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A LETTER FROM THE CO-CHAIRS

Dear Participant,

We'd like to take this moment to thank you for coming to this year's conference, and to introduce ourselves and the rest of the UNIS-UN organizing and executive committees.

The UNIS-UN Conference was founded in 1976 by Ms. Sylvia Gordon, a teacher at the United Nations International School. Her dream was to create an event that would draw attention to the world's most pertinent issues while embodying the values of education and cross-cultural understanding shared by UNIS and the UN. Over the years, UNIS-UN has evolved into the largest student-run conference held in the United Nations General Assembly, with over 500 students attending from six continents.

Each year, the responsibility of carrying on UNIS-UN and the legacy of Ms. Gordon is placed on a group of highly dedicated UNIS students, who have shown responsibility and passion for continuing her efforts. Our planning begins in April by interviewing and selecting students for our Executive Committee. We are then divided into six commissions: Editing, Finance, Logistics, Visiting Schools, Speakers, and Technology. Together, we work with UNIS students making up the Organizing Committee to plan all aspects of the conference, from website design and social media presence to speaker and participant invitations and more.

Last year, the responsibilities of the UNIS-UN executive committee significantly changed. This year, these challenges remained and evolved as we had to continue to adapt to overcome the lingering challenges presented by the pandemic. We have built on what we learned from last year's challenges of adjusting to a fully online-platform to make this year's conference even better. Commissions were tasked with exploring new innovative ways to make our conference engaging and informative all while over a virtual platform. Through another year of successful teamwork and collaboration, we have planned a conference that we are incredibly proud of.

Over the coming days, you will have the opportunity to listen, discuss, and debate the most prominent issues concerning food insecurity. As you hear from speakers and debate panelists we hope that you will not only express your own voice but also bring what you learn and experience here to your own countries and communities. We've worked hard to plan a marvelous experience for you, and we are excited to welcome you to our 46th annual UNIS-UN Conference.

Here's to a wonderful conference!

Sincerely,

Eva Lifsec and Jack Hochman

Co-Chairs of UNIS-UN

FOREWORD

Food insecurity is an issue that has been prevalent for centuries. Now at a record breaking global population, a new problem is emerging: whether or not our planet has sufficient resources to nourish the growing 7.9 billion of us. Food affects our lives dramatically, and for those who have endless access, there is never a question of where your next meal is coming from.

This working paper seeks to address and educate on the impact food has, and will continue to have, on our growing world. It is our hope that its contents will allow you to further develop your understanding of the issue as a whole as well as how to address the struggle many food insecure individuals and countries face. It is crucial to understand the significant impact we as individuals have on our planet in regards to what we eat, how we acquire our food, and how we discard it. Sustainability is a topic that is frequently promoted, however, how does one effectively pursue sustainable living and habits when it comes to sourcing and discarding food? How have innovations in tech and agronomical sciences diminished gaps of accessibility in relation to food? And what role do food industries themselves play as actors in the global consumption of food? We hope that the following articles assist you in answering these ambitious questions and that they nurture compelling discussions. As you hear from debate panelists and speakers, this information is at your disposal for contribution to the discussion.

DEBATE MOTION I

“The fast-food industry has had positive effects on reducing food insecurity.”

In debating this motion, we encourage students to consider both the benefits and disadvantages of the fast-food industry. Students should evaluate the accessibility, nutrition and sustainability of fast food, and create compelling arguments that relate these concepts back to the main idea of food insecurity. Students should also consider how the fast food industry supplies families with a low cost food source for the required nutrition in a given day. On the other hand, fast food is notorious for its negative health impacts, especially those pertaining to cholesterol problems and heart complications. The fast food industry has observed successes on a transnational scale and will continue to have tremendous relevance in the near future; so it will be the job of us, as future leaders, politicians and lawmakers, to determine the boundaries, ethics, limitations and benefits of this industry. This raises some questions such as: How does the fast food industry contribute to the nutrition of low income families? How has the fast food industry provided economic opportunities that positively affect other aspects of society? How does the fast food industry impact other food industries? How can the fast food industry fill the gaps in food deserts? Consider the effects specifically on small-scale, family-owned businesses or other grocery stores. How has the fast food industry imposed additional pressures on the healthcare system due to the negative medical repercussions experienced by those who are regular consumers? How has the fast food industry taken advantage of low income families' dependency on low cost nutrition to maximize profits and customer retention?

