

**Case Study Title:** The World Food Crisis: A Paradox of Success

**Article Information:**

G-8 pledge billions for food initiative  
Richard Wolf and Ken Dilanian  
USA TODAY July 10, 2009  
News  
USA TODAY page 6A

Feed hungry, then help them feed themselves  
DeWayne Wickham  
USA TODAY October 20, 2009  
News  
USA TODAY page 11A

Imagine there's no hunger  
Edna Gundersen  
USA TODAY November 9, 2009  
Life  
USA TODAY page 3D

1 in 6 hungry in America last year  
Marisol Bello  
USA TODAY November 17, 2009  
News  
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In Haiti, children are the most vulnerable  
Donna Leinwand, Marisol Bello, and Martha T. Moore  
USA TODAY January 25, 2010  
News  
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**Summary Statement:**

Global food production increased 150% since 1960 because of technological advances including fertilizers and pesticides and fishing fleets with GPS and sonar. Nevertheless, one-third of the human population is undernourished. One billion people, 15% of world population, did not get adequate nourishment in 2009. Another 1.2 billion people consumed enough calories and protein but insufficient vitamins and minerals. Hunger is greatest in sub-Saharan Africa and southern Asia, however, 10 to 15% of U.S. households do not have reliable access to food. There are two types of malnourishment: kwashiorkor, insufficient intake of protein, and marasmus, insufficient intake of protein and calories. In reality, these are extremes and most malnourished individuals show symptoms of both. Malnutrition often leads to mental and physical retardation. Children who survive to adulthood remain impaired and are likely to perpetuate the cycle of poverty and hunger. Living with chronic hunger and malnutrition is called food insecurity.

Until the mid 20<sup>th</sup> century, the world population was less than half the current population and farmland and fisheries provided secure food supplies. Traditional agriculture uses mostly human and animal labor to produce only enough food for a farm family, with little left over to sell or for reserve. Traditional farming usually relies on polyculture, growing several different plants simultaneously. Such crop diversity reduces loss due to pests and bad weather. Intensive agriculture uses fertilizer and irrigation to obtain a higher yield per acre and food to sell. Beginning in the 1950s, increasing populations and urbanization led to fewer family farms and the need for intensive farming to feed city dwellers. American farmers received government subsidies for increasing production through use of mechanization, fertilizers, and pesticides.

Environmental deterioration accompanied the Green Revolution that began in the 1950s. By the 1960s, it became apparent that chemical pesticides persisted in the food chain and have adverse effects on birds and other animals. Currently one hectare of productive land is being lost every 7.67 seconds. Irrigation erodes topsoil and increases soil salinity by precipitating dissolved salts in the soil. Agricultural and rangelands are being used for housing, industry, and highways in industrialized and developing countries. In underdeveloped countries, subsistence farmers clear marginal land, such as hillsides and rain forests, causing erosion of fertile topsoil. Additionally, productive oceans are being depleted because modern fishing methods are catching fish faster than they can reproduce. Also unintended deaths of “bycatch,” turtles, birds, and juvenile fish, caught in large nets destroys food chains.

The Green Revolution introduced high-yielding grains which now account for half of all land planted in wheat and rice. This loss of agricultural biodiversity can limit the ability to adapt to climate change and create monoculture crops that are more susceptible to pests.

Weather can disrupt food production anytime. Record high temperatures in Ukraine in 1972 reduced wheat yields and disrupted the global cereal market for two years. High temperatures in France in 2003 decreased wheat production by 30%. Food insecurity has increased since 1985 due to rapid population growth, climate change, and soil deterioration.

**Discussion Questions:**

1. Due to civil wars and a prolonged drought, country X has enough food for 7 days. The next crop of rice will be ready in 30 days. Assume you are the leader of X. How do you decide who gets the food: age, gender, most hungry, lottery, auction?
2. Use the data shown below to answer the questions.

	Column A	Column B	Column C
	World grain production × million metric tons	World pop × billion	Grain production, kg/capita [=(A/B) ×100]
1930	629	2.0	
1940	714	2.3	
1950	631	2.6	
1960	847	3.0	
1970	1103	3.7	
1980	1441	4.5	
1990	1687	5.3	
2000	1842	6.0	
2009	2000	6.8	
2025		7.3 (estimate)	
2050		9.3 (estimate)	

- a. Graph the population and grain production over time.
  - b. Project what will happen in 2025. In 2050.
  - c. Calculate the grain production per person and graph this over time.
  - d. How do you account for the value in the 1970s? In 2000?
  - e. Discuss your recommendations to achieve food security.
3. Worldwide, malnutrition contributes to the deaths of 5 million children every year.
    - a. Why isn't this "headline" news?
    - b. Who is responsible for these children?
    - c. Should developed countries provide food?
  4. In 1987, China replaced large agricultural collectives with family farms. In each village, the land was allocated to families. The move increased grain harvest by half in less than 10 years. Are family farms like this feasible, sustainable, or desirable?

5. Use the data shown below to answer the questions.

	Per capita food supply*	Arable land, sq km**	Grain production × 1000 metric tons	Food imports, % daily supply	Annual population growth rate, %	Population × 1000
Brazil	128	590,081	123	3.1	1.2	198,739
Democratic Republic of the Congo	72	64,838	111	5.9	3.20	68,693
Haiti	92	7,747	93	60.5	1.84	9,036
Japan	118	43,989	95	64.8	-0.19	127,079
Nigeria	91	300,553	137	6.7	2.00	149,229
Qatar	116	190	7	95.6	0.96	833
U.S.	143	1,650,070	117	3.5	0.98	307,272
<b>World</b>	<b>118</b>	<b>85,521,406</b>	<b>2000</b>	<b>—</b>	<b>1.14</b>	<b>6,844,200</b>

\* Percent of Food and Agriculture Organization's recommended daily requirement for a normal, active person in a particular climate.

\*\* Arable land is land that can be used to grow crops, it includes cultivated land and jungles.

- Provide reasons why countries like Nigeria and Haiti don't have enough food but Japan does.
- If developed countries provide aid to countries with a high growth rate, will this result in survival of more children and a higher growth rate?
- What is the effect of increasing cropland on natural resources?
- Discuss whether the world food crisis is a problem of overpopulation or distribution.

### Future Implications:

Currently, the world produces enough food to feed everyone. However, millions remain undernourished because distribution requires energy, money, and political stability. Moreover, this production level may not be sustainable because climatic variations, natural disasters, and human intervention are constantly changing land and water.

The challenge is providing food security for the current population and 80 million more people annually while protecting the soil and water upon which food production depends. Scientists are making the tools for a new "Greener Revolution." Texas researchers have developed a nontoxic cottonseed, which allows cotton plants to be used for fiber, oil, and protein. Polycultures that alternate crops with nitrogen-fixing soybeans reduce the need for fertilizer and pesticides. Using agricultural waste for animals and biofuels leaves grains for human food. More water-efficient irrigation technologies and using recycled water allows agriculture in drought-prone areas. Raising plant-eating fish in freshwater ponds protects oceans and provides nutritional protein. Foods fortified with vitamins and minerals can combat some of the world's most common nutritional disorders.

Providing a sustainable food supply will require a variety of policies and actions that promote economic development, apply sound ecological principles to manage resources, and biotechnology to develop drought-resistant crops and pest controls.

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For questions or additional information e-mail [tria.cohen@ptk.org](mailto:tria.cohen@ptk.org) or call 601-984-3515.

**Additional Resources:**

Brown, L. R. (May 2009). "Could food shortages bring down civilization." *Scientific American* 300(5), 50-57. Discusses political instability caused by food insecurity.

Despommier, D. (November 2009). "The rise of vertical farms." *Scientific American* 301(5), 80-87. Presents urban agriculture as a means to alleviate food shortages.

"Diet, health and the food supply." (September 2007). *Scientific American* 287(3). A special issue devoted to the global paradox of obesity and malnutrition.

Food and Agriculture Organization of the United Nations. <<http://www.fao.org>>. The source for comprehensive data on food security and food safety by country and worldwide.

Thurow, R. and S. Kilman. (2009). *Enough: Why the poorest starve in an age of plenty*. New York, NY: PublicAffairs. The authors explore the relationship between economic development and agriculture from the 1960s to the present.

United Nations World Food Programme. *Food Force*. <<http://www.food-force.com/>>. Resources for students and teachers, includes a video game to learn about world hunger in real-world situations.