

# Feeding the World

*Food Systems, Global Hunger, and the Politics of the Plate*

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## C1 Level Reading Material

Fleydo English School

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### Chapter I: The Green Revolution

*How science transformed agriculture — and the consequences no one anticipated*

In the mid-20th century, the world faced a crisis that many believed was insurmountable. Global population was surging — from 2.5 billion in 1950 to a projected 4 billion by 1975 — and food production, constrained by traditional farming methods, appeared incapable of keeping pace. The spectre of mass **famine** haunted policy-makers and scientists alike. Paul Ehrlich's 1968 bestseller *The Population Bomb* predicted that hundreds of millions of people would starve to death in the 1970s and 1980s, regardless of any measures taken. He was, mercifully, wrong — but the reason he was wrong is itself one of the most consequential stories of the modern era.

The **Green Revolution**, a term coined in 1968 by the USAID administrator William Gaud, refers to the suite of agricultural innovations — high-yield **hybrid** seed varieties, synthetic **fertilisers**, chemical **pesticides**, and modern **irrigation** techniques — that dramatically increased food production across Asia, Latin America, and parts of Africa between the 1960s and 1990s. The architect of this transformation was Norman Borlaug, an American agronomist whose development of disease-resistant, semi-dwarf wheat varieties in Mexico earned him the Nobel Peace Prize in 1970. Borlaug's wheat, and the similarly improved rice varieties developed at the International Rice Research Institute in the Philippines, enabled countries like India, Pakistan, and Indonesia to achieve near self-sufficiency in grain production within a single generation.

The statistics are staggering. Global cereal production more than doubled between 1960 and 2000, even as the amount of land under cultivation increased by only 15 percent. In India alone, wheat production rose from 12 million tonnes in 1965 to 73 million tonnes by 1999. The Green Revolution is credited with saving an estimated one billion people from starvation — a humanitarian achievement of extraordinary magnitude.

#### The Hidden Costs

Yet the Green Revolution's success came at a price that is only now becoming fully apparent. The emphasis on a narrow range of high-yield crop varieties encouraged **monoculture** — the cultivation

of a single crop over vast areas — which reduced agricultural **biodiversity** and rendered farming systems dangerously vulnerable to pests, diseases, and climate variability. In Punjab, once celebrated as the Green Revolution's greatest success story, decades of intensive farming have led to severe soil degradation, falling water tables, and widespread contamination of groundwater with pesticide residues.

The revolution also exacerbated social inequality. The new technologies required significant capital investment — for improved seeds, chemical inputs, and irrigation equipment — that was beyond the reach of many **smallholder** farmers. Those who could not afford to modernise were progressively marginalised, forced to sell their land and migrate to overcrowded cities. In much of sub-Saharan Africa, where infrastructure was weakest and investment scarcest, the Green Revolution largely failed to take root, leaving the region dependent on rain-fed **subsistence** agriculture and acutely vulnerable to drought and conflict.



The environmental legacy is equally troubling. Synthetic fertilisers, while dramatically boosting yields, have contributed to the eutrophication of rivers, lakes, and coastal waters worldwide. Nitrogen runoff from agricultural land has created over 400 oceanic "dead zones" — areas where oxygen levels are too low to support marine life. Agriculture now accounts for approximately 10 percent of global greenhouse gas **emissions**, with livestock farming alone responsible for more **methane** than the entire global transport sector.

## Chapter II: The Hunger Paradox

*Why obesity and starvation coexist in a world of plenty*

The world today produces enough food to feed approximately 10 billion people — substantially more than the current global population of 8 billion. Yet according to the United Nations' Food and Agriculture Organisation, approximately 735 million people were chronically undernourished in 2022, while a further 2.4 billion experienced moderate or severe food insecurity. Simultaneously, over 1 billion adults worldwide are classified as obese, and diet-related diseases — cardiovascular illness, type 2 diabetes, certain cancers — now kill more people globally than infectious diseases. This **paradox** — the coexistence of hunger and excess within the same global food system — is one of the defining moral failures of our age.

The root cause of hunger in the 21st century is not insufficient production but inequitable distribution. Food is, above all, a **commodity** — a product bought and sold on global markets according to the logic of supply, demand, and purchasing power. Those who can afford to eat well do so; those who cannot go hungry. This is not a natural law but a political choice, embedded in trade agreements, agricultural **subsidies**, land ownership patterns, and the **structural** inequalities that determine who has access to resources and who does not.

**Malnutrition** takes multiple forms, and its most insidious manifestations are often invisible. **Micronutrient deficiencies** — insufficient intake of vitamins and minerals such as iron, zinc, vitamin A, and iodine — affect over 2 billion people worldwide and are a leading cause of childhood **stunting**, impaired cognitive development, and weakened immune function. This "hidden hunger" receives far less attention than acute famine but inflicts far greater cumulative damage on human potential.