DEBATE MOTION II

“Food secure nations have the responsibility to provide food for undernourished populations”

In debating this, we would like you to consider the advantages and disadvantages of food secure nations supporting and providing aid to those that are undernourished. World hunger is on the rise, with about 10% of the global population going to bed hungry each night. Food secure nations, such as the US, Ireland, and the UK, have access to sufficient resources and technologies to contribute to solving world hunger. However, hunger and poverty aren't only an issue affecting emerging countries, but also developed nations. This gives rise to the question of how we define a 'food secure' nation when all countries have a percentage of their population facing issues of hunger and malnourishment? Also, consider to what extent conflicts between nations limit the impact of aid from food secure nations? How have politicians within underdeveloped countries attempted to address this issue, if at all? Should food secure nations be reimbursed for aiding undernourished populations? Is it even another government's role to provide enough food for another country when multilateral organizations (IMF, the World Health Organization, etc.) are already being funded by food secure nations? Who falls under the universe of obligation for a food secure nation? How can providing for undernourished populations not only improve issues surrounding food insecurity, but also other factors such as the economy and overall quality of life? What is the relationship between population growth and food security and does it have a considerable impact on a nation's food security? These are some guiding questions that we hope you will address while preparing for the debate.

POLITICS

Elea Demetriou

From our hunter gatherer origins till now, humanity has always revolved around food. In this way, food is both a political and social matter. The emergence of global food systems and trade have been highly influenced by multiple factors. The influence of different climactic zones on the ability to house certain agricultural markets as well as raise livestock, and the uneven distribution of land resources, is what led to trade between continents. What certain countries lack is what others have, and vice versa. Similarly, patterns of colonization and decolonization led to the evolution of global trade systems, as well as the infrastructures to support them.¹ Food is a political issue when examined to the extent of what governments are doing, or are capable of doing, in order to keep food stability in their nation. It is also a political issue when looking at it through the lens of exports and imports, as well as a country's economy. If the GDP of a certain country comes primarily from agricultural production, then consequently that country will have a more political focus on food than a country whose GDP comes mostly from services.² Food implicates matters of consumption, production, and distribution across both national levels and local levels. This article will explore the politics of food through lenses of global trade and supply, as well as farmers issues and rights. Lastly, it will explore food dumping— a more recent phenomenon of the global food market.

Global supply chains (GSCs) are, by definition, networks that possibly span across multiple countries and continents with the purpose to source and supply goods (such as food) and services. These GSCs are crucial in linking developing countries to international markets.³ Substantial parts of the production portion of GSC's happen in developing countries, which offers these countries both opportunities as well as challenges. For one, the dependence the international market has on said developing countries gives those countries power and connections on the international level. However, this power is followed by immense amounts of pressure, responsibility, and expectations. Being a production country also introduces competitiveness between other production countries.⁴ Some argue that this viciously competitive market aids development, as it forces countries to develop mature infrastructures of production at rapid rates (therefore aiding their GDP). Others state that it leads away from development and rather wreaks havoc on a socio-economic level.⁵

The weaponization of GSC's by countries such as China and the US are very prominent, as politics are involved in every aspect of the GSC. Examples of weaponization are tariffs and sanctions stemming from international feuds which result in an inaccessibility to food for certain populations. Taking China's

¹ Food and Agriculture Organization. "World Agriculture: Towards 2015/2030 - An FAO Perspective." www.fao.org/3/y4252e/y4252e11.htm.

² Leach, Melissa, et al. "Food Politics and Development." *ScienceDirect.com | Science, Health and Medical Journals, Full Text Articles and Books*, www.sciencedirect.com/science/article/pii/S0305750X20301509.

