Reproductive and Maternal health: Nutritional Deficiencies

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5th September 2017
What happens to the food that we eat?...

1. Ingestion
2. Digestion
3. Absorption
4. Assimilation
5. Egestion

<table>
<thead>
<tr>
<th>Nutrients</th>
<th>Energy yielded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbohydrates</td>
<td>4 kcal/g</td>
</tr>
<tr>
<td>Proteins</td>
<td>4 kcal/g</td>
</tr>
<tr>
<td>Alcohol</td>
<td>7 kcal/g</td>
</tr>
<tr>
<td>Fats</td>
<td>9 kcal/g</td>
</tr>
<tr>
<td>Vitamins, minerals, and water</td>
<td>-</td>
</tr>
</tbody>
</table>

Digestion

- Bread
- Meat
- Margarine

Glucose
Amino Acids
Fatty Acids
Basic overview of Energy and human life

Chemical energy
- Carbohydrates
- Fats
- Others

ATP
- body's "energy currency"

Chemical waste
- Carbon dioxide
- Water

Heat

metabolism
Why special needs?
Total energy expenditure for an average young adult woman and man

- Basal metabolic rate
- Energy expended breaking down food
- Energy expended from physical activity

WOMAN

MAN

15 MJ/day
(About 3,500 calories)

SOURCE: Adapted from Frontiers in Physiology (2013)

<table>
<thead>
<tr>
<th>ENERGY EXPENDITURE</th>
<th>Basal Metabolism</th>
<th>Physical Activity</th>
<th>Eating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breathing</td>
<td>Walking</td>
<td>Chewing</td>
<td></td>
</tr>
<tr>
<td>Organ function</td>
<td>Running</td>
<td>Swallowing</td>
<td></td>
</tr>
<tr>
<td>New cell formation</td>
<td>Tennis</td>
<td>Stomach contractions</td>
<td></td>
</tr>
<tr>
<td>Circulation</td>
<td>Bowling</td>
<td>Digestive juices</td>
<td></td>
</tr>
<tr>
<td>Thinking</td>
<td>Fidgeting</td>
<td>Absorption</td>
<td></td>
</tr>
<tr>
<td>Maintaining body temp</td>
<td>Calisthenics</td>
<td>Elimination</td>
<td></td>
</tr>
<tr>
<td>All basic body functions</td>
<td>Any physical movement</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
BASAL METABOLIC RATE IN PREGNANCY

OXYGEN CONSUMPTION (ml/min/24h)

WEEKS GESTATION

0  20  24  28  32  36  38
Compare carbohydrate, fats and proteins in terms of energy storage.

<table>
<thead>
<tr>
<th>Energy /100g</th>
<th>Carbohydrates</th>
<th>Fats</th>
<th>Proteins</th>
</tr>
</thead>
<tbody>
<tr>
<td>kJ</td>
<td>1,760</td>
<td>4,000</td>
<td>1,720</td>
</tr>
<tr>
<td>kcal (Calories)</td>
<td>421</td>
<td>956</td>
<td>411</td>
</tr>
</tbody>
</table>

Carbohydrates are broken down into monosaccharides (sugars) during digestion, absorbed into the blood and assimilated into cells for respiration.

Foods rich in sugars or simple (processed) carbohydrates give a quick release of blood sugar. More complex carbohydrates give a slower, more sustained release of sugars to the blood.
Factors Affecting Nutritional Status

- High illiteracy
- Unemployment/Underemployment
- Large families
- Low purchasing power
- Ignorance
- False food beliefs
- Inadequate intakes
- High dependence rate
- Malnutrition
- Poor utilisation of services
- Improper health services
- Poor PDS
- High cost
- Low availability of foods
- Inadequate production of foodgrains
- Reduced work
- Poor environment
- Morbidity
- Absorption of nutrients
- Low Appetite
- Lack of resources
- Poor infrastructure
- Poor coverage of immunization
Figure 1 Obesity-associated diseases linked to complications of the immune system. CNS, central nervous system.
Three common diseases

- Diabetes
- Hypertension (BP)
- Arthritis
Risks Continued…

- Cardiovascular diseases

Chronic diseases now a leading cause of death in rural India—mortality data from the Andhra Pradesh Rural Health Initiative International Journal of Epidemiology 2006

