Achieving Global Nutrition Security and Its Role in Development

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Objectives of the Seminar

- Global malnutrition overview
- Major causes of malnutrition and its affect on human development
- Basic nutritional requirements for human populations
- Approaches to tackle malnutrition
Undernourishment in the World

Territory size shows the proportion of all undernourished people worldwide, that live there.
Dietary Energy Consumption
Undernourishment in the World

- Approximately 1 billion people are classified as hungry by FAO figures – 300 million are children
- Only ~8% of the 300 million children are victims of famine or emergency situations
- Almost 150 million children (27%) underweight (UNICEF)
- Every 3.6 seconds a person dies of undernutrition related causes and most are children under 5 years
- In sub-Saharan Africa, 40% of children under the age of five are chronically undernourished (as measured by stunted growth or short for height)
Some definitions

• Malnutrition encompasses both under and over nutrition
• Line between under-nutrition and obesity is a fine one
• Undernutrition is the inadequate intake of protein, energy and micronutrients combined with frequent infections that result in poor growth
• “Hidden hunger” is often in reference to micronutrient deficiencies
Undernutrition Indicators

- **UNDERWEIGHT** = Weight/age – CHRONIC or ACUTE
- **STUNTING** = Height/age -- CHRONIC
- **WASTING** = Weight/Height -- ACUTE
- **MUAC** = Mid-upper arm circumference
Kwashiorkor

- Clinical symptoms: swollen belly (edema – swelling caused by accumulation of watery fluid in the tissues of the body), weakness, ulcerated skin, changes in hair color, apathy, anorexia
- primarily in young children when the mother stops breast feeding and begins feeding low protein starches (e.g. cassava, plantains, green bananas)
- sufficient energy may be present
Marasmus – the disease of starvation

- severe energy deprivation
- appearance: like wizened little old people, skin and bones
- hearts weak and muscles wasted, metabolism slow
- little or no fat under skin to insulate against cold, body temperature may be subnormal
- commonly seen in very young children from birth to 18 months but can occur at any age
The other end of the spectrum: Nutrition Transition

Starchy, low variety, low fat diet
Labor intensive

MCH deficiencies
Stunting
Infectious disease

High mortality

THEN COMES…..

Increased economic growth, urbanization, technological changes

High fat, sugar, processed foods
Less labor intensive

Obesity
CVD
Diabetes

Increased life Expectancy;
Non-communicable
disease
Why Does Undernourishment Exist?

• Poverty
• Conflict
• Unequal distribution due to geography, discrimination, gender and culture
• Climatic factors – drought, flooding, tsunami, earthquakes
Millennium Development Goals

Formulated at the UN Millennium Summit and articulated in the Millennium Declaration, 2000

- Goal 1: Eradicate extreme poverty and hunger
- Goal 2: Achieve universal primary education
- Goal 3: Promote gender equality and empower women
- Goal 4: Reduce child mortality
- Goal 5: Improve maternal health
- Goal 6: Combat HIV/AIDS, malaria and other diseases
- Goal 7: Ensure environmental sustainability
- Goal 8: Develop a Global Partnership for Development
Nutrition-Health Impacts

Leading Causes of Death in Children Under Five in Developing Countries and the Contribution of Undernutrition

Deaths attributable to undernutrition:
- Pneumonia: 20%
- Diarrhea: 15%
- Malaria: 11%
- Measles: 5%
- Perinatal: 23%
- Other: 22%
- HIV/AIDS: 4%

Nutrition is Essential for Development

Eradicating extreme poverty and hunger, reducing child mortality and achieving all of the MDGs are largely dependent on the progress in nutrition. - UNICEF, 2006

Source: Haddad and others (2002).
“Food security exists when all people, at all times, have physical and economic access to sufficient safe and nutritious food to meet their dietary needs and food preferences for a healthy and active life.”
Rising Food Prices of 2008

The Food Chain

Articles in this series will examine growing demands on, and changes in, the world’s production of food.

Articles in the Series

Environmental Cost of Shipping Groceries Around the World
By Nathan R. Finger

Never has food moved around the world at the speed or in the amounts it has over the last five years. Now, many say it is time to make shoppers and shoppers pay for the resulting pollution.

Price Volatility Adds to Worry on U.S. Farms
By Sarah E. Hennessey

Wild swings in crop futures are damaging mechanisms that are supposed to cushion the job of farming.

A Drought in Australia, a Global Shortage of Rice
By Keith Bradsher

The collapse of Australia’s rice production may foreshadow some of the effects of global warming on agriculture.

As Prices Rise, Farmers Spurn Conservation Program
By Paul B. Jacobs

Farmers are taking their fields out of a government

Rising Prices, Rockier Markets

The increased volatility of grain futures prices is making it harder and more expensive for farmers to hedge their risks.

FUTURES CONTRACT PRICE
Prices per bushel, shown on comparable percentage change scales.

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$8 $20 $12
The World Reacts to the Perfect Storm
What does the world look like now and in the future?

• 75% of population in Europe and the Americas live in urban areas
• 35% of Africa and Asia's population is urban; by 2030, 50%
• Over 50% of population (3.3 billion) will live in cities by 2008
• Urbanization will result in:
  – Lack of work
  – Poor sanitation
  – Lack of clean water
  – Overcrowding
  – Increased malnutrition and infection

Kibera Slum, Nairobi
Classes of Nutrients: Macronutrients

- Carbohydrate: 4 calories per gram
- Fat: 9 calories per gram
- Protein: 4 calories per gram
- Nitrogen
Classes of Nutrients: Micronutrients

• Vitamins: fat and water soluble
  – Fat Soluble - A, D, E and K
  – Water Soluble - C, B family (thiamin, niacin, riboflavin, B6, B12), folate

• Minerals:
  – Zinc, iron, copper, calcium, potassium, magnesium, phosphorus
Cereal and Roots

• Together, in the developing world, provides up to 80% of energy intake

• Cereals
  – Edible seeds of domesticated grasses: maize, sorghum, millets, wheat, rice, oats, teff, barley, quinoa, triticale
  – Wheat, rice and maize > ½ the world’s food energy
  – High in carbs; some have moderate amounts of protein and B vitamins; low in vitamins A, C

• Roots
  – Cassava, potato, cocoa yam
  – High in starch, low in protein
Milling and Fortification

• Pestle and mortar – outer coat is removed but germ remains – leaving some nutrients
• Heavy milling – undesirable from nutritional view
• Unprocessed grains are often considered “poor man’s food” or not the taste preference
• Due to milling, many nations have added fortificants to refined flours
Cereal Composition

Most Cereal Grains have similar structure and nutritive value

100g of whole grain:
- 350 kcal
- 8 to 12 g protein
- Ca, iron and B vitamins
- Lack Vit C and A

Husk – no nutritive value
Pericarp – fibrous; few nutrients
Aleurone – rich in protein, V and M
Endosperm – mainly starch
Germ – nutrient rich
Vegetables

• Not seen as a prestige food ("rabbit food")
• Tomatoes, pumpkins, leaves (amaranth, kale, cabbage, cassava and pumpkin leaves), roots (carrot and turnip)
• Very little protein and CHO
• Rich in vitamins (A, C, Ca, Fe)
• Indigestible residue – fiber
Consumption of animal proteins is low

- In the developing world, consumption of animal proteins is very low (primarily due to economics)
- Higher consumption of legumes and pulses
The Big Four of Micronutrient Deficiencies: Hidden Hunger

- **Vitamin A** - An estimated 140 mil children are afflicted
- **Iron** - 2 bil people suffer from anemia, mainly pregnant and lactating women and young children
- **Folate** - Maternal folate deficiency leads to a quarter of a million severe birth defects each year
- **Iodine** – 32% of the developing world population lives at risk of iodine deficiency, and disorders with iodine deficiency during pregnancy cause 18 million babies to be born mentally impaired every year

WHAT OTHER MICRONUTRIENTS ARE CRITICAL BUT IGNORED?
Vitamin A Deficiency

- 250 million children are vitamin A deficient
- 250,000 - 500,000 vitamin A deficient children become blind every year, 1/2 dying within 12 months of losing their sight
- 600,000 women die from childbirth-related causes each year, the vast majority of them from complications which could be reduced through better nutrition, including provision of vitamin A. (WHO)
- Xerophthalmia and corneal blindness, anemia, stunted growth, impaired immunity, increased severity of infection (measles, diarrhea or malaria), mortality
How to get the intake for Vitamin A?

Amounts of different foods that contain approximately 500 RE vitamin A (roughly the recommended daily intake of vitamin A for an adult)

- 1 spoon (10 ml) Fresh red palm oil
- 1 small Carrot
- 1 small Mango
- Egg-sized piece Liver
- 1.5 cups chopped Dark green leaves
- 1 small Pawpaw
- Medium-sized piece Yellow sweet potato
- 1 litre Milk
Iodine Deficiency and Cretinism

32% of the developing world population lives at risk of iodine deficiency, and iodine deficiency during pregnancy cause 18 million babies to be born mentally impaired every year.
Iron Deficiency and Causes of anemia

- 2 bil people suffer from anemia, mainly pregnant and lactating women and young children

- **Iron Deficiency**
  - Anemia, fatigue and weakness, brittle nails

- **Major causes of anemia**
  - Iron deficiency (1300-2200 m)
  - Hookworm (876 m)
  - Vitamin A deficiency (300 m)
  - Malaria infection (300 m)
  - Other causes – chronic infections, genetics
Dietary Iron

• Two types of iron
  – Heme iron (animal sources)
  – Non-heme iron (plant sources)
• Absorption of heme iron is 20-30%
• Absorption of non-heme iron varies between 1-10% and is much more affected by iron status
Where are the gaps?

- Child and maternal care
- Vulnerable – orphans, elderly, widowed
- Gender -intraHH labor division, finance control, food distribution
- Food processing, storage and cooking methods
- Urbanization, landless, increasing food prices…
- Adequate local supply and access of food
- Nutrition in context with infectious disease
- Local indigenous foods promotion
- Food versus nutrition security
- Translating agriculture diversity to household nutrition practices, homestead gardening
- Not a priority for governments
- Functioning health systems

EDUCATION, EDUCATION, EDUCATION
Approaches to alleviating malnutrition

• Pharmaceutical supplementation
  – Pills and Sprinkles
  – Deliver known amount of nutrient(s) in question
  – Essential for clinical cases of malnutrition
  – Depends on coverage and cost

• Fortification (adding Vit. D to milk)
  – Rural poor eat limited amounts of processed food
    • Reliance on home-grown or locally produced food
    • Unlikely to be processed and fortified
Approaches to alleviating malnutrition (2)

• Adequate diet from local foods
  – What happens to diet quality when cash crops are sold?
  – Hard to monitor
    • Variation in crop yield from year to year
    • Post-harvest losses
    • Lack of diet diversity - Much agricultural emphasis on cereal crops
    • Intra-household allocation - Who receives the most nutritious food?
PROVEN INTERVENTIONS ROOTED IN HEALTH OR “MEDICINIZED”

**Maternal Nutrition**
- Maternal supplementation
- Maternal iodine through iodisation of salt

**Child Nutrition**
- Promotion of breastfeeding (individual and group counselling)
- Improved complementary feeding
- Zinc supplementation and in management of diarrhea
- Vitamin A fortification or supplementation
- Universal salt iodisation
- Treatment of severe acute malnutrition

“Easier” and many, are quick impact strategies. But are they enough???

Lancet, 2008
Linking agricultural biodiversity and human nutrition

Frison, Food and Nutrition Bulletin, 2006
IN ORDER TO ACHIEVE FOOD SECURITY...

• Move beyond medicinized nutrition - the health sector cannot solve all the problems
• Requires EVERY sector’s involvement - nutrition is complex, with sociocultural influences
• Calls for the inclusion of demand and supply sides of nutrition
MVP NUTRITION STRATEGY

ALLEVIATE HUNGER AND MALNUTRITION

CLINICAL-BASED
SCHOOL-BASED
FOOD-BASED
COMMUNITY-BASED
NUTRITION MUST BE INTEGRATED

COMMUNITY

ALLEVIATE HUNGER AND MALNUTRITION

- CLINICAL-BASED
  - MDG 1, 2, 4, 5 + 6
  - HEALTH GENDER EDUCATION TECHNOLOGY/INFRASTRUCT

- SCHOOL-BASED
  - MDG 1, 2 + 3
  - AGRICULTURE, BUSINESS HEALTH, GENDER EDUCATION WATER, ENVIRONMENT

- FOOD-BASED
  - MDG 1, 3, 4 + 7
  - AGRICULTURE, HEALTH BUSINESS, GENDER WATER, ENVIRONMENT

- COMMUNITY-BASED
  - MDG 1, 3, 4, 5 + 6
  - HEALTH EDUCATION GENDER WATER, TECHNOLOGY
MVP NUTRITION STRATEGY

**Maternal care:** supplementation and iodine
Child care: Vitamin A and EBF +CF, zinc, and growth
Treatment of severe malnutrition
HIV/TB/malaria nutrition therapy

**School Meals Program**
School Gardens
School Health
Nutrition in education

**CLINICAL-BASED**

**SCHOOL-BASED**

**FOOD-BASED**

**COMMUNITY-BASED**

Home and community gardens
Food processing and storage
Home-based fortification
Appropriate complementary foods
Sub-species and traditional nutritious crops
Livestock/animal rearing/fish farming

CMAM
Outreach
Education
AGROECOLOGICAL ZONE INFLUENCES

% children <5 stunted vs % children <5 underweight

- banana-based
- maize-based
- tree crops
- root-crop based
- annual rainfall <600mm
RAINFALL and UNDERNUTRITION

% children <5 underweight vs. average annual rainfall (mm)

$R^2 = 0.7931$
FOOD INSECURITY AND DIET DIVERSITY

FOOD INSECURITY SCORE (1 = MOST INSECURE)

DIET DIVERSITY SCORE

R² = 0.9303
Challenges and Lessons Learned So far

• Nutrition is often considered a secondary intervention because many other immediate needs and is more complicated requiring integration with other sectors such as agriculture, water and health.

• Nutrition is underfunded and there is little nutrition expertise in some places where it is most needed.

• Community Health Workers are often insufficiently trained in treating malnutrition, and often lack the necessary tools.

• Solving hunger is sometimes mistakenly considered the answer to ending undernutrition.
How would you address nutrition in these communities?
Dertu, Kenya
Sauri, Kenya
Timbuktu, yes, Timbuktu, Mali
Mwandama, Malawi
Koraro, Ethiopia