## **Food Deserts and the Geography of Access**

In wealthy nations, the geography of hunger takes a distinctive form. The concept of the **food desert** — an area, typically in a low-income urban neighbourhood, where residents have limited access to affordable, nutritious food — has become central to public health research. In the United States, an estimated 19 million people live in food deserts, where the nearest supermarket may be several miles away and the most accessible food outlets are convenience stores and fast-food restaurants offering calorie-dense but nutritionally poor options. The result is a cruel inversion of the global pattern: in the world's wealthiest country, it is the poorest citizens who suffer most from diet-related illness.

The political dimensions of hunger are equally stark. During the 2007–2008 global food price crisis, staple food prices doubled within months, triggering riots in over 30 countries. The crisis exposed the fragility of a global food system in which many developing nations had been encouraged — by international financial institutions and trade agreements — to abandon domestic food production in favour of export-oriented cash crops, leaving them dangerously dependent on imported grain whose price they could not control.



## **Chapter III: The Scandal of Waste**

*One-third of all food produced is never eaten — and the planet pays the price*

According to the United Nations Environment Programme, approximately 1.3 billion tonnes of food are lost or wasted every year — roughly one-third of all food produced for human consumption. If food waste were a country, it would be the third-largest emitter of greenhouse gases on Earth, behind only China and the United States. The scale of this waste is not merely an economic inefficiency; it is an environmental catastrophe and, in a world where hundreds of millions go hungry, a moral scandal of the first order.

Food loss and food waste occur at every stage of the **supply chain**, but the patterns differ dramatically between developing and developed nations. In low-income countries, the majority of losses are **post-harvest** — food that spoils before reaching the consumer due to inadequate storage, refrigeration, and transport infrastructure. In sub-Saharan Africa, up to 40 percent of fruit and vegetable harvests are lost before they ever reach a market, often because farmers lack

access to basic cold-chain facilities. These losses represent not merely wasted food but wasted labour, water, energy, and land — resources that impoverished communities can ill afford to squander.

In high-income countries, by contrast, the problem lies overwhelmingly at the retail and consumer end of the chain. Supermarkets reject enormous quantities of **perishable** produce that fails to meet cosmetic standards — misshapen carrots, undersized apples, blemished tomatoes — despite being perfectly nutritious. Consumers, accustomed to perpetually stocked shelves and influenced by confusing date labelling ("best before," "use by," "sell by"), discard vast quantities of food that is still safe to eat. In the European Union, households alone account for over 50 percent of all food waste.

## The Environmental Reckoning

When food waste ends up in **landfill**, it decomposes anaerobically, producing methane — a greenhouse gas roughly 80 times more potent than carbon dioxide over a 20-year period. The water footprint of wasted food is equally alarming: producing food that is never eaten consumes approximately 250 cubic kilometres of water annually — three times the volume of Lake Geneva. The land used to grow wasted food covers an area larger than China.

Addressing food waste requires intervention at every level of the system. In developing countries, investment in cold-chain infrastructure, improved storage facilities, and better rural road networks could dramatically reduce post-harvest losses. In wealthy nations, regulatory reforms — including standardised date labelling, relaxed cosmetic standards for produce, and tax incentives for food donation — are essential. France's pioneering 2016 law prohibiting supermarkets from destroying unsold food, requiring them instead to donate it to charities, has been widely cited as a model for other nations.



## Chapter IV: The Geopolitics of the Plate

*Food as a weapon, a commodity, and a source of sovereignty*

Food has always been intertwined with power. From the Roman Empire's dependence on Egyptian grain to the Soviet Union's catastrophic collectivisation of agriculture, the control of food production and distribution has been a central instrument of political authority. In the 21st century, the **geopolitics** of food have become, if anything, more complex, as climate change, population growth, trade liberalisation, and financial speculation interact to create a global food system of extraordinary fragility.

The concept of **food sovereignty**, first articulated by the international peasant movement La Vía Campesina in 1996, offers a radical alternative to the dominant model of liberalised food trade.

Food sovereignty asserts the right of peoples and nations to define their own agricultural and food policies, prioritising local production for local consumption over export-oriented agriculture driven by global market forces. Its advocates argue that the current system — in which a handful of multinational corporations control vast segments of the global seed, fertiliser, and grain markets — concentrates power in the hands of the few while leaving millions of farmers and consumers vulnerable to price **volatility** and supply disruptions.

Climate change represents perhaps the most serious long-term threat to global food security. Rising temperatures, shifting precipitation patterns, and the increasing frequency of extreme weather events — droughts, floods, heatwaves — are already reducing crop yields in many of the world's most food-insecure regions. The Intergovernmental Panel on Climate Change has warned that without significant adaptation measures, global crop yields could decline by up to 25 percent by 2050, even as population growth drives demand in the opposite direction.