- Orthopaedic and hepatic problems

- Depression
Tackling the triple burden

• Struggling with problem of Malnutrition- undernutrition
  Undernutrition still kills almost 1.5 million women & children
• Micronutrient deficiency can exaggerate in certain conditions
• Alarming increase in overweight & obesity
  In urban India, more than 23% of women are either overweight or obese, which is higher than the prevalence among men (20%)
• Undernutrition-micronutrient def-obesity (triple burden)
• Hunger and obesity affect same population – Double burden (More than 800 million people go hungry yet half a billion people are obese)
Factors affecting Nutritional status of a woman

• Household income and its utilization
• Quality of the environment
• Number of siblings
• Vulnerability to gender discrimination
• Educational level
• Her activity status & exposure to social stimulation
• Decision making power at the household, etc.
Improve Nutrition Throughout Women's Lives

Addressing the needs of girls and women throughout their lives — the "life cycle approach" — can improve women's nutritional status.

Many nutritional deficits experienced in infancy and childhood have irreversible consequences, so interventions to support adequate nutrition from infancy onward directly benefit women later in life.
Nutrient Requirements

- **Energy**: 2330 Kcal (13-115 yrs.) & 2440 Kcal (16-17 yrs.)
- **Protein**
- **Minerals** – Ca (800 mg);
  Fe (27 mg/dL) 0.5 mg/day lose by way of Menstruation therefore ensure adequate intake of Iron
  Zn (12mg/d) supplements are helpful in treating pubertal delay.
- **Vitamins** – B₁ (1.2mg/d), B₁₂ (0.2-1µg/d)
  B₂ (1.4mg/d),
  Niacin (14mg/d),
  Pyridoxine (2mg/d)
  Vit D for structural growth,
  functional integrity of newly formed cells depends on Vit A (600µg/d Retinol & 4800µg/d ß-Carotene), Vit C & E.
Nutritional Problems

- Obesity
- Anemia
- Under nutrition
- Premenstrual Syndrome
- Eating Disorders (Anorexia Nervosa, Bulimia Nervosa, Binge Eating)
PREVALENCE OF ANAEMIA IN PREGNANT WOMEN

- H.P.: 61%
- M.P.: 79.4%
- A.P.: 82.5%
- BIHAR: 84.1%
- MAHA.: 87.2%
- ASSAM: 91.4%
- RAJ.: 94.9%
- J&K: 96.8%
- POOLED: 84.6%

Vijayaraghavan
PREVALENCE OF ANAEMIA - ADOLESCENT GIRLS

Source: ICMR, 1989
ANAEMIA IN FEMALES

• PREVALENCE OF ANAEMIA IS VERY HIGH IN BOTH THE GROUPS

• NO CHANGE NOTICED OVER TIME IN THE PREVALENCE
Every adolescent girl...

- need access to information and services related to nutrition, reproductive health, family planning, and general health. Programs can reach girls through a variety of avenues, including schools, workplaces and youth-oriented health programs.
- Needs education and literacy to improve nutrition.
- should receive enough food, iron and folate supplements, and iron and iodine-fortified foods.
- Needs to use their knowledge of nutrition when preparing and handling food can also improve their health and that of their families.
- Needs Twice yearly deworming prophylaxis.
- develops life skills to avoid early marriage & early pregnancy is also vital.
Pregnant Mothers

Nutrient Requirements

- Energy: +350Kcal
- Protein: 82.2g/d
- Minerals –
  Ca(1200mg/d);
  Fe(35mg/d);
  Iodine(+25µg);
  zinc(12mg/d)

Vitamins – increased need for Vit D, Vit A, Vit E & Vit K
- Vit C (40mg/d);
- B₁ (+0.2mg/d);
- B₂ (+0.3mg/d);
- B₆ (2mg/d);
- B₁₂ (0.2-1µg/d);
- Niacin (14mg/d);
- Folic Acid (400µg/day)
Micronutrient Deficiencies

- **Iron**: Anemia is responsible for about 35% of preventable LBW. Infants born to anemic mothers are at greater risk of low birth weight, premature birth, & impaired cognitive development.

- **Vitamin A**: Low maternal stores of vitamin A compromise children's stores of vitamin A, putting those children at greater risk of illness and death.

- **Iodine**: Iodine deficient mothers are more likely to miscarry or have a stillborn child. The physical growth & mental development of the children who do survive is often severely impaired, & children may suffer irreversible mental retardation.

