<tr>
<td>Total</td>
<td>570</td>
<td>630</td>
<td>700</td>
</tr>
</tbody>
</table>
Growing disparities in incomes among regions (per capita income in constant international dollars)

The rich get richer while the poor remain the same

Nutrition: a Lifecourse approach

Prevent Premature Death
Diet Related Chronic Disease
Cardiovascular(CHD, Stroke)
Obesity, Diabetes,
Dyslipidemia
Cancer, Osteoporosis, Aging

Prevent Disability
Physical/Mental

Infection/diarrhea
Stunting
Micronutrient deficiency

Years of Life

Nutrition: a Lifecourse approach

Prevent Child Deaths
LBW / PEM / Stunting

Preventing Disability
Physical/Mental

Child mortality by region


Top five child killers
Causes of under-5 mortality
Percentages 1998

Prevent Child Deaths

Prevent Disability
Physical/Mental

Prevent Premature Death
Diet Related Chronic Disease
Cardiovascular(CHD, Stroke)
Obesity, Diabetes,
Dyslipidemia
Cancer, Osteoporosis, Aging

Prevent Child Deaths
LBW / PEM / Stunting
Infection/diarrhea
Stunting
Micronutrient deficiency

Preventing Disability
Physical/Mental

Child mortality by region


Top five child killers
Causes of under-5 mortality
Percentages 1998

Other 23%
Malaria 7%
Vaccine-preventable diseases 15%
Respiratory Infections 18%
Diarrhoeal diseases 17%
Perinatal Conditions 20%

Selected major risks to health: Childhood and maternal undernutrition

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Measured adverse outcomes (of exposure)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>Mortality and acute morbidity from infectious diarrhoea, malaria, measles, pneumonia and other infectious diseases, Perinatal conditions from maternal underweight</td>
</tr>
<tr>
<td>Iron deficiency</td>
<td>Anaemia, maternal and perinatal causes of death</td>
</tr>
<tr>
<td>Vitamin A deficiency</td>
<td>Diarrhoea, malaria, maternal mortality, vitamin A deficiency disease</td>
</tr>
<tr>
<td>Zinc deficiency</td>
<td>Diarrhoea, pneumonia, malaria</td>
</tr>
</tbody>
</table>


Despite Gains, Millions Go Hungry

HEALTH/FUNCTIONAL CONSEQUENCES

Deficiencies

<table>
<thead>
<tr>
<th></th>
<th>Iodine</th>
<th>Iron</th>
<th>Vit. A</th>
<th>Zinc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pregnancy outcome</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Growth</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Cognition</td>
<td>✗</td>
<td>✗</td>
<td>?</td>
<td>✗</td>
</tr>
<tr>
<td>Vision</td>
<td>?</td>
<td>?</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Immunity</td>
<td>?</td>
<td>?</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Work Capacity</td>
<td>?</td>
<td>✗</td>
<td>?</td>
<td>?</td>
</tr>
</tbody>
</table>

Irreversibility

Shrimpton et. al. 2001

Micronutrient Malnutrition

- Iron
- Iodine
- Vitamin A
- Zinc

Progress in combating malnutrition has been slow

Malnutrition declines at a rate of 4 million per year 1991-99

If malnutrition declines at rate of 22 million per year 2001-15

CHRONIC DISEASES ARE THE MAJOR CAUSE OF DEATH IN ALMOST ALL COUNTRIES

Projected global deaths by cause, all ages, 2005

60% of all deaths are due to chronic diseases

Diabetes mellitus, regional estimates, 1995-2025

NCD prevention: a Life Course Approach


% Prevalence of Overweight and Obesity in 5-17 yrs old

Examples of trends

• More use of restaurants and fast food stores
• Increasingly replacing fruits and vegetables
• Larger portions of food at lower prices
• Frequent and widespread food purchasing ties
• Multiple TV channels around the clock
• Fall in opportunities for physical activity
• Increase in use of motorised transport, school
• Increase in hazards for walkers and cyclists
• Pull in opportunities for physical activity
• Increased sedentary recreation
• Multiple TV channels around the clock
• Quantities and variety of energy dense foods
• Frequent and widespread food purchasing ties
• Larger portions of food at lower prices
• Processed snacks (sweet, salty and/or fatty) increasingly replacing fruits and vegetables
• Use of sugary soft drinks to replace water
• More use of restaurants and fast food stores
The economic costs of undernutrition are high: productivity losses

