

Our Hungry Planet

Supplementary Materials



Changing Your Diet

Did you know that food production is the single largest use of land on earth? Croplands and pastures occupy 40 percent of the earth's ice-free surface.¹ But not all kinds of food take the same amount of land to produce. The amount of land required to produce something is called a 'land footprint.' When you take into account the land used to graze animals and the land used to grow crops to feed the animals, meat and dairy have a larger land footprint than vegetables, fruits, and grains.

As people earn more money, they eat more meat and dairy products. Increasing global wealth could lead to a doubling in meat and dairy demand in the coming decades. If every person in the world ate the meat-heavy diet of an average American, by 2050 we would need twice the farm land that we currently use.² Forests and other habitats would have to be cleared to make more room for agriculture.

Eating less animal products can reduce our diet's land footprint and reduce global deforestation. Deforestation is not only a threat to biodiversity, it is also a major source of greenhouse gas emissions. Trees capture and store carbon through photosynthesis, and when they are burned or cut down, this carbon is released back into the atmosphere. A recent study found that cutting global meat and dairy consumption in half would free up enough additional land to feed 2 billion people.³ Also changing the kind of meat we eat can change the land requirements of our diets. On average beef takes 28 times more land than other forms of animal protein.⁴ Therefore, switching from beef to chicken or pork could significantly reduce the land requirements of our diets.

But changing what we eat may not be easy for everyone, given that culture, tradition, and personal habits all play a role in dietary preferences. And in some developing countries with dry climates, grazing livestock is one of the few reliable sources of food. However, in the U.S. and in western Europe, most people eat more meat than is healthy, contributing to obesity and other diseases. Therefore eating less meat could benefit the environment and our health.⁵

To learn about other solutions to global food issues, read more at [Our Hungry Planet](#).

¹ [Foley et al. \(2011\)](#)

² [Kastner et al. \(2012\)](#)

³ [Cassidy et al. \(2013\)](#)

⁴ [Eshel et al. \(2014\)](#)

⁵ [Tilman, G.D. & Clark, M. \(2014\)](#)





Weighing the Benefits and Drawbacks of Changing Your Diet

For a complex problem, we need to evaluate how a solution fares across multiple dimensions:

Benefits

Drawbacks

**Environmental
Factors**

**Social & Cultural
Factors**

**Economic
Factors**



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Weighing the Benefits and Drawbacks of Changing Your Diet

For a complex problem, we need to evaluate how a solution fares across multiple dimensions:	Benefits	Drawbacks
Environmental Factors	<ul style="list-style-type: none">• Eating less meat—especially red meat—reduces the land, water, and energy requirements of our diets.• Reducing the land footprint of our diets would reduce deforestation.	<ul style="list-style-type: none">• Without some livestock for manure, some farms would need to use synthetic fertilizers to grow crops.• Not all climates can easily support vegetables, fruits, and grains (e.g., arid climates).
Social & Cultural Factors	<ul style="list-style-type: none">• Eating less animal products would be good for our health.	<ul style="list-style-type: none">• Significant changes in diet could disrupt some long-standing cultures and traditions.• Personal habits, tastes, and nutritional needs might not be conducive to diet changes
Economic Factors	<ul style="list-style-type: none">• A 2015 study found that eating less meat can save families money.¹	<ul style="list-style-type: none">• Meat and dairy production is a large industry. Some large companies may have to shift focus away from livestock sector towards other kinds of food.

Additional resources

BBC News: [Beef environment cost 10 times that of other livestock](#)

NPR: [A Nation Of Meat Eaters: See How It All Adds Up](#)

Civil Eats: [Mostly Plants: New Science Says a Healthier Diet is Best for the Climate](#)

University of Minnesota's Institute on the Environment: [Change our diets, change our density?](#)

Scientific American: [How Does Meat in the Diet Take an Environmental Toll?](#)

¹ Flynn, M. M. & Schiff, A. R. (2015)



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Eliminating Food Deserts

A food desert is a residential area without easy access to fresh and healthy foods such as fruits and vegetables. The United States Department of Agriculture defines food deserts differently depending on where people are living. In cities and rural towns, a food desert is defined as lack of healthy food access within a mile of a person's home. In rural areas, where people are more likely to own a car, food deserts are defined as lack of healthy food access within 10 miles of a person's residence.¹

In the United States it is estimated that 23 million people live in food deserts. Lack of access to healthy, affordable fruits, vegetables and whole grains can lead to poor diets. Eating too much fast food that is high in fat, salt, and sugar can contribute to obesity and diet-related diseases such as cardiovascular disease and some cancers. Having access to fresh fruits and vegetables has the potential to improve people's diets and health.