- **Folate and Other B Vitamins**: Folate deficiency at the time of conception can cause neural tube defects in infants, & maternal zinc deficiency is associated with preterm delivery, low birth weight, and increased infant mortality. Other B vitamins, including B6 & B12, are important for ensuring children's healthy neurological development.
Complications

- Anaemia
- Toxaemia or Pregnancy Induced HTN or Eclampsia
- Gestational Diabetes
Nutritional Interventions

• Access to sufficient quality & quantity food
• Regular Consumption of iron & folate supplements when pregnant & for at least 3 months after childbirth
• Regular salt consumption with adequate levels of iodine to prevent foetal brain damage associated with iodine deficiency
• In areas where many women suffer CED and with high incidence of LBW, pregnant and lactating women may need high-energy food supplements.
• Educational programs and public information campaigns
LACTATING MOTHERS

Exclusive breast feeding

• Exclusive breastfeeding during the first six months
• Breastfeeding protects infants and children from illness and helps ensure healthy growth and development,
• Breastfeeding for up to two years can also help mothers keep their iron levels up by delaying the return of menstruation.
• encouraging women to breastfeed their infants immediately after birth and to avoid supplemental feeding for at least the first six months could save the lives of 1.5 million children each year.
## Nutrient Requirements

<table>
<thead>
<tr>
<th></th>
<th>Energy Kcal/d</th>
<th>Protein g/d</th>
<th>Ca mg/d</th>
<th>Fe mg/d</th>
<th>Vit B1 mg/d</th>
<th>Vit B2 mg/d</th>
<th>Niacin mg/d</th>
<th>Vit B6 mg/d</th>
<th>Vit C mg/d</th>
<th>Vit B12 µg/d</th>
<th>Zn mg/d</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-6 m</td>
<td>+600</td>
<td>77.9</td>
<td>1200</td>
<td>25</td>
<td>+0.3</td>
<td>+0.3</td>
<td>+4</td>
<td>2.5</td>
<td>80</td>
<td>1.5</td>
<td>12</td>
</tr>
<tr>
<td>6-12 m</td>
<td>+520</td>
<td>70.2</td>
<td>1200</td>
<td>25</td>
<td>+0.2</td>
<td>+0.2</td>
<td>+3</td>
<td>2.5</td>
<td>80</td>
<td>1.5</td>
<td>12</td>
</tr>
</tbody>
</table>
Old age

- Osteoporosis
- Obesity
- Degenerative diseases like CAD, cancer, diabetes mellitus, hypertension

Nutrition & Bone Health
Improve Women's Status

"The quality of care and feeding offered to children … is critically dependent on women's education, social status, and workload."
—UN Sub-Committee on Nutrition

• Addressing gender inequalities -
• Women who have greater control over household resources tend to be healthier and better nourished — as do their families — because women tend to spend more on the nutrition, health, and well-being of their households
How Women's Nutrition Affects National Economies

• Malnutrition in women leads to economic losses for families, communities, and countries because malnutrition reduces women's ability to work and can create ripple effects that stretch through generations.

• Malnutrition leads to reduced income from malnourished citizens, and face long-term problems related to LBW, including high rates of cardiac disease and diabetes in adults.

• Problems related to anemia, for example, including cognitive impairment in children and low productivity in adults, cost US$5 billion a year in South Asia alone.

• A recent report from Asia shows that malnutrition reduces human productivity by 10 percent to 15 percent and gross domestic product by 5 percent to 10 percent.

• By improving the nutrition of adolescent girls and women, nations can reduce health care costs, increase intellectual capacity, and improve adult productivity.
Programs

1. Integrated Child Development Services Scheme (ICDS) 2 Oct, 1975

Beneficiaries: 1. Children below 6 years
               2. Pregnant and lactating women
               3. Women in the age group of 15-44 years
               4. Adolescent girls in selected blocks

Services:
1. Supplementary nutrition, Vit-A, Iron and Folic Acid,
2. Immunisation,
3. Health check-ups,
4. Referral services,
5. Treatment of minor illnesses,
6. Nutrition and health education to women,
7. Pre-school education of children in the age group of 3-6 years, and
8. Convergence of other supportive services like water supply, sanitation
provides supplementary feeding of about 300 calories and 10 grams of protein to preschool children and about 500 calories and 25 grams of protein to expectant and nursing mothers for six days a week.