<table>
<thead>
<tr>
<th>Malnutrition Type</th>
<th>% Loss in GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein-energy malnutrition (moderate stunting)</td>
<td>6</td>
</tr>
<tr>
<td>Iron deficiency (heavy labor)</td>
<td>10</td>
</tr>
<tr>
<td>Iron deficiency (blue-collar labor)</td>
<td>17</td>
</tr>
<tr>
<td>Iodine deficiency</td>
<td>5</td>
</tr>
</tbody>
</table>

Current losses in productivity (manual labor) vs Losses based on childhood malnutrition (cognitive).

As are the economic costs of diet-related chronic disease

China’s economic cost of diet-related chronic disease is 2.4 percent of GDP

Note: GDP loss likely to be much higher when taking into account morbidity.

Food production has increased but distribution is unequal

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>Vegetable</th>
<th>Animal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1967-69</td>
<td>2059</td>
<td>1898</td>
<td>161</td>
</tr>
<tr>
<td>1987-89</td>
<td>3287</td>
<td>2567</td>
<td>786</td>
</tr>
<tr>
<td>1997-98</td>
<td>3383</td>
<td>2333</td>
<td>950</td>
</tr>
</tbody>
</table>

The world has been able to increase per capita food availability for the last 4 decades

<table>
<thead>
<tr>
<th>Year</th>
<th>Available Energy (Kcal per person)</th>
<th>Available Protein (grams per person)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960</td>
<td>2000</td>
<td>50</td>
</tr>
<tr>
<td>1970</td>
<td>2200</td>
<td>55</td>
</tr>
<tr>
<td>1980</td>
<td>2400</td>
<td>60</td>
</tr>
<tr>
<td>1990</td>
<td>2600</td>
<td>65</td>
</tr>
<tr>
<td>2000</td>
<td>2800</td>
<td>70</td>
</tr>
</tbody>
</table>

The energy expenditure is determined by the dietary practice, activity practice, and household food availability. The underlying cause of the economic loss is the basic cause of the food production.
**Hunger is not due to lack of food: The world produces enough calories & protein:**

*Those that need less get more while The poor that have greater needs get less***

---

### Farm Production

<table>
<thead>
<tr>
<th>Region</th>
<th>Meat kg/caput/day</th>
<th>Milk kg/caput/day</th>
<th>Fish kg/caput/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>11.4</td>
<td>27.5</td>
<td>8.0</td>
</tr>
<tr>
<td>East and South Asia</td>
<td>41.1</td>
<td>93.9</td>
<td>8.6</td>
</tr>
<tr>
<td>West Asia</td>
<td>19.6</td>
<td>60.7</td>
<td>4.4</td>
</tr>
<tr>
<td>Latin America</td>
<td>15.1</td>
<td>20.7</td>
<td>9.4</td>
</tr>
<tr>
<td>Developing countries</td>
<td>17.1</td>
<td>36.6</td>
<td>8.8</td>
</tr>
<tr>
<td>Developed countries</td>
<td>81.6</td>
<td>200.0</td>
<td>26.8</td>
</tr>
</tbody>
</table>

