

ESSENTIAL Questions

How does food reflect and influence culture and identity?

Food and culture are profoundly intertwined. Every meal tells a story about the culture that shaped it, when it was eaten, and by whom and when and where it was served. Recipes and ingredients have always traveled, and different civilizations may use the same food in distinct ways. For example, chile peppers native to the Americas are both a celebrated staple of Mexican **cuisine** and an essential ingredient in kimchi, the national dish of Korea. Culinary traditions change over time, influenced by geography, climate, economics, trade, and individual creativity. Recipes, both oral and written, gave food its own language. We know from an ancient cookbook that ingredients from Persia, Central Asia, and China blended into inventive feasts in the court of Mongolian ruler Kublai Khan. Modern examples of fusion cuisine include pineapples on pizza and sweet plantain in sushi.



Before refrigeration, access to vegetables during winter was difficult. Koreans often made huge batches of kimchi, salted and fermented vegetables preserved in pots and sometimes protected from early spring sunshine by small grass huts.

What's the role of human ingenuity in shaping food – past, present, and future?

Over the centuries, humans have created a spectacular diversity of foods to suit our needs, which range from higher yields and drought resistance to bigger size and better flavor. We farm in backyard plots and large-scale commercial operations, and adapt to regional conditions as well as the global marketplace. We use longstanding techniques such as irrigation and **selective breeding**, and new ones like genetic modification of plants and animals. **Arable land** is finite, so farmers are working on ways to produce more food sustainably and distribute it more efficiently. Ingenuity doesn't stay on the farm. We've developed many ways — roasting, pickling, and microwaving, to name just a few — to transform raw ingredients into a fantastic range of flavors, recipes, and cuisines.

How does what we eat affect the planet?

Decisions about food — how and where it's grown, how it's processed, and how it reaches our plates — all affect the environment. Our collective choices reflect trade-offs between productivity and environmental impact, between economic and social priorities. Clearing land for agriculture alone contributes as much as 12% of global carbon dioxide

emissions annually, and methane, another greenhouse gas, is released by livestock and rice cultivation. This increase in **greenhouse gases** is causing the climate to warm. Fertilizers and pesticides can pollute widely, and 70% percent of the world's available fresh water that humans use goes to crops and livestock. Fishing is a key source of protein for billions of people, but almost 90% of global marine **fisheries** are under pressure and entire marine ecosystems have been devastated. Transporting food between far-flung markets has an environmental cost as well. Global demand for food is increasing — along with global per capita demand. Despite all the effort that goes into producing food for people to eat, one third of it never reaches their mouths. In the developed world, much food is wasted after it reaches the consumer, and throughout the world much is lost while grown or stored.

Why is the diversity of food important?

Whether farms or forests, healthy ecosystems are biodiverse: home to a variety of living things. Healthy, resilient agricultural ecosystems replenish soil nutrients and support a range of crops and livestock, along with pollinators and the natural enemies of pests. Monocultures — where a single variety of a crop is cultivated in a given area — are less able to adapt to changes in weather or pest populations. American farmers experienced this in 1970 when their corn crop was devastated by southern corn leaf blight. Healthy meals, like healthy ecosystems, also involve diversity. There are many different ways to meet nutritional needs, and diets change as we encounter new flavors and dishes. Many ingredients in our kitchen cabinets come from different countries, broadening our nutritional and culinary options.

What's the role of food in human health?

Humans convert food into energy and the vitamins and minerals it contains keep us healthy. The amount of food a person requires varies according to weight, sex, energy output, and **metabolism**, and changes with age. What we eat affects our health and wellbeing. Too much, too little, or the wrong kinds of foods — like ones with an abundance of salt, sugars, and fats, or lacking in nutrients — can make people sick. Cultural factors that include habits, family income, ethnic heritage, attitudes toward body size, advertising, and peer pressure influence nutritional choices and eating patterns. Fewer than 5% of Americans are **undernourished**, but around 15% are **food insecure**. By causing poor health, low energy levels, and even mental impairment, insufficient **calories** can reduce people's ability to work and learn, leading to more poverty and even greater hunger. While an estimated one in every eight people, or 870 million, around the world is undernourished, more than a billion are overweight or obese — conditions associated with chronic health problems. A moderate, balanced diet is key to human health.