3. Applied Nutrition Programs (ANP); 1973
The beneficiaries are children between 2-6 years and pregnant and lactating mothers. Nutrition worth of 25 paise per child per day and 50 paise per woman per day are provided for 52 days in a year. No definite nutrient content has been specified.

4. Nutrition Programme for Adolescent Girls (NPAG) 2002-03
**Target Group:** Adolescent girls (11-19 years) (weight < 35 Kg).
**Services:** (i) 6 kg of free food-grains (wheat/rice/Maize based on habitual consumption pattern of the state) /per month per beneficiary.
(ii) Nutrition and Health Education to the beneficiaries and their families.
5. National Nutritional Anemia Prophylaxis Program (NNAPP); 1970

- the expected and nursing mothers as well as acceptors of family planning - one tablet of iron and folic acid containing 100 mg elementary iron & 0.5 mg of folic acid

- children (1-5 yrs.) - one tablet of iron containing 20 mg elementary iron (60 mg of ferrous sulphate and 0.1 mg of folic acid) daily for a period of 100 days.

6. National Program for Prevention of Blindness due to Vitamin A Deficiency

7. National Iodine Deficiency Disorders Control Program, 1992
FIRST TRIMESTER NUTRITION

**Folic Acid**
Healthy formation of red blood & development of the central nervous system.

![Folic Acid Examples](image)

**Vitamin A**
Keeps you healthy & boosts your immune system to fight off infections.

![Vitamin A Examples](image)

**Ginger**
Is great for nausea & morning sickness.

![Ginger Examples](image)
Nutritional Requirements

- Calories
  - Approximately 77,000 Kcal energy is required per pregnancy if weight gain is supposed to be 12Kg.
  - More than 40,000 Kcal is accounted by protein & fat storage.
  - For this, ICMR (2010) has recommended additional calorie intake as below:

<table>
<thead>
<tr>
<th>Trimester</th>
<th>Additional Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>85Kcal/day</td>
</tr>
<tr>
<td>Second</td>
<td>280Kcal/day</td>
</tr>
<tr>
<td>Third</td>
<td>470Kcal/day</td>
</tr>
</tbody>
</table>
## Zinc

<table>
<thead>
<tr>
<th>RNI for pregnancy</th>
<th>(Requirement increases due to accrual of fetal and maternal tissues)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1(^{st}) trimester</td>
<td>5.5 mg</td>
</tr>
<tr>
<td>2(^{nd}) trimester</td>
<td>7 mg</td>
</tr>
<tr>
<td>3(^{rd}) trimester</td>
<td>10 mg</td>
</tr>
<tr>
<td>Lactation</td>
<td>9.5 mg</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Function</th>
<th>Synthesis of nucleic acids DNA and RNA and important in reproduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inadequate intake</td>
<td>Few case reports severe human zinc deficiency in pregnancy led to major obstetric complication and congenital malformation in fetus</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Diet</th>
<th>Vegetarians may need more zinc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recommended</td>
<td>Zinc supplementation is recommended when iron supplementation &gt; 30 mg/day (IOM, 1991) as large amount iron supplement decrease zinc absorption</td>
</tr>
</tbody>
</table>
Preconception assessment including:

- Nutritional intake (e.g., sufficient intake of folic acid).
- Life style (e.g., drinking and smoking habits).
- Woman’s health status.
- Identify any potential problems (e.g., ectopic pregnancy).
- Identify the woman’s understanding and expectations of conception, pregnancy, and parenthood.
Preconception Care

- Timing
- Mental and physical health
- Genetic counseling
- Dental Health
- Nutrition – Folic acid, 800mg/day during child bearing age to prevent neural defects/anemia.
- Supplements
- When do you stop contraception?
Effects of Malnutrition

- Lasting effects on the growth and functional status
- Under nutrition during childhood leads to stunted growth and reduced production
- Severe PEM is associated with infections and carries high mortality
- Malnutrition accounts for 0.2 million deaths
- 30 percent of newborns have low birth weight
- 52 percent of women and 74 percent of children anaemic.
- Other major nutritional deficiencies
  - Vitamin A deficiency
  - Iodine deficiency
### Burden of NMR and IMR in India