Financial **speculation** on food commodities has added a further layer of instability. Following the deregulation of commodity futures markets in the early 2000s, investment banks and hedge funds poured billions of dollars into food commodity trading, amplifying price swings that bore little relation to underlying supply and demand fundamentals. During the 2008 food crisis, speculation on wheat and rice futures was identified by the UN Special Rapporteur on the Right to Food as a significant contributor to the price spikes that pushed millions into hunger.



## Chapter V: Reimagining the Food System

*From regenerative agriculture to lab-grown meat — can we feed the future sustainably?*

The converging pressures of population growth, climate change, biodiversity loss, and resource depletion have made it clear that the current food system is not **sustainable** in its present form. A growing chorus of scientists, policy-makers, and entrepreneurs are now arguing that nothing less than a fundamental transformation of how we produce, distribute, and consume food is required — a transformation that must simultaneously increase output, reduce environmental impact, and ensure equitable access.

**Regenerative** agriculture, an approach that seeks to restore soil health, enhance biodiversity, and sequester carbon through practices such as cover cropping, crop rotation, minimal tillage, and integrated livestock management, has emerged as one of the most promising alternatives to industrial farming. Unlike conventional agriculture, which treats soil as a mere medium for delivering chemical inputs to plant roots, regenerative farming treats soil as a living ecosystem whose health is fundamental to long-term productivity. Early evidence suggests that regenerative practices can match or even exceed conventional yields while dramatically reducing input costs and improving **resilience** to drought and flooding.

**Agroecology** — the application of ecological principles to agricultural systems — offers a complementary framework. By mimicking the diversity and complexity of natural ecosystems, agroecological farms can reduce dependence on synthetic inputs, support pollinator populations, and maintain the genetic diversity that is essential for adapting to changing climatic conditions. Crucially, agroecology also draws on **indigenous** farming knowledge systems that have sustained communities for millennia but were systematically marginalised by the Green Revolution's emphasis on standardised, technology-driven solutions.

## **Technological Frontiers**

At the technological frontier, **vertical farming** — the practice of growing crops in stacked, indoor environments using artificial lighting and hydroponic or aeroponic systems — promises to revolutionise urban food production. Vertical farms can produce crops year-round, independent of weather and season, using up to 95 percent less water and virtually no pesticides. Companies such as AeroFarms, Plenty, and Infarm have attracted billions in investment, and the global vertical farming market is projected to exceed \$20 billion by 2028.

**Cellular agriculture** — the production of animal products (meat, dairy, eggs) directly from cell cultures rather than from slaughtered animals — represents perhaps the most radical technological disruption on the horizon. In 2013, the world's first lab-grown hamburger was produced at Maastricht University at a cost of \$330,000; by 2023, several companies had received regulatory approval to sell cultured chicken, and production costs had fallen by over 99 percent. If cellular agriculture can achieve price parity with conventional meat — a milestone most analysts expect within the next decade — the implications for animal welfare, land use, water consumption, and greenhouse gas emissions would be transformative.



The challenge of feeding the world is ultimately not a technical problem but a political one. The technologies, knowledge, and resources to nourish every person on Earth already exist; what is lacking is the collective will to deploy them equitably. A food system that wastes one-third of its output while hundreds of millions go hungry, that degrades the very ecosystems on which future production depends, and that concentrates power and profit in the hands of a shrinking number of corporate actors is not merely inefficient — it is, by any reasonable moral standard, indefensible. The question is not whether the food system will change, but whether that change will be driven by foresight and justice or by crisis and catastrophe.

## Vocabulary Reference

Term	Definition
<b>Famine</b>	Extreme scarcity of food affecting a large population
<b>Green Revolution</b>	Mid-20th-century transformation of agriculture through science and technology
<b>Yield</b>	The amount of crop produced per unit of land
<b>Hybrid</b>	Produced by crossing two genetically different varieties
<b>Fertiliser</b>	A chemical or natural substance added to soil to increase productivity
<b>Pesticide</b>	A substance used to destroy insects or organisms harmful to crops
<b>Irrigation</b>	The artificial supply of water to land for agriculture
<b>Monoculture</b>	The cultivation of a single crop over a large area
<b>Biodiversity</b>	The variety of plant and animal life in a habitat
<b>Smallholder</b>	A farmer cultivating a small plot of land
<b>Subsistence</b>	Farming that provides only enough food for the farmer's family
<b>Emissions</b>	The release of gases, especially greenhouse gases, into the atmosphere
<b>Malnutrition</b>	A condition resulting from an inadequate or unbalanced diet
<b>Micronutrient</b>	Essential vitamins and minerals required in small quantities
<b>Stunting</b>	Impaired growth in children caused by chronic malnutrition
<b>Food Desert</b>	An area with limited access to affordable, nutritious food
<b>Commodity</b>	A raw material or primary agricultural product for trade
<b>Paradox</b>	A seemingly contradictory situation that reveals a deeper truth
<b>Supply Chain</b>	The network of processes from production to consumer delivery
<b>Post-Harvest</b>	Occurring after a crop has been collected from the field
<b>Perishable</b>	Liable to decay or go bad quickly
<b>Landfill</b>	A site for disposing of waste by burying it
<b>Methane</b>	A potent greenhouse gas produced by decomposing organic matter
<b>Speculation</b>	Trading in commodities to profit from price fluctuations
<b>Food Sovereignty</b>	A people's right to define their own food and agriculture policies