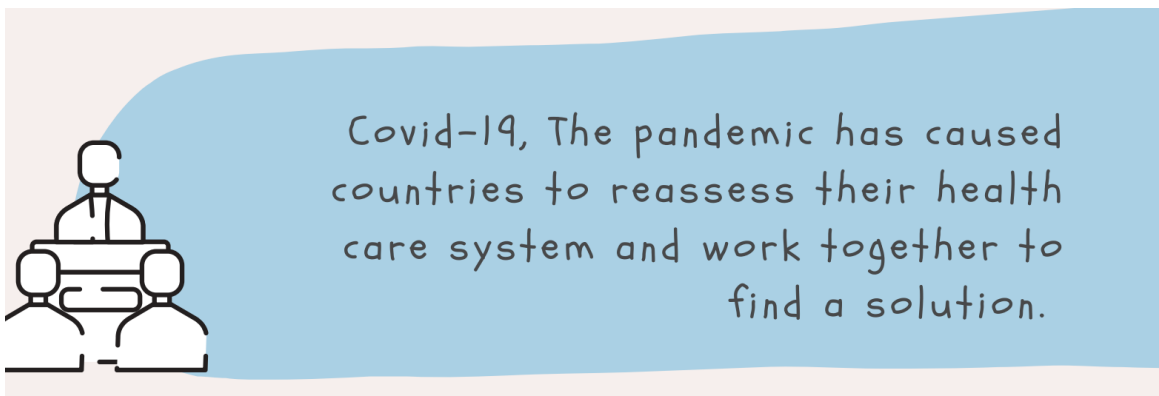
³ CIPS. "Global Supply Chains." *The Chartered Institute of Procurement and Supply*, www.cips.org/knowledge/procurement-topics-and-skills/supply-chain-management/global-supply-chains/.

⁴ Nicita, Alessandro, et al. "POLICY ISSUES IN INTERNATIONAL TRADE AND COMMODITIES STUDY SERIES No. 55." *UNCTAD*, unctad.org/system/files/official-document/itcdtab56_en.pdf.

⁵ Nicita, Alessandro, et al. "POLICY ISSUES IN INTERNATIONAL TRADE AND COMMODITIES STUDY SERIES No. 55." *UNCTAD*, unctad.org/system/files/official-document/itcdtab56_en.pdf.

industrialization, the nation has mastered these supply chains. Examples of this can be seen in its manufacturing, port construction and operation, distribution and shipping logistics, and even its round-the-clock maritime surveillance and security. This is an issue for countries such as Saudi Arabia or Qatar, whose GDP's are almost completely dominated by service and barely any agriculture. Since Saudi Arabia and Qatar do not have anywhere near the necessary agricultural production levels to sustain their populations within their borders, they rely heavily on Chinese food imports. That is how the weaponization of Global Supply Chains happens.⁶

We can see examples of the politics of supply chains and trade all across the globe thanks to COVID-19. During this pandemic, manufacturers have been forced to reassess their supply chains. Governments everywhere will be facing significant pressure for the foreseeable future to increase domestic production, grow employment, reduce their dependence on risky sources, and rethink strategies of lean inventories and just-in-time replenishment. In other words, the COVID-19 crisis has led countries to reassess their own levels of food self-sufficiency.⁷



It is in the interest for countries (especially those with GDP's made up mostly in the agriculture sector) to direct their farmers in order to increase production as much as possible and have more control of their internal market. In 1949-1978,⁸ China assisted their farmers by forming communes and taking away private land. Governments striving for production control are causing unrest in certain countries. In India, for example, there is currently unrest that stems from arguments over farmer's rights, which has caused nationwide protests to ensue. Farmers have been trying to encourage their prime minister to decrease the reliance the Indian economy has on it's agricultural sectors and instead push for a higher level of private investments to bring growth. However, Prime Minister Modi has plans to double the national economy by 2024 despite the already barely sustained level of agricultural production faltering.⁹ This is only one example where national governments and politics are involved

⁶ O'dea, Christopher R. "How China Weaponized the Global Supply Chain." *National Review*, 14 Oct. 2021, www.nationalreview.com/magazine/2019/07/08/how-china-weaponized-the-global-supply-chain/.