GLOSSARY

arable land: land suitable for growing crops

biotechnology: using living biological organisms or processes for various purposes, including production of drugs, hormones, and genetically modified foods

calorie: a unit of energy, provided in food by carbohydrates, proteins, and fats

commodity: bulk agricultural product that can be sold and traded, such as wheat or soy

cuisine: a set of cooking practices and traditions, often associated with a particular region or culture

domestication: altering wild plant and animals at the genetic level by selective breeding to accentuate traits that benefit humans

fishery: an area where fish are harvested (wild) or farmed (aquaculture)

food security: stable access to enough food and the ability to prepare it in a healthy way

greenhouse gas: gases that absorb solar energy and reemit it as infrared energy that warms Earth's atmosphere

metabolism: the set of chemical reactions that maintain life within organisms

organic farming: farming that does not use synthetic fertilizers and relies on natural or mechanical methods for weed and pest control

selective breeding: breeding members of the same species for desirable traits

undernourishment: too little food for good health. Malnutrition — too little of the right kinds of nutrients — can involve under or over nourishment.

THE SCIENCE OF TASTE

Your tongue and mouth are filled with taste buds. Each cell in these bundles senses a single **taste** — sweet, sour, bitter, salty, or umami (savory) — and sends this chemical information to the brain. In order to sense **flavors**, your brain integrates information about taste, along with texture, temperature, and input from the other senses: your eyes (red drinks likely taste sweet!), your ears (celery has to crunch!), and above all your nose. Odor molecules are inhaled through your nostrils and also pass between your throat and nasal cavity as you chew. These messages travel to the brain, which can tell thousands of aromas apart. All of this sensory input combines to make it possible to enjoy countless subtle flavors, like the difference between strawberry and cherry jellybeans. Preferences — whether you like spicy foods or unusual flavors, for example — can be shaped by many factors, including anatomy, genetics, evolution, culture, memory, and marketing.

COME PREPARED

Plan your visit. For information about reservations, transportation, and lunchrooms, visit amnh.org/plan-your-visit.

Read the Essential Questions in this guide to see how themes in *Our Global Kitchen* connect to your curriculum. Identify the key points that you'd like your students to learn.

Review the Teaching in the Exhibition section of this guide for an advance look at the models, artifacts, and interactives that you and your class will be encountering.

Download activities and student worksheets at amnh.org/our-global-kitchen/educators. Designed for use before, during, and after your visit, these activities focus on themes that correlate to the New York State Science Core Curriculum.

Decide how your students will explore the *Our Global Kitchen* exhibition.

- You and your chaperones can facilitate the visit using the **Teaching in the Exhibition** section of this guide.
- Your students can use the **student worksheets** to explore the exhibition on their own or in small groups.
- Students, individually or in groups, can use copies of the **map** to choose their own paths.

CORRELATIONS TO NATIONAL STANDARDS

Your visit to the *Our Global Kitchen: Food, Nature, Culture* can be correlated to the following standards.

National Curriculum Standards for Social Studies

Thematic Strands: 1. Culture; 3. People, Places, and Environments; 7. Production, Distribution, and Consumption; 8. Science, Technology, and Society; 9. Global Connections

A Framework for K-12 Science Education

Crosscutting Concepts: Patterns; Cause and Effect: Mechanism and Explanation; Scale, Proportion, and Quantity; Systems and System Models; Energy and Matter: Flows, Cycles, and Conservation; Structure and Function; Stability and Change

Science Practices: Asking Questions and Defining Problems; Analyzing and Interpreting Data; Constructing Explanations and Designing Solutions; Engaging in Argument from Evidence; Obtaining, Evaluating, and Communicating Information

Core Ideas: LS3.A: Inheritance of Traits; LS3.B: Variation of Traits; LS4.C: Adaptation; LS4.D: Biodiversity and Humans; ESS3.A: Natural Resources; ESS3.C: Human Impacts on Earth Systems; ETS2.B: Influence of Engineering, Technology, and Science on Society and the Natural World

Teaching in the EXHIBITION

Food is fuel — and so much more. Our food choices connect all of us: families, cultures, and the billions of people with whom we share ingredients, cuisines, and the planet itself. Feeding this growing global population will require meals that meet our nutritional needs, safeguard the environment, and still delight us with their textures and flavors.

