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Introduction to Food Production, Public Health, and the Environment

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Section A: Overview

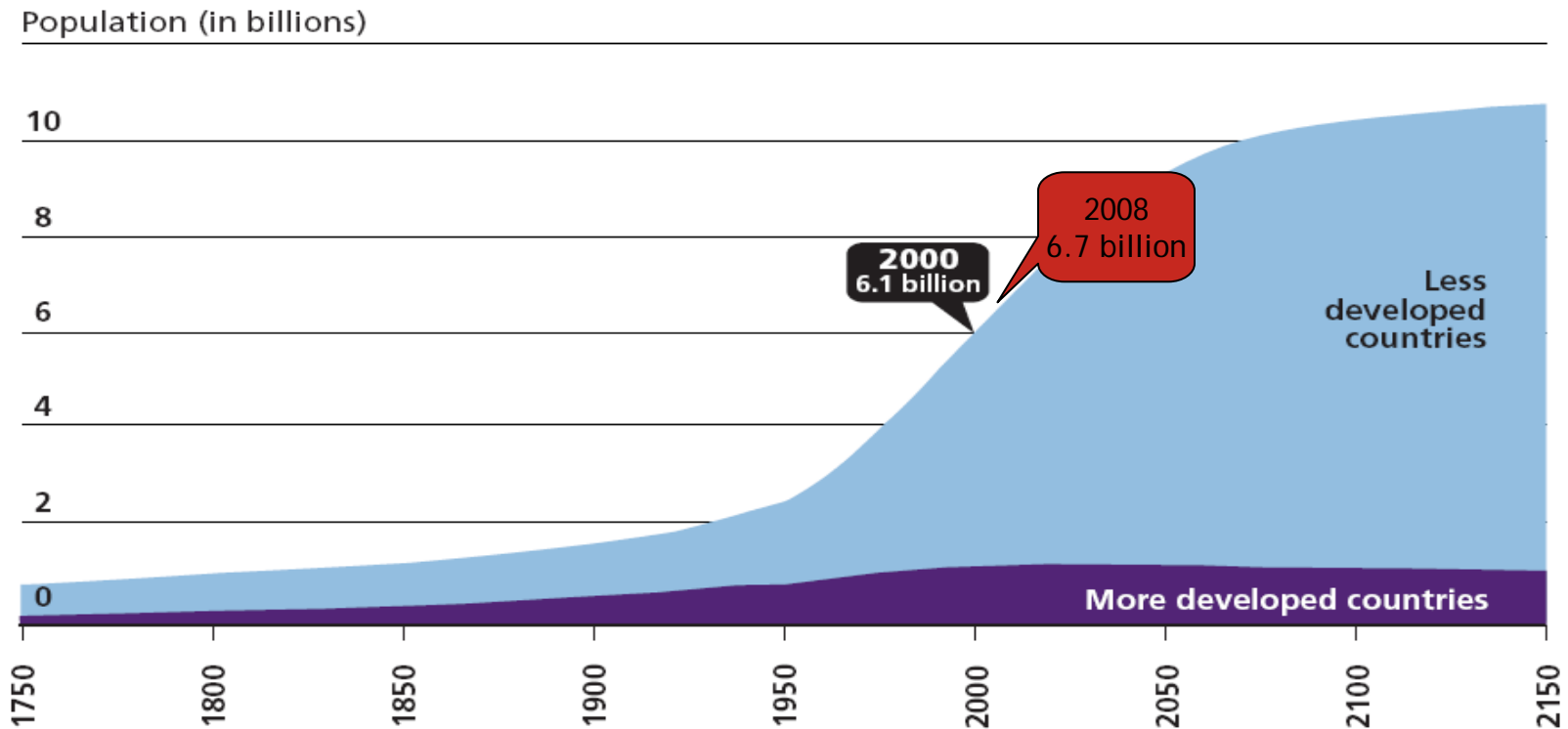
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Vicious Spiral

- The late James Grant introduced the idea of the vicious spiral of poverty, population growth, and environmental degradation (the PPE spiral)
- Sustainable development is progress for all without exceeding the planet's capacity



World population growth, 1750-2150



Source: United Nations, *World Population Prospects, The 1998 Revision* (New York: UN, 1998); and estimates by the Population Reference Bureau.