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Births</td>
<td>25 million (M)</td>
<td>3 million</td>
</tr>
<tr>
<td>Prematurity Rate</td>
<td>12 - 15 %</td>
<td></td>
</tr>
<tr>
<td>LBW</td>
<td>25 - 30 %</td>
<td>6 million</td>
</tr>
<tr>
<td>IMR</td>
<td>60 / 1000</td>
<td></td>
</tr>
<tr>
<td>Deaths</td>
<td>1.5 million</td>
<td></td>
</tr>
<tr>
<td>NMR</td>
<td>40 / 1000</td>
<td></td>
</tr>
<tr>
<td>Deaths</td>
<td>1 million</td>
<td></td>
</tr>
<tr>
<td>HMD</td>
<td>2 % of births</td>
<td>500,000</td>
</tr>
</tbody>
</table>
Hidden hunger

• **Nutrient**: Element or compound used in an organism's metabolism or physiology.

• **Micronutrients**: Nutrients needed for life in small quantities.
  – Minerals: Iron, Iodine, Zinc, Cobalt, Chromium, Copper, manganese etc
  – Vitamins: Water soluble and fat soluble

• More than two billion people (i.e. one in three persons worldwide) suffer from micronutrient deficiency.
According to current stats…

1 billion insufficient kcals and nutrients (hunger)

2 billion sufficient kcals, but insufficient nutrients (hidden hunger)

3 billion sufficient kcals and nutrients (healthy)

1.4 billion excess kcals (some with insufficient nutrients) (overweight/obesity)


FAO. 2013. Food Systems for better Nutrition.


Consequences of Hidden Hunger throughout life

- Elderly: Increased morbidity (osteoporosis, mental impairment, etc.), Increased mortality
- Baby: Low birth weight, Higher mortality rate, Impaired mental development, Increased risk of chronic disease
- Adult: Reduced productivity, Poor socioeconomic status, Malnourished
- Pregnant Women: Increased mortality, Increased perinatal complications, Reduced productivity
- Child: Stunted, Reduced mental capacity, Frequent infections, Inadequate growth catch up, Reduced productivity, Higher mortality rate
- Adolescent: Stunted, Reduced mental capacity, Fatigue, Increased vulnerability to infection

Inadequate vitamin and mineral status


Adapted from the United Nations Administrative Committee on Coordination Sub-Committee on Nutrition (ACC/SCN), Fourth Report on the World Nutrition Situation, 2000, Geneva: ACC/SCN in collaboration with IFPRI.
Malnutrition - Embryo / Fetus

- IUGR - leads to Low Birth Weight (LBW)
- IDD - Brain Damage
- Folate deficiency - Neural Tube defects, Still births
- ↑ Infant Mortality Rate
- ↑ Premature deliveries
- ↑ Pregnancy Wastage
- Risk of Metabolic Syndrome
- 1 out of 3 children have some form of malnutrition - many are invisible
INFECTION AND UNDERNUTRITION

….. *a Vicious Cycle*

INFECTION
(water and foodborne)

Reduced Food intake/absorption

Lowered resistance/
Frequent infections

UNDERNUTRITION

Death
Safe water and basic sanitation

- 7.5% deaths are related to water, sanitation, and hygiene
  “Safer Water, better health” (WHO report, 2008)
- Cases reported are gastroenteritis and cholera
- Contaminated water - A matter of ‘serious concern’
- Polluted water claims lives at Bholakpur
Sanitation, water engineering skills and capacity building.

Food Safety

Building awareness to address climate change
On the Flip side: Overnutrition

More common

- In urban areas
- Among the affluent and educated

<table>
<thead>
<tr>
<th>Urban Hyderabad</th>
<th>males</th>
<th>females</th>
</tr>
</thead>
<tbody>
<tr>
<td>overweight</td>
<td>21.8%</td>
<td>27.4%</td>
</tr>
<tr>
<td>obese</td>
<td>2.1%</td>
<td>8.9%</td>
</tr>
</tbody>
</table>

Table: Visweswara Rao et al. (1995)

Major causes

- Increasing urbanization (Urban housing)
- Sedentary lifestyles
- Changing food habits
- Occupational work patterns
- Transport
- New stress of working in Call Centers and IT
- Fast Food
Risks related to obesity

In India, alarming rise of NCDs
- accounting for 53% of the deaths in 2008.
- ICMR India Diabetes (INDIAB) study (2011), with data from three states (Tamil Nadu, Maharashtra and Jharkhand) and one union territory (Chandigarh), representing nearly 18.1% of the nation’s population indicates that around 62.4 and 77.2 million people were diabetic and pre-diabetic in 2012 respectively.

Source: S. Khandelwal and K. S. Reddy *obesity* reviews (2013) **14** (Suppl. 2), 114–125:
Why high Malnutrition

Health Infrastructure
• Non-availability of health services/low inst. delivery
• Immunization / ANC / PNC/ emergency care

Human Resource Constraints
• Absence of community workers/ANMs/Nurses
• Non-access to cheap medicines

Food insecurity
• Food availability
• Nutrient in-take
• Seasonality of food
• Nutrition and health education

Gender
• Early marriage/ pregnancy
• Non-spacing
• Anaemia among women
• Low Birth Weight Babies

Weak public health measures against
• Malaria, Water
• Infections, Diseases
• Diarrhoea, dysentery, fever

Cultural practices
• Breast feeding
• Food consumption during pregnancy
• Unsafe and unclean deliveries
Food Security: All people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life.
Food System

• Food systems are the time from when the food is produced in the field, the processes it goes through, all the way until the food lands on our plate.

• During that time, the food or the products can go through a number of processes – harvesting, transportation, processing – that affects quality of food systems are stretching our natural resources without meeting our nutritional needs.

• Poor families in low-income countries struggle to get their daily bread, maize or rice while marketing and cheap prices push food that is high in fat, sugar and salt.

• Fixing food systems is the key to ending malnutrition.
Food hygiene

A major concern

• 1 in every 10 diseases and 6% of all deaths globally are caused due to lack of Sanitation

In India

• 1.03 crore (10 million) people die annually
• 7.8 lakh (~7.5%) deaths are related to water, sanitation and hygiene as per “Safer Water, better health” (WHO report, 2008)
• Diarrhoeal diseases cause 4.02 lakh deaths
• Antibiotic resistance, drug/pesticide residue
• Implementation of Food Safety and Standards Act 2006
Economic Impact of unsafe food

Individuals
• Medical costs
• Missed work & lost wages
• Travel to get care
• Expenses for care taker
• Chronic disease

Society
• Loss of productivity
• Cost of disease investigation
• Loss of revenue due to business closure and product avoidance
• Chronic disease
HACCP

HACCP stands for ‘Hazard Analysis Critical Control Point’. HACCP is a system which looks for and prevents potential problems before they happen.

HACCP may be used by food companies to make sure they do not break the law by putting consumers at risk when producing food.
Good Practices in Food Chain

- GAPS
- Pesticide use
- Manure use
- Harvesting
- Processing
- Packaging
- Storage
- Transport
- Worker Hygiene

HACCP
- Grading and Sorting Tables
- Elevated auction platforms
- Washing and Disinfection
- Washing of Crates
- Worker Hygiene
- Cold Storage

HACCP
- Grading and Sorting Tables
- Washing and Disinfection
- Worker Hygiene
- Cold Storage

- Consumer Education
- Consumer Awareness

FROM FARM TO FORK
Nutrition Emergencies

WHO assists with projects including:

- A manual that provides an explanation of how-to guide for managing nutritional needs
- A field guide to determine nutrition requirements
- Specific guides for prevention and control
- Guides for feeding infants and young children
- Training modules for humanitarian aid workers
- Guides for caring for the nutritionally vulnerable
- Training modules for management of severe malnutrition
Food Safety Organizations

• The US Food and Drug Administration (FDA)
  • Protects and inspect the food supply

• The Department of Agriculture
  • Protects the meat supply, fish, and unusual species such as snakes, alligators and ostriches
Food Safety Organizations

• The Center for Disease Control (CDC)
• International Food Safety Authorities Network (INFOSAN)
• The Food and Agriculture Organization of the United Nations (FAO)
  • Poor sanitation and lack of clean drinking water
Nutritional Support Programs

• Supplying monetary funds
• Global Alliance for Improved Nutrition (GAIN)
• The International Micronutrient Malnutrition Prevention and Control Program (IMMpaCT)
• Woman, Infants and Children (WIC)
• Food and Nutrition Service of the US Department of Agriculture
Improve women’s health – improve the world.

We have a collective responsibility to make a difference.
Food is essential for life

“What is amazing is the quiet acceptance of the consistent deprivations”
- Amartya Sen