Use the **guided explorations** below to help your students investigate how food is grown, how it reaches our markets and kitchens, how cooks and cultures create cuisines, and the role of food in ceremony and celebration. (*Possible answers follow each question.*)

Our Global Kitchen Theater

A video towards the beginning of the exhibition describes how everything we eat affects — and is affected by — the world around us. Invite students to watch the video and keep this theme in mind as they walk through the exhibition.



GROW

OVERVIEW: Over the centuries, humans have created countless varieties of crops and livestock adapted to local conditions. We've also come up with many different ways to grow food, which involve factors that range from climate and soils to available energy and technology.

GUIDED EXPLORATIONS:



Domesticated chickens produce up to 300 eggs a year. Their closest wild ancestor, the red junglefowl of Southeast Asia, lays 10 to 15.

- **“Reshaping Our Foods” wall:** Most domesticated species barely resemble their wild ancestors. Have students look at these examples of plants and animals we raise for food and identify ones they recognize. (*e.g. chicken, strawberry, sheep, potato, chile*) Ask them what aspects have been transformed by humans. (*e.g. yield, size, shape, taste*)

- **Agriculture mini-dioramas, vertical gardens, & “Future of Growing” cases:** All plants require water, light, and a growing medium (e.g. soil) in order to thrive. Have students compare and contrast farming methods. What techniques help people farm successfully around the world? What are some challenges they face? (*e.g. large-scale farming produces high yields at relatively low prices; uses chemicals and a great deal of water; depletes the soil*) How are farmers addressing these challenges? (*e.g. in densely populated urban areas farmers use rooftop garden beds, vertical gardens, and hydroponic growing technology*)



On diversified farms like this one, farmers grow crops and raise animals in ways that sustain natural ecosystems.



TRADE

OVERVIEW: From sacks of spices to shiploads of grain, food moves along complex trade networks: between corporations and governments, from markets to restaurants, even among families and neighbors.

GUIDED EXPLORATIONS:

- **Aztec marketplace diorama:** Walk through the giant marketplace near Tenochtitlán in 1519 with your students. Food and other items were carried to this capital city from all over the thriving Aztec Empire (now Mexico). Invite students to examine what's for sale and to identify foods that look familiar. (*e.g. peppers, tomatoes, corn*) What common foods are missing? (*e.g. bread, cheese, chicken*) Have them find chocolate in different forms and explore how the Aztecs used it. (*e.g. beverage, currency, tribute to conquerors, offerings to gods*)



Vast and well organized, the market of Tlatelolco served up to 60,000 people a day. Beyond its walls loomed the Aztec city's great pyramid.

- **“Modern Markets” map & trade interactive:** Food might come from your garden — or from the other side of the world. Have students explore how and why foods move around the world.



COOK

OVERVIEW: Over time and across civilizations, cooking has given rise to a fantastic diversity of tools, techniques, and cuisines.

GUIDED EXPLORATIONS:

• **Cooking objects, preservation methods, & utensils:**

People in almost every culture around the world cook. Have students explore similarities and differences in the ways cultures around the world preserve and prepare food.

(e.g. high-heat cooking in China, grinding corn in Mesoamerica,

stewing in Morocco, pickling in Korea) See if students can figure out what the various utensils are used for.



French chefs are famous for using copper pots, like those in this kitchen. Copper, an excellent conductor of heat, has been used in cooking for thousands of years in many parts of the world.

• **Cooking interactive:** Invite students to prepare four virtual dishes — grilled fish from the United States, poached eggs with hollandaise sauce from France, groundnut soup from Africa, and tamales from the Americas — to learn about the science behind different cooking methods. *(e.g. grilling, poaching, sweating, boiling, sautéing, stewing, steaming)*



TASTE

OVERVIEW: The flavor of food depends on a variety of factors, including appearance, smell, and familiarity.