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- Sharing the world's resources
 - 6.3 billion global population (as of 2005)
 - ▶ 6.8 billion in 2008
 - 1 billion overweight or obese
 - Nearly 1 billion with inadequate nutrition

Intergenerational Equity and the Food System

- Land degradation
 - 40 percent of the world's agricultural land is degraded
 - Topsoil loss due to runoff
- Water use
 - Agriculture accounts for two-thirds of water use worldwide
 - Aquifer drawdown happens faster than water can be replaced
- Water degradation
 - Fertilizer and pesticide runoff
 - Livestock in the U.S. produce 1.4 billion tons of manure
- Antibiotic resistance
 - 70 percent of the antibiotics produced in the U.S. are used in animal production
- Depletion of fish stocks
 - 70 percent of world's fisheries are exploited or depleted
 - 50 percent of fish consumed now from aquaculture
- Loss of biodiversity

Who Consumes the World's Food?

- Grain consumption per capita per year

U.S.A.	~800 kg
Italy	~400 kg
Taiwan	~300 kg
China	~250 kg
India	~200 kg

Why?

- Meat-based diets consume more grain resources than plant-based diets
 - ~700 kg grain to produce 100 kg of beef
 - ~400 kg grain to produce 100 kg of pork
 - ~200 kg grain to produce 100 kg of poultry

Meat Consumption Trends

Actual and projected meat consumption (million metric tons)			
	1983	1993	2020
China	16	38	85
India	3	4	8
Developed countries	88	97	115
Less-developed countries	<i>50</i>	<i>88</i>	<i>188</i>
World	<i>139</i>	<i>184</i>	<i>303</i>

Food Consumption: Kilograms per Person in 2006

	United States	Europe	India	China
Wheat	101	252	64	76
Rice	13	5.4	76.5	95.8
Corn	753	122.8	13	107.5
Vegetable Oils	38.7	41.8	10.4	17.5
Milk	89	68.4	35	10.4
Beef	41.8	17.5	1.3	5.4
Chicken	44.5	15.3	1.8	7.6

Adapted from <http://www.iht.com/articles/2008/05/13/business/food.php>

Global Meat Demand Doubling in 30 Years

- Since 1961, U.S. per capita meat consumption has increased by 70 percent, from 141 pounds to 223 pounds (100 kg)
- Average for industrialized countries is 77 kg per person
 - For non-industrialized countries it's 27 kg per person
- Global demand for meat will double from the 1990s to 2020

Do We Need All That Protein and Meat?

- Average U.S. adult male consumes 170 percent of RDA for protein (97 g vs. RDA of 56 g)
- Average U.S. adult female consumes 127 percent
- Average American derives 67 percent of protein from animal sources, compared to 34 percent worldwide
- Note: recommended dietary allowance (RDA) equals the average daily dietary intake level that is sufficient to meet the nutrient requirement of nearly all (97-98 percent) healthy individuals in a particular life stage and gender group (USDA)

Meat Consumption and Health

- Meat and other animal products are the major sources of dietary saturated fat and dietary cholesterol
 - Heart disease and stroke
 - Type II diabetes
 - Certain cancers
- By decreasing morbidity and mortality, advanced medical interventions that treat symptoms of chronic disease may mask the impacts of our diet and food system on public health

A World of Stark Contrasts

- Animal-based foods contribute to chronic diseases
- Diet-related diseases are on the increase worldwide
- WHO estimates that more than 230 million children (40 percent) in less-developed countries are stunted from malnutrition
- Obese and malnourished living in the same household

Are There Alternatives?

- If the next 100 billion beef burgers from McDonald's were veggie burgers ...
 - Same number of calories
 - 1.22 billion pounds *less* fat
 - 551 million pounds *less* saturated fat
 - 1.1 billion pounds *more* fiber
 - 660 million pounds *more* protein