Although a neighborhood's lack of healthy food does play a role in unhealthy diets, it's not the only thing that determines a person's eating habits. As it turns out, a family's income plays a major role in their diets, even more so than proximity to grocery stores with healthy food. Recent research suggests that introducing a supermarket doesn't necessarily improve nearby residents' diets.² This suggests some families may not always have the time to plan and prepare home-cooked meals.

Introducing a supermarket into low-income neighborhoods may also have secondary impacts. Grocery stores make neighborhoods more attractive to live in, and in several instances in the U.S., introducing new stores into neighborhoods has increased housing costs, potentially making it more expensive to live in those places.³

To learn about other solutions to global food issues, read more at [Our Hungry Planet](#).

¹ [USDA \(November, 2015\)](#)

² [Guminski, Sarah \(October, 2015\)](#)

³ [Sullivan, Daniel Monroe \(2014\)](#)





Weighing the Benefits and Drawbacks of Strategies to Eliminate Food Deserts

For a complex problem, we need to evaluate how a solution fares across multiple dimensions:	Benefits	Drawbacks
Environmental Factors		
Social & Cultural Factors		
Economic Factors		



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Weighing the Benefits and Drawbacks of Strategies to Eliminate Food Deserts

For a complex problem, we need to evaluate how a solution fares across multiple dimensions:	Benefits	Drawbacks
Environmental Factors	<ul style="list-style-type: none">• Living close to fresh and healthy food may lead to less miles driven in a car.• More access to fruits and vegetables may lead to less meat consumption.	
Social & Cultural Factors	<ul style="list-style-type: none">• Having access to more fruits and vegetables may lead to a healthier diet.• Access to a grocery store within walking distance may promote more exercise.	<ul style="list-style-type: none">• Not everyone has the time to cook vegetables or prepare salads.
Economic Factors	<ul style="list-style-type: none">• Improved diets could reduce healthcare costs.	<ul style="list-style-type: none">• Grocery stores make neighborhoods more attractive to live in, potentially making housing costs more expensive.

Additional Resources

Atlantic: [Are Food Deserts to Blame for America's Poor Eating Habits?](#)

New York Times: [Giving the Poor Easy Access to Healthy Food Doesn't Mean They'll Buy It](#)

NPR: [How To Find A Food Desert Near You](#)



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Reducing Food Waste

Globally about one-third of the food produced never gets eaten, and this translates to about 1.3 billion tons¹, or over 140 million garbage trucks full of wasted food per year. In the United States, about 40 percent of the food is wasted!² Most food waste in the United States happens in homes or at restaurants, where food is thrown away because it spoils before it can be used, because it is left uneaten on a plate, or because too much food is made and not eaten. According to the U.S. Department of Agriculture, on average an American family of four throws out about \$1,500 worth of food in a year.³

Food waste not only costs us money, it also takes a huge environmental toll. In the U.S. a lot of resources, including fertilizer, cropland, freshwater, and energy, are used to grow uneaten food.⁴

When food and other organic matter decomposes, it produces methane gas. Methane is a greenhouse gas that is 30 times more potent than carbon dioxide. Since food waste is the biggest component of landfills, landfills are a major source of greenhouse gas emissions. Thus, reducing food waste could reduce methane emissions from landfills.

Reducing food waste would also likely decrease food prices, which would benefit low-income consumers.⁵ If food waste in the U.S. were cut by 30 percent, it would be enough food for 50 million people!

Although reducing food waste would have huge economic and environmental benefits, changing consumer behavior is difficult. Instead of making one big trip to the grocery store a week, better meal planning and more frequent trips to the store could reduce food waste. Also, sell-by and use-by dates on packages don't indicate when food is no longer safe to eat. The confusion around the meaning of these dates leads to lots of still fresh foods being tossed out.

To learn about other solutions to global food issues, read more at [Our Hungry Planet](#).