GUIDED EXPLORATIONS:

• **Carts & models:** The way we sense food is shaped by both biology and experience. Have students explore how their taste buds work, how appearance can affect flavor, how culture influences food choices, and the evolution of food preferences.

• **Tasting experiments:** Students can participate in taste experiments or watch demonstrations.



EAT

OVERVIEW: As the saying goes, “you are what you eat.” Meals reflect our histories, social and economic status, and priorities. Issues that include obesity and food scarcity are influencing the way we eat now — and will eat in the future.

GUIDED EXPLORATIONS:

• **“Groceries for a Week” photos:** Diets vary greatly. Have students examine photos of what families around the world consume over the course of one week. How do these families’ diets compare to their own?

• **“What Does Food Mean to You?” virtual postcards:** Have students explore what food means to other visitors. Ask what image they would choose for their own postcard.

• **Dioramas and models of seven iconic meals:** These represent meals eaten by notable people in different eras, including Kublai Khan’s feast, Jane Austen’s dessert, and Michael Phelps’ breakfast. Invite students to examine the meals and identify familiar dishes. What do these meals reflect about when and where they were served, and to whom? *(e.g. ice cream was a luxury in an era before refrigeration; a meal on-the-go for an ancient traveler)*

• **“Future of Food” exhibit:** Invite students to explore what the future holds, from eating algae and insects to the role of biotechnology.



CELEBRATE

OVERVIEW: Food does so much more than keep us alive. It plays a central role in family tradition, cultural heritage, and religious ritual.

GUIDED EXPLORATIONS:

• **“Celebrations” theater and objects:** Invite students to watch the video and examine objects to explore how food is part of celebrations and rituals around the world, such as China’s Autumn Moon Festival and the Day of the Dead in Mexico.



For their harvest festival, Korean families make songpyeon: steamed rice dumplings filled with sweet sesame, bean, or chestnut paste.

ONLINE Resources

Our Global Kitchen Exhibition Website

amnh.org/our-global-kitchen

Access videos, photo galleries, related programs, and more.

Global Grocery

amnh.org/ology/features/globalgrocery/

Find out where in the world many of the foods in your kitchen come from. OLogy is the Museum's website for kids.

Science Bulletins

amnh.org/sciencebulletins

Videos, essay, and data visualizations about current research.

Monterey Bay Seafood Watch

montereybayaquarium.org/cr/seafoodwatch.aspx

Sustainable seafood choices for consumers and businesses.

Healthy School Food

www.healthyschoolfood.org

Nutrition education, information about plant-based foods, and programs for the whole school community from the New York Coalition for Healthy School Food.

Food n' Me

foodnme.com

A lively interactive site that educates kids and promotes healthy eating.

NYPL: What's on the Menu?

menus.nypl.org

Over 15,000 historical restaurant menus, dating back hundreds of years and searchable dish by dish.

The Kitchen Sisters

kitchensisters.org

The "Hidden Kitchens" radio series explores how communities come together through food.

Windowfarms

our.windowfarms.org

Find out why and how to start a farm in your window, and join a global online community of vertical farmers.

Johns Hopkins: Teaching the Food System

jhsph.edu/research/centers-and-institutes/teaching-the-food-system

A cross-disciplinary approach to studying what's involved in getting food from field to plate. An 11-module curriculum emphasizes the relationships between food, public health, equity, and the environment.

USDA: Choose My Plate

www.choosemyplate.gov

The USDA's building blocks of a healthy diet, with tools and tips to help Americans make good food choices.

Harvard School of Public Health: The Nutrition Source

hsph.harvard.edu/nutritionsource

Clear and thorough information about healthy eating, including a Nutrition A-Z, recipes, studies, and news.

Meatless Monday

meatlessmonday.com

Information and recipes to help reduce meat consumption and its toll on the environment. Includes links to other public health initiatives, and activities for kids.

Nourish: Food + Community

nourishlife.org

Resources designed to encourage meaningful conversations about food and sustainability in schools and communities.

Share Your Best Food Memories!

We invite you and your students to take part in the "What Does Food Mean to You?" interactive.

Just post your **photo** on Instagram with hashtag #CelebrateFood. Include a **caption** about what makes this moment special. Your photo may be featured in the exhibition or on amnh.org!



CREDITS

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