---

### Overfishing: Some Fish Stocks Have Collapsed

- Atlantic cod
- Haddock
- Red halibut
- Atlantic cod

---

### Changes in dietary fat sources during Evolution

- **Hunter-Gatherer**
- **Agricultural**
- **Industrial**

---

**Farmed Fish Are a Growing Share of the Global Fish Harvest**

- Total Capture
- Total Aquaculture

---

**Overfeeding Needs in Diet Composition**

- Protein
- Fat
- Carbohydrates
- Other nutrients
### Grams of fat /caput/day

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>World</td>
<td>52.5</td>
<td>57.15</td>
<td>46.6</td>
<td>73.57</td>
<td>24.77</td>
</tr>
<tr>
<td>North Africa</td>
<td>43.97</td>
<td>58.43</td>
<td>25.22</td>
<td>63.93</td>
<td>38.83</td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>41.47</td>
<td>41.03</td>
<td>41.32</td>
<td>44.67</td>
<td>3.27</td>
</tr>
<tr>
<td>East &amp; South-east Asia</td>
<td>27.77</td>
<td>32.27</td>
<td>43.9</td>
<td>51.93</td>
<td>26.03</td>
</tr>
<tr>
<td>South Asia</td>
<td>28.07</td>
<td>31.37</td>
<td>38.86</td>
<td>45.53</td>
<td>13.33</td>
</tr>
<tr>
<td>China</td>
<td>23.23</td>
<td>27.13</td>
<td>47.53</td>
<td>78.50</td>
<td>-61.30</td>
</tr>
<tr>
<td>Near East</td>
<td>51.20</td>
<td>62.10</td>
<td>73.50</td>
<td>80.63</td>
<td>26.27</td>
</tr>
<tr>
<td>Eastern Europe</td>
<td>90.47</td>
<td>110.53</td>
<td>116.0</td>
<td>104.67</td>
<td>24.17</td>
</tr>
<tr>
<td>European Union</td>
<td>117.2</td>
<td>127.93</td>
<td>142.3</td>
<td>149.03</td>
<td>41.13</td>
</tr>
<tr>
<td>Latin Amer &amp; Caribbean</td>
<td>54.0</td>
<td>64.87</td>
<td>73.40</td>
<td>80.63</td>
<td>30.93</td>
</tr>
<tr>
<td>North America</td>
<td>116.90</td>
<td>124.93</td>
<td>138.30</td>
<td>143.00</td>
<td>33.10</td>
</tr>
</tbody>
</table>
| Oceania               | 101.57  | 101.97  | 112.83  | 110.67  | 12.47                       

### Quality of Fats in Modern Nutrition

- Saturated fats (C12:0, C14:0, C16:0, C18:0)
- Trans fatty acids (hydrogenated fats)
- Monounsaturated fatty acids (18:1)
- Sats / MUFA / PUFA
- Cholesterol
- Essential fatty acids ω-3 and ω-6
- Long Chain PUFAs (AA,EPA,DHA)
- Energy Density of diet (fats and carbohydrates)

### Food-based approaches

- Food-based dietary guidelines
- Food guides for general populations, pregnant women, infants and young children (several countries)
- Nutrition labeling (where processed foods are commonly consumed)

### Principal nutrient/food changes

**Reduce**
- Total fat
- Saturated Fats (C14,C16)
- Trans fatty acids
- Free sugars
- Refined starches
- Sodium/salt
- Preserved meats

**Increase**
- Vegetables,
- Fruits, legumes
- Fibre/HSP
- ω-3 fatty ac (LNA,EPA,DHA)
- Iron/iodine
- Zinc/folate?
- PHYSICAL ACTIVITY
• Home gardening (several countries)
• Self-sufficient economy (Integrated food production for food security – Thailand)

Countries initiating action plans – 2005/6
Countries targeted initially by WHO: now all visited
• WPRO: Malaysia*, Singapore*, China (Hong Kong*), Pacific Islands*
• SEARO: India*, Thailand*
• EMRO: Pakistan*
• PAHO: Brazil*, Canada (Quebec), US, Caribbean
• EURO: Major developments in association with WHO Euro-52 Ministries’ Conference in Istanbul 15-17th Nov 2006

Distribution channels
Price Levels and variability
Employment and wages
Nutrition status of individuals

Adapted from Weiner 2003
Promising: quality foods

* Biodiversity
* Innovative techniques
  - Plant breeding (GMO, conventional)
  - Nutrient dense crops
  - Animal husbandry
  - Aquaculture

FOOD PRODUCTION, NUTRITION AND HEALTH
Emorn Wasantwisut,
Institute of Nutrition, Mahidol University, Thailand