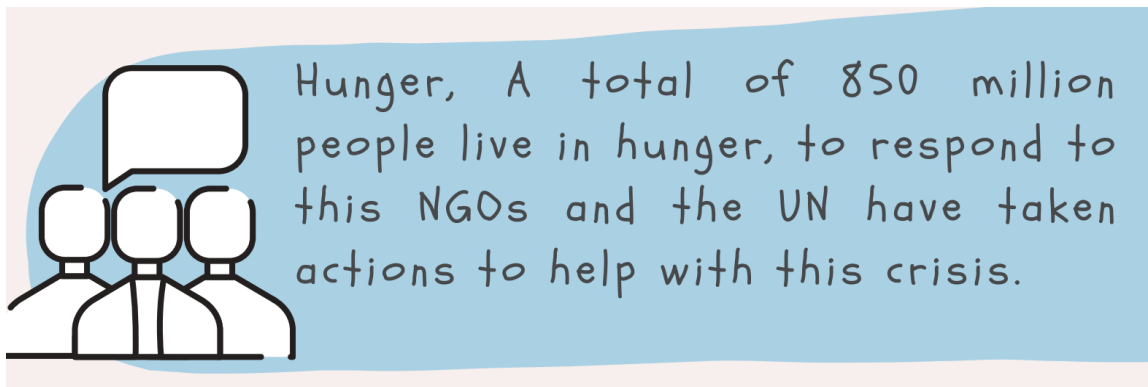
⁷ Sihhi, Willy C. "Global Supply Chains in a Post-Pandemic World." *Harvard Business Review*, 1 Sept. 2020, hbr.org/2020/09/global-supply-chains-in-a-post-pandemic-world?sa=D.

⁸ Nations Encyclopedia. "China - Overview of Economy." *Encyclopedia of the Nations*, www.nationsencyclopedia.com/economies/Asia-and-the-Pacific/China-OVERVIEW-OF-ECONOMY.html.

⁹ NYT. "Why Are Farmers Protesting in India?" *The New York Times*, NYT, 27 Jan. 2021, www.nytimes.com/2021/01/27/world/asia/india-farmer-protest.html.

with the production of the food they export. This shows that politics are involved in every aspect of food– from its production to its distribution.

In a world where 850 million people live in hunger,¹⁰ food aid is crucial. However, this same food aid can sometimes have less benevolent motivators, such as engineering product shortages to drive up product prices. If there is a surplus of a certain food produced by a country, for example, wheat, the prices will drop due to less demand. If there is a shortage, the prices will rise since there is more demand, resulting in people being willing to pay more for it.¹¹ It is in the interest of a country to avoid production shortages of a certain product. Countries like the US have found that in certain cases, the solution to preventing price drops due to product surpluses is to dump their excess product in developing countries and disguise it as food aid. In theory, this would not be an issue because these countries are in need of food. However, there are concerning ramifications to all this excess food aid that have drawn the attention of UN agencies and NGOs, which worry about how all this food aid hinders the independent development of the receiving countries.¹² This ‘food aid’ is in some cases more of food dumping than any actual aid.



Looking at Ethiopia, a war-battered country striving for development, we see a country that struggles profoundly with food insecurity. Only 1% of an estimated 5.2 million people in need of food aid actually receive it.¹³ US exportations of food as aid to Ethiopia totaled to \$109 million in 2019, over half of which have been wheat exportations (\$62 million).¹⁴ What we can conclude from this knowledge is that even though the US is giving all this food aid, the situation in Ethiopia is not improving. In fact it is doing more harm than good. The food dumping happening in Ethiopia marketed as aid by the US is hindering the domestic production of food. Since the US is giving free wheat, no one in Ethiopia is buying the wheat produced by local farmers because they figure that they can just get it for free from the aid. Without successful farmers, there is no development. The goal

¹⁰ Kripke, Gawain. "Food aid or hidden dumping?" *oxfam library*, Oxfam, oxfamlibrary.openrepository.com/bitstream/handle/10546/114492/bp71-food-aid-or-hidden-dumping-240305-en.pdf.

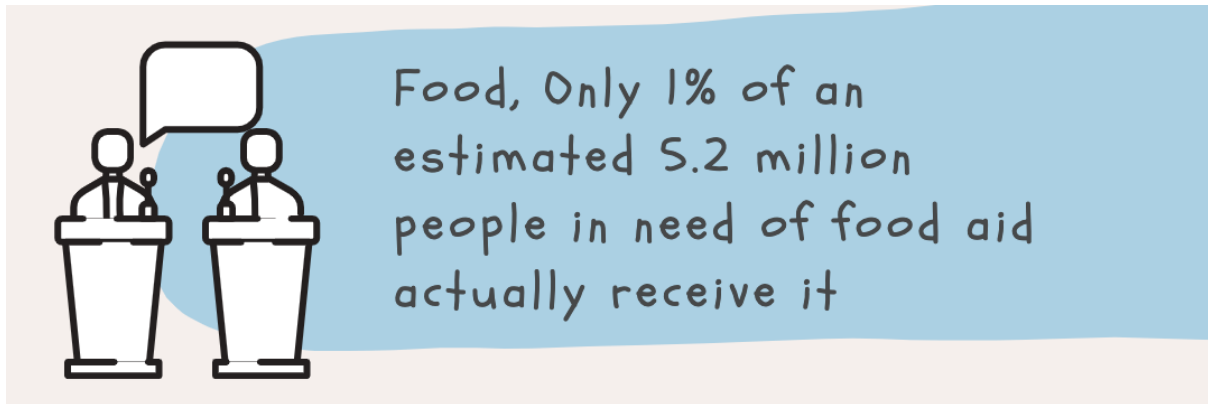
¹¹ Kripke, Gawain. "Food aid or hidden dumping?" *oxfam library*, Oxfam, oxfamlibrary.openrepository.com/bitstream/handle/10546/114492/bp71-food-aid-or-hidden-dumping-240305-en.pdf.

¹² Kripke, Gawain. "Food aid or hidden dumping?" *oxfam library*, Oxfam, oxfamlibrary.openrepository.com/bitstream/handle/10546/114492/bp71-food-aid-or-hidden-dumping-240305-en.pdf.

¹³ Jerving, Sara. "In Ethiopia's Tigray, only 1% of people needing food aid received it." *Devex.com*, Devex, 22 Oct. 2021, www.devex.com/news/in-ethiopia-s-tigray-only-1-of-people-needing-food-aid-received-it-101901.

¹⁴ United States Trade Representative. "Ethiopia." *United States Trade Representative*, Executive Office of the President, ustr.gov/countries-regions/africa/east-africa/ethiopia.

is to have Ethiopia develop into individually sustaining and supporting itself and its demand for food in the long term. This example is only one of many similar political relationships around the world.¹⁵



The World Trade Organization (WTO), set up the Consultative Subcommittee on Surplus Disposal (CSSD) in 1954, to monitor and report as well as forum food aid abuse complaints. Regrettably, between 1991 and 2001, the average reporting rates of this committee dropped from 80% to 4%, leaving food dumping to resume.¹⁶ This results in countries such as Ethiopia to continue to struggle with creating independent means to provide sufficient food to their country. Food is very much a political and social matter. The emergence of trade routes across the globe is thanks to the different patterns of colonization that took place throughout our history. At this moment in time, food is a political issue as it examines what governments are doing, or are capable of doing, in order to keep food stability in their nation. It is also a political issue when looked at through the lens of exports and imports, as well as a country's economy. The evolution of society designed Global Supply Chains (GSCs) have their own complicated array of corresponding politics. This can be seen in the weaponization of GSCs, as well as more circumstantial situations such as the recent COVID-19 crisis. Additionally, a large aspect of the politics of food comes from countries wanting to control their domestic production, and therefore closely regulating their agricultural sectors. Lastly, it is important to recognize the more recent issue of food dumping across the globe, which is an aspect of food politics born from the global economy and market.

¹⁵ Kripke, Gawain. "Food aid or hidden dumping?" *oxfam library*, Oxfam, oxfamilibrary.openrepository.com/bitstream/handle/10546/114492/bp71-food-aid-or-hidden-dumping-240305-en.pdf.

¹⁶ Kripke, Gawain. "Food aid or hidden dumping?" *oxfam library*, Oxfam, oxfamilibrary.openrepository.com/bitstream/handle/10546/114492/bp71-food-aid-or-hidden-dumping-240305-en.pdf.

CULTURE

Daria Mehrnia

Historically playing a big role in the traditions and customs of different cultures, food has long been recognized as a way of honoring one's heritage. By being able to share the dishes that define their ancestry, families use food as a way of unity and bonding. Food has been ingrained in all cultures around the world, holding specific meaning and importance that has shaped the way families interpret their ethnicities. Food can help represent cultures as it combines history and tradition into a form that still makes sense in the modern world. The knowledge of these old recipes and dishes is passed down from generation to generation, maintaining its cultural significance. These dishes define their cultures and are also a way of learning and discovery for others. Many ethnic restaurants provide diversity and the opportunity to further education and open-mindedness, as cuisine is an integral part of all cultures.

Considering food is a very traditional aspect of different cultures, its integrity has been maintained throughout history. Yet, in today's ever-changing world, commercialization has become more and more prevalent, therefore affecting all foods— even the most traditional and classic ones. While commercialization can broaden people's horizons and make different types of cuisine more accessible, it can be proved that the processed food industry has been detrimental to the cultural significance of time-honored dishes.

The cultural appropriation of food has made it so the respect and customs that came with the dishes originally are harmed. There is evidence of thousands of conventionally cultural foods that have been altered to fit a more 'attractive' and 'aesthetic' mold. For example, sushi, a very traditional Japanese dish, is meant to be clean and fresh, showcasing the high-quality raw fish used. Sushi has been said to have originated from Japan in the

ninth century during the spread of Buddhism.

As the practice strayed away from the consumption of meat, Buddhists turned to fish. The Japanese would eat preserved fish caught from their freshwater lakes, along with fermented rice, and therefore are the first to have created the notion of sushi.¹⁷

Unfortunately, the Westernization of the dish has made the dish much heavier, sauce and grease-laden, and extremely different from the original. While this proves that other

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"Food is culture, and everything - especially gender - is affected by culture."

– Silvia Benzo, author and professor of philosophy and gender studies.

¹⁷ Avey, Tori. "Discover the History of Sushi." *PBS*, Public Broadcasting Service, 5 Sept. 2012, <https://www.pbs.org/food/the-history-kitchen/history-of-sushi/>.

countries are learning from these cultures, it can also be shown that the ‘modernization’ of traditional established recipes is stripping away from its cultural importance.

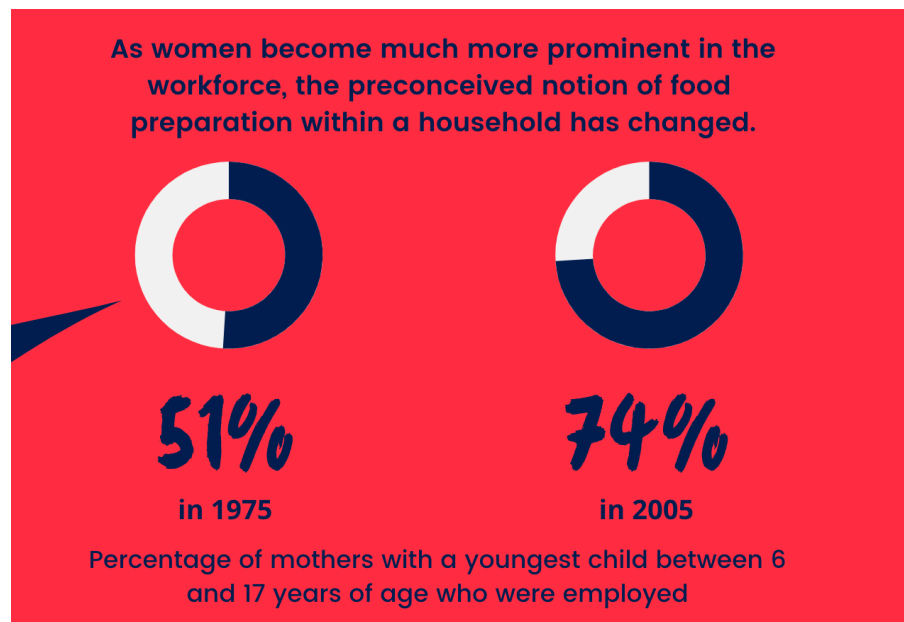
Silvia Benso, author and professor of philosophy and gender studies, has said that “food is culture, and everything — especially gender — is affected by culture.” Throughout history, we see this in foods' deep influence on gender norms and the roles played in specific cultures. The classic notion of “women must stay in the kitchen and cook for the entire family” has been deeply ingrained into so many cultures and traditions so much so that it has become the norm. The picture of the perfect wife was painted as a woman who could cook and constantly provide for her family, an example being a 20th-century ad for Kellogg’s with the slogan: “*Mother never ran out of Kellogg’s Cornflakes*”.¹⁸ This ideal has been carried out for centuries all over the world, creating gender stereotypes linked to food.

As women have become much more prominent in the workforce, the preconceived notion of food preparation within a household has changed. Considering women were historically not given equal opportunities in the workplace, their “responsibility” to prepare meals was seen as a way to keep them busy. Thankfully, with women gaining a much stronger standing occupationally, the culture around women being the only cooks in the family has started to change. The

proportion of mothers with a youngest child between 6 and 17 years of age who were employed increased from 51% in 1975 to 74% in 2005.¹⁹ In households with two working parents, processed foods have become much more prevalent, taking away from the culture and traditions of sharing meals.

Working mothers spend significantly less time in grocery shopping, cooking, eating, and playing with their children and are

more likely to purchase prepared foods²⁰— something that goes against a lot of the values instilled in the history of gender roles. These changes in traditional stereotypes are unexpectedly large and the effects that they have on



¹⁸ Paul Freedman Chester D. Tripp Professor of History. “How Steak Became Manly and Salads Became Feminine.” *The Conversation*, 2 July 2021, <https://theconversation.com/how-steak-became-manly-and-salads-became-feminine-124147>.

¹⁹ Datar, Ashlesha, et al. “Maternal Work and Children's Diet, Activity, and Obesity.” *Social Science & Medicine* (1982), U.S. National Library of Medicine, Apr. 2014, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4001859/>.

²⁰ F., Cawley J.;Liu. “Maternal Employment and Childhood Obesity: A Search for Mechanisms in Time Use Data.” *Economics and Human Biology*, U.S. National Library of Medicine, <https://pubmed.ncbi.nlm.nih.gov/22790446/>.

food culture had remained unaccounted for as the correlation did not become apparent until real consequences were shown.

Not only is there a gender stigma around the preparation of food, but because of society's influence, this has also come to affect the foods people eat and reach for. Women have historically been considered more "dainty" and "frail" than men, feeling the need to reach a standard set by society. The immense pressure of being thin as a woman has altered their choice of food. Women are expected to eat more salads and vegetables—foods associated with a certain body image. As articulated by Hayley Howell, "I think there's a pressure to eat healthy, to eat a salad and not burgers or shakes, especially if you're a heavier build."²¹ Food has begun to take a different meaning, stripping away from the rich history behind meals and dishes, and attaching a negative connotation to different groups of food. Trends dating back to the 19th century show evidence of certain foods being targeted as "feminine" versus "masculine." Women were geared towards lighter foods like yogurt and indulgent desserts, while men were told to eat heartier, heavier meals that would enhance their masculinity and strength.²² As written by Oscar Rickett in *Munchies*: "If you are a man, advertisers believe that you like meat cooked on fire or food that's simple to eat. Or you like yogurt, crumbly chocolate that can only be enjoyed as a 'guilty pleasure' and anything without calories."

Food has always been a defining factor in all cultures. Whether it be in the sense of gender or tradition, food and cuisine have always had a big importance in building diversity and education in society. Used as a symbol of unity and care, food is a staple of bringing people together and sharing time with loved ones. The number of different dishes, recipes, and ingredients is what makes every culture so unique and this is what enhances the importance of food in each culture. Though often overlooked and underestimated, food can truly be a powerful tool in the unification of the world and its society.

²¹ Taylor Synclair Goethe | published Dec. 1st, 2018. "The Culture of Cuisine: Is Food Gendered?" *Reporter*, <https://reporter.rit.edu/features/culture-cuisine-food-gendered>.

²² Paul Freedman Chester D. Tripp Professor of History. "How Steak Became Manly and Salads Became Feminine." *The Conversation*, 2 July 2021, <https://theconversation.com/how-steak-became-manly-and-salads-became-feminine-124147>.

FOOD WASTE

Helena Rocha

Food insecurity is a term that is used to describe how there are people in the world that do not have access to healthy and sustainable food.

While 25% of the world population is food insecure,²³ a third of the world's food is thrown away every year.²⁴ In the United States alone, between 30% and 40% of the food supply is thrown away and wasted each year,²⁵ even when



10.5% of the United States population is food insecure.²⁶ In addition to the food that is wasted, water is also being wasted as it is essential to the process of producing foods.²⁷ Food waste and the water waste that comes with it has become a large problem in the modern world. Solutions for this problem include modern ones, such as donating unwanted food or food scraps, and not-so-modern ones like composting.

Food waste occurs in many different forms. The infestation of crop pests and the diseases that come from those pests, ones which make food unfit for human consumption, is one of the first occurrences of food waste throughout the food cycle. An additional form of waste happens when prices for certain crops drop when its supply becomes too high for the demand. This comes as a consequence of the commercial price becoming less than the cost of the work, packaging, and shipment. When this happens, farmers tend to forgo harvesting, producing a major amount of food waste and water waste because of all the water that was used to produce the crops.

Waste is also produced during the packaging process, when some foods are thrown away because they might not look appealing, or because they may have gone bad. Then there is the food that is thrown away at supermarkets when they have passed their "sell by" date even if the food is still safe for consumption. Lastly, there is the food that is thrown away in households. By either buying too much food and not having enough time to eat it all, the food then spoils and needs to be thrown away.²⁸

According to The World Counts, the most wasteful stage in the food cycle is when the food is being produced. This stage produces roughly 44% of the food waste. The second most wasteful stage is when the food is

²³ Roser, Max, and Hannah Ritchie. "Hunger and Undernourishment." *Our World in Data*, 8 Oct. 2019, <https://ourworldindata.org/hunger-and-undernourishment#:~:text=9%25%20of%20the%20world%20population,moderately%20or%20severely%20food%20insecure.>

²⁴ "Roughly a Third of the World's Food Is Wasted. That's about 1.3 Billion Tons a Year." *The World Counts*, <https://www.theworldcounts.com/challenges/people-and-poverty/hunger-and-obesity/food-waste-statistics/story.>

²⁵ "Food Waste FAQs." *USDA*, <https://www.usda.gov/foodwaste/faqs.>

²⁶ "Food Security and Nutrition Assistance." *USDA ERS - Food Security and Nutrition Assistance*, <https://www.ers.usda.gov/data-products/ag-and-food-statistics-charting-the-essentials/food-security-and-nutrition-assistance/#:~:text=The%20prevalence%20of%20food%20insecurity,had%20very%20low%20food%20security.>

²⁷ "Why Food Waste Means Water Waste." *Ceres*, <https://www.ceres.org/news-center/blog/why-food-waste-means-water-waste.>

²⁸ "The Problem of Food Waste." *FoodPrint*, 11 June 2021, [https://foodprint.org/issues/the-problem-of-food-waste/.](https://foodprint.org/issues/the-problem-of-food-waste/)

stored after production and consumption which produces another 31% of the 1.3 billion tons of food waste produced each year.²⁹ With all this food

that is wasted, there are still other problems that come from the waste of food. When food is wasted and thrown in landfills, they decompose slower because of the lack of oxygen and insects that would normally eat the food scraps. When the food breaks down without the

presence of oxygen, it produces

methane,³⁰ a greenhouse gas that is 86 times more potent than carbon dioxide which in large quantities is harmful to the environment.³¹ In addition, the production of food places a strain on natural resources because it requires a significant amount of water.

Rarely does food waste come without water waste. 80% of the United States' freshwater use goes into food production while the world's freshwater supply continues to deplete.³² Meats are generally very water-wasteful foods, being that beef uses 1,800 gallons of water per pound produced while pork uses 576 gallons per pound. A majority of this water waste comes from the animals' feed, and the amount of food that each individual animal consumes before being slaughtered.³³ The reason for beef's heightened water usage is due to the fact that cows inefficiently turn the food they eat into meat on their bodies and, as a consequence of their size, they need to eat more food to grow. Meanwhile, pigs and chickens require less food to grow because they are smaller and need less food, making their water footprint smaller. Additionally, beef tends to have a greater negative

impact on the environment because of its gray water footprint, which signifies the pollution of ground and surface water. Lastly, the production of methane that comes from the cows'



²⁹ "Roughly a Third of the World's Food Is Wasted. That's about 1.3 Billion Tons a Year." *The World Counts*, <https://www.theworldcounts.com/challenges/people-and-poverty/hunger-and-obesity/food-waste-statistics/story>.

³⁰ "In Today's Landfills, Food Is Embalmed for Decades at a Time." *VICE*, <https://www.vice.com/en/article/aeyxxz/in-todays-landfills-food-is-embalmed-for-decades-at-a-time?scrllybrkr=289ddb3a>.

³¹ "The Problem of Food Waste." *FoodPrint*, 11 June 2021, <https://foodprint.org/issues/the-problem-of-food-waste/>.

³² "The Problem of Food Waste." *FoodPrint*, 11 June 2021, <https://foodprint.org/issues/the-problem-of-food-waste/>.

³³ "Meat's Large Water Footprint: Why Raