II: WHAT IS THE FOOD PROBLEM?
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I. The Crops that Feed the World

A. Major World Food Crops (FAO data)
   - Grains: corn/maize, rice, wheat, sorghum, millet
   - Tubers: potato, cassava, sweet potato, yam
   - Legumes: soybeans, groundnuts/peanuts, beans, cowpeas
   (Note: Importance in diet varies by region/country)

B. The Diffusion of the World's Major Crops
   1. Where Did These Crops Originate?
      - Today's crops grown far from "centers of origin" (Origins)
        - C. America/Mexico: corn, tomato, cotton, cacao
        - South America: cassava, potato, peanuts
        - Africa: millet, sorghum, coffee, cowpea, yam
        - Europe: oats, rye
        - Near East: wheat, barley, apples
        - Asia: rice, soybean
2. How were these crops diffused? (*What we eat*)
   - Explorers
   - Migrants
   - Systematic introductions
     - Rice: US, 1700s
     - Soybeans: Brazil, 1940s, now world’s largest producer

3. Why have these crops been adopted throughout the world?
   Met preferences of:
   - Consumers:
     - Taste/variety
     - Cheaper source of calories
   - Farmers:
     - Market potential (e.g., soybeans in Brazil)
     - Growing advantages (e.g., cassava in Africa)

4. Why are the "centers of origin" important to us? (*maize, beans*)

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**II. What Factors Affect World Food Demand?**

A. What Factors Cause Food Demand To Change?
1. 
2. 
3. 

B. What Factors Determine Consumers’ Tastes & Preferences?
1. Price
2. Culture (*Photo*)
3. Income/changes in income

*Note*: Food’s share of HH expenditures: rich (10%), middle income (30-40%), poor countries (50-60%)

*Engel’s law* (mid-1800s):
- As Y increases, families spend smaller % on food;
- As Y increases, individual’s food preferences change
3. **Income elasticity (e) of demand show impact of income change**

**Def.** change in demand (%) associated with 1% change in income (Y)

- Y elasticity of a food varies between countries, due to cultural & income differences

**Examples**
- Rich countries: High? Low?
- Poor countries: High? Low?

C. **How Can Countries Predict Future National Demand?**

Future food demand = Pop. Change (%) + [ Y Change (%) x (e) ]

**Examples**
- Poor LDC: D = (3.5%) + ((2%) x (0.8)) = 5.1%
- Mid-income LDC: D = (2.0%) + ((2%) x (0.4)) = 2.8%
- Wealthy DC: D = (1.0%) + ((2%) x (0.1)) = 0.2%

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III. **How “Food Secure” Is the World?**

A. The “right to food”

- A traditional right (Sierra Leone, Indonesia)

  - Guaranteeing the “right to be free of hunger” is considered a human right, an **obligation** of governments (UDHR, 1948)

B. **Types of Food Security**

  **Def.** all citizens have enough food to meet their nutritional needs

  1. How is food insecurity/hunger measured?

  2. National vs. household food security

    - National:  

    - Household:  

    - How do nations/households achieve food security?

**Note:** national food security doesn’t insure HH food security! **Why?**
C. Degrees of food insecurity (chronic hunger vs acute hunger)

1. “Chronic” hunger/food insecurity (hunger that leads to malnutrition)
   Def.: a deficit of 100-400 calories/day (2,100 calories recommended)
   o Extent: 923 million people in LDCs, 1/6th of world population
   o Little progress in reducing # of hungry people (Trends, 1965-2010)
   o Hunger, the main #1 risk to health worldwide
   o Country: status, WFP programs (WFP)
   o Regions most affected:
     ✓ 98% in LDCs—16% of the population
     ✓ Most people? Asia & Pacific: 578 million (63%, <17%)
     ✓ Highest incidence? SS Africa: 265 million (26%, 30%)
   o Most vulnerable groups—Who are the hungry?
     ✓ Rural poor (majority) ✓ Urban poor ✓ Disaster Victims
     ✓ Children: 25% Figure ✓ Women: 60%
   o Consequences?
     ✓ Reduces kids intellectual development (PEM)
     ✓ Reduces adults’ ability to work
     ✓ Increases everyone’s vulnerability to diseases/mortality
       ➔ Slows economic growth/development

   o Underlying Causes (complex of interrelated human ills)?
     ✓ Poverty (1.4 billion people earn < $1.25/day) (Figure)
     ✓ Rapid population growth
     ✓ Environmental degradation (e.g., soil erosion)
     ✓ Conflict, civil war ➔ refugees
     ✓ Lack of access (e.g., education, land)
     ✓ Natural disasters that cause crop losses

   o Success in reducing chronic hunger?
     ✓ Greatest success: Asia (esp. East Asia/China) (Figure)
       due to success in increasing food production/ag. productivity
     ✓ Brazil—“Zero Hunger” program
     ✓ Least success: SS Africa (Kids, Fig. Amt, Change) (Figure)
     ✓ Why?
     ✓ School feeding programs can make a big difference!!

   o Why limited success?
     ✓ Problem is so extensive
     ✓ Chronic hunger is hidden, not highly visible
     ✓ Many factors contribute to the problem
     ✓ Lack of political will to allocate needed resources
2. “Acute” hunger/food insecurity (food emergencies)—new food crisis!!!


**Def.** extreme food shortage that may cause famine

- **Extent**
  - In 2009 30 countries faced acute food shortages (FAO)

- **Regions most affected in 2009? (parts of 20 countries)**

- **Current/recent causes (triggers of acute food shortages? (Table))**
  - **Political-related**
    - Civil conflict, wars, insecurity, refugees, displaced persons
  - **Weather/natural disaster-related**
    - Drought (Niger) declining ground water table (India)
    - Floods (Pakistan, Mozambique, 2000), cyclones, tsunamis, earthquakes (Haiti)
    - Pest/disease outbreaks (West Africa)
  - **Crop failure**

- **Social-related**
  - HIV/AIDS

- **Economic (several new causes, most severe in 2009)**
  - Government policies/economic crisis (Zimbabwe, N. Korea)
  - High oil prices → high fertilizer price (Fig.), high transport costs
  - High international commodity prices (Fig.)
  - Reduction in cropland (US corn diverted to produce ethanol)
  - Export embargos imposed by some countries
  - Global financial crisis (credit crunch, less $ for food aid & investing in infrastructure/agricultural development)

- **Long-Term trends that have contributed to chronic & acute food insecurity**
  - Growing demand for food in prospering China/India (grain, meat)
  - Decline in funding for agricultural research (now being reversed)
  - Conversion of farmland to urban uses

- **Today, food shortages are affecting low income groups in all LDCs**
  - Threat to stability/government
Past success in reducing acute hunger?
- Considerable success, few deaths in recent years (Figure)
- Famines have been prevented by:
  - Improved ability to predict:
  - First line of defense is local sharing/coping strategies
  - Then, UN's World Food Program & Western donors have provided food aid as the crisis deepened (Photo) [http://www.wfp.org/](http://www.wfp.org/)  WFP Zimbabwe  Niger
  - Criticisms of US/international response to current crises?

3. Famine
- Def: Extreme/acute food shortage that if not addressed, result in acute hunger, emaciation, & death—especially affects kids (Photo)
- Regions—Typically only affects a part/region of a country

Causes of famine?
- Natural factors (drought, flooding, earthquakes, tsunamis, crop pests) are often the trigger/agent
- But human factors are the major cause of famine, government failure to respond magnifies the impact of the natural triggers

Examples of acute food shortages that resulted in deaths
- Colonial India (British neglect)
- Sudan, civil war (government has used food as a weapon)
- N. Korea (govt. restricted NGO food distribution)
- Zimbabwe (govt. prevented NGO access to some regions)

Solutions?
- Immediate: targeted food aid programs to the most vulnerable
- Short term: international pressure on governments (Sudan, Zimbabwe, N. Korea)
- Long term: peace, democracy, agricultural development (Examples?)
- Natural disasters: better preparation & response mechanisms
## IV. Ending World Hunger?

### A. Can We Meet the Food Needs Future Generations?

#### 1. Optimist’s Arguments until 2008: past successes shows it’s possible!
- More food is available worldwide that ever before
- Food production has increased faster than population  
  ![Figure](image1)
- Grain yields have doubled in past 30 years  
  ![Figure](image2)
- Grain prices have declined for decades  
  ![Figure](image3)
- If prices increase, farmers will grow more grain
- New technology (esp. biotechnology) is on the horizon
- Other?

#### 2. Pessimist’s Arguments: predict massive food shortages, more malnutrition! Are these predictions coming true? (“Limits to Growth”)
- Declining rate of yield increase for cereal crops  
  ![Figure](image4)
- Declining cropland--due to urbanization, industrialization, soil erosion—will reduce future food supply (Philippines=Honda)
- Declining supply of groundwater—will reduce water for crop irrigation (unexpected consequence India’s green Revolution)
- Increasing income--will increased demand for grain & meat, world will need more grain (e.g., China/India)  
  ![Figure](image5)
- Climate change—1 degree C rise will reduce grain yields 10%  
  ✓ IFPRI 2050 price projections: Wheat +40/196%; Corn +60/150%
- Declining foreign aid for agriculture & agricultural research  
  ![Figure](image6)
- Population growth & rapid urbanization--will increase demand
- Rising energy prices—will increase cost of fertilizer, transport
- Rising corn prices due to ethanol production
- Other?
B. What's Needed to Insure Food Security/Reduce Hunger & Poverty?

1. Some proposed supply-related solutions:
   - Increase agricultural productivity/need a 2nd Green Revolution, esp. Africa (e.g. new technologies to increase yields)
   - Promote sustainable natural resource use to reduce environmental degradation (e.g., soil erosion, salinization)
   - Improve rural infrastructure (dams, roads) & market access
   - Increase water use productivity/efficiency
   - Increase funding for agricultural development

   **Note:** Recent donor recognition of the need to invest in improving agricultural, strengthening research systems
   - Other?

2. Some proposed demand-related solutions:
   - Reduce population growth (promote family planning)
   - Enhance food access/safety nets for the most needy (food aid)
   - Other?

3. Some proposed policy-related solutions (US & other DCs)
   - Provide greater debt relief to the poorest LDCs
   - Reduce agricultural subsidies in DCs ($1 billion/day) (CD)
   - Reduce corn-based biofuel subsidies ($0.54/gal.)/production
   - Increase assistance to combat the HIV/AIDS crisis in Africa
   - Support multinational efforts to resolve civil conflicts
   - Implement initiatives to reduce global warming
   - Other?
C. Do we (the global community) have the political will to end hunger?

- Minimal progress since early 1990s in reducing world hunger
  - World Food Summit (1994) goal—reduce number of hungry by 50% (from 850 million in 1990-92 to 424 million in 2015)
  - Millennium Development (2000) goal—reduce the percent of hungry by 50% between 1990 and 2015

- FAO estimates poor countries need an additional $44 billion/year of agricultural aid to increase food output as world population increases from 6.7 billion to 9.1 billion (2050)

- Will ending world hunger be given higher priority in the future? Is the current food crisis a wake up call?

- As hunger threatens social & political stability and creates a fertile environment for anti-western hostility, how can we not respond?

V. The Food Crisis in Sub-Saharan Africa

Many interrelated causes—some generalizations

A. Today’s focus is on Africa, not Asia (1974 food crisis);

What’s the problem in huge (very diverse) Africa?  
(Figure)

1. Farmers face harsh growing environment  
(Figures)
  - 2/3 continent has low rainfall (desert or semi-arid), droughts occur frequently
  - Soils are very old, poor in quality  
(Photo)
  - Tsetse fly reduces the agricultural area (20% of land uninhabitable) & use of animal traction  
(Figure)
  - Hot climate results in rapid water evaporation
2. Farmers lack access to improve food crop technology
   - Farmers grow many different crops, utilizing many types of cropping systems—Implications? (Figure)
     - Farms are typically small, subsistence oriented—Implications?
     - Little irrigation (compared to Asia), so crop production is risky
     - Poor farmers can’t afford to buy modern inputs (improved varieties, fertilizer), since credit is seldom available
     - Farmers have limited formal education—Implications?
     - Colonial governments neglected food crop research (Figure)
     - Countries have few agricultural scientists/small agricultural research budgets

3. Rapid population growth absorbs growth in food production
   - Total food production up but per capita food production down (Figure)

4. Many governments have neglected agriculture
   - Limited funding for agricultural research
     - Weak extension services, have excluded women (Photo)
     - Government policies have discriminated against agriculture (e.g., forced farmers to sell crops at low prices to keep urban prices low)

5. HIV/AIDS crisis
   - Reduces resources that governments & farmers have available to invest in agriculture
   - Creates farm labor shortages

6. Several countries are plagued by civil war

7. Global Warming (2080)?
   - 5% decline in food production
   - 25-40% loss of natural habitat

No quick fix is possible

B. Africa has great potential to meet its future food needs, success stories include Ghana, Mali, Uganda & previously Zimbabwe