<b>Volatility</b>	The tendency to change rapidly and unpredictably
<b>Geopolitics</b>	The influence of geography and economics on politics and international relations
<b>Regenerative</b>	Relating to practices that restore and renew natural systems
<b>Agroecology</b>	Applying ecological principles to agricultural systems
<b>Resilience</b>	The capacity to recover quickly from difficulties
<b>Vertical Farming</b>	Growing crops in stacked indoor environments
<b>Cellular Agriculture</b>	Producing animal products from cell cultures rather than animals
<b>Sustainable</b>	Able to be maintained without depleting natural resources

## Fill-in-the-Blank Exercise

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**Word Bank:** *monoculture, malnutrition, food desert, subsidy, post-harvest, speculation, food sovereignty, regenerative, vertical farming, cellular agriculture*

1. The Green Revolution's emphasis on high-yield varieties encouraged \_\_\_\_\_, reducing agricultural biodiversity.
2. Hidden hunger — widespread micronutrient deficiency — is a form of \_\_\_\_\_ that affects over 2 billion people.
3. A \_\_\_\_\_ is an area where residents have limited access to affordable, nutritious food.
4. Agricultural \_\_\_\_\_ in wealthy nations distort global markets and disadvantage developing-country farmers.
5. In sub-Saharan Africa, up to 40 percent of harvests are lost due to \_\_\_\_\_ failures in storage and transport.
6. Financial \_\_\_\_\_ on commodity futures amplified the food price crisis of 2007–2008.
7. The concept of \_\_\_\_\_ asserts a people's right to define their own agricultural and food policies.
8. \_\_\_\_\_ agriculture restores soil health through cover cropping, crop rotation, and minimal tillage.
9. \_\_\_\_\_ grows crops in stacked indoor environments using up to 95 percent less water.
10. \_\_\_\_\_ produces meat directly from cell cultures rather than from slaughtered animals.

**Answers:** 1. monoculture 2. malnutrition 3. food desert 4. subsidies 5. post-harvest 6. speculation 7. food sovereignty 8. Regenerative 9. Vertical farming 10. Cellular agriculture

## Comprehension Quiz

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1. The Green Revolution is credited with saving approximately:

- A) 100 million people
- B) 500 million people
- C) One billion people**
- D) Two billion people

2. Norman Borlaug received the Nobel Peace Prize for developing:

- A) Synthetic fertilisers
- B) Disease-resistant high-yield wheat varieties**
- C) The first pesticide
- D) Irrigation systems

3. The primary cause of hunger in the 21st century is:

- A) Insufficient global food production
- B) Overpopulation
- C) Inequitable distribution and access**
- D) Climate change alone

4. 'Hidden hunger' refers to:

- A) Famine in remote areas
- B) Widespread micronutrient deficiencies**
- C) Food hoarding by governments
- D) Unreported crop failures

5. Approximately what fraction of all food produced globally is lost or wasted?

- A) One-tenth
- B) One-fifth
- C) One-third**
- D) One-half

6. In developing countries, most food loss occurs:

- A) At the consumer level
- B) During post-harvest storage and transport**
- C) At supermarkets
- D) During cooking

7. The concept of 'food sovereignty' was first articulated by:

- A) The United Nations
- B) The World Bank
- C) La Vía Campesina**
- D) The European Union

8. Regenerative agriculture differs from conventional farming primarily in its:

- A) Use of genetically modified seeds
- B) Emphasis on restoring soil health and biodiversity**
- C) Reliance on synthetic fertilisers
- D) Focus on monoculture

**9. Vertical farming's key advantage is:**

- A) Lower initial investment costs
- B) Year-round production using dramatically less water**
- C) Higher nutritional content in crops
- D) Simpler technology

**10. The text argues that the challenge of feeding the world is ultimately:**

- A) A purely technical problem
- B) Unsolvable with current technology
- C) A political problem requiring equitable deployment of existing resources**
- D) Best addressed by increasing meat production