¹ [Gustavsson, J. et al. \(2011\)](#)

² [Gunders, Dana \(2012\)](#)

³ [USDA \(September, 2015\)](#)

⁴ [Reich, A. H. & Foley, J.A. \(April, 2014\)](#)

⁵ [Buzby, J.C., et al. \(2014\)](#)





Weighing the Benefits and Drawbacks of Reducing Food Waste

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Weighing the Benefits and Drawbacks of Reducing Food Waste:



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Environmental Factors	<ul style="list-style-type: none">• Reducing food waste would reduce the land, water, and energy required for our diets.• Landfills would emit less methane.• Less deforestation for food production.	
Social & Cultural Factors	<ul style="list-style-type: none">• Meal planning could be a way to get the whole family involved in a fun project together.	<ul style="list-style-type: none">• Changing behaviors around shopping, preparing and storing food may be difficult.• Not everyone has time for better meal planning.
Economic Factors	<ul style="list-style-type: none">• Reducing food waste could save consumers money. A typical American household could save \$1,500 a year.• Could reduce overall food prices, which would benefit lower income families.	

Additional Resources

NPR: [It's Time To Get Serious About Reducing Food Waste, Feds Say](#)

ENSIA: [How one small change could reduce your food waste](#)

ENSIA: [If everybody hates wasting food, why do we do it \(and how can we stop\)?](#)

UMN Food Policy Res. Cen.: [Food Loss and Waste in the US: The Science Behind the Supply Chain](#)

National Geographic: [One-Third of Food Is Lost or Wasted: What Can Be Done](#)



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Vertical Farming

Many people living in urban environments don't know where the fruits and vegetables they eat are grown. Also, about 23 million people in the U.S. don't live close to stores that sell fresh fruits and vegetables in regions referred to as 'food deserts'. Vertical and urban farms are a way to bring fruit and vegetable farms into cities.

Growing food uses more land than any other human activity, but vertical farming is a way to grow food without using up so much land. Vertical farms can be different kinds of structures used to grow crops vertically, such as a multi-story greenhouse or structures built along the side of skyscrapers.

If plants are grown within a building, it is possible vertical farms could reduce the irrigation water needed to grow crops, especially if the water is recycled for multiple uses. Also, crops grown within a building wouldn't have to be sprayed with pesticides because there would be a lot less bugs and pests. But vertical farms are very expensive and require more energy—in the form of artificial light—than open field farms, and may not be able to meet a high proportion of our food needs.¹

Vertical farming is often touted as being environmentally friendly because it could reduce the number of miles food needs to travel to get to our plates. However, the energy used to transport food is often a small fraction of the total energy used to plant, fertilize, and harvest food. Also all of the sunlight energy crops typically receive when grown in open fields must be replaced by artificial light in cities, depending on the type of structure used for vertical farming.

To learn about other solutions to global food issues, read more at [Our Hungry Planet](#).

¹ Sarkar, A. & M. Majumder (2015) Opportunities and Challenges in Sustainability of Vertical Eco-Farming: A Review. Journal of Advanced Agricultural Technologies Vol. 2, No. 2.





Weighing the Benefits and Drawbacks of Vertical Farming

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Weighing the Benefits and Drawbacks of Vertical Farming

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Environmental Factors	<ul style="list-style-type: none">• Vertical farming could result in less land used to grow fruits and vegetables.• Could use less water and pesticides to grow crops.• Could grow crops year-round.	<ul style="list-style-type: none">• Vertical farming is energy intensive.
Social & Cultural Factors	<ul style="list-style-type: none">• People like knowing where and how their food was grown.• When children see vegetables grown in their neighborhood they're more likely to eat them.	<ul style="list-style-type: none">• Vertical farming is labor intensive
Economic Factors	<ul style="list-style-type: none">• Could create new employment opportunities in urban areas	<ul style="list-style-type: none">• Large upfront cost to building vertical farming structures.• Vertical and urban farms use prime urban areas which would be expensive to maintain.

Additional Resources

CNBC: [Vertical farming: The next big thing for food—and tech](#)

Io9: [World's first commercial vertical farm opens in Singapore](#)

New York Times Op-Ed: [A Farm on Every Floor](#)

BoingBoing: [World's first underground urban farm is about to sell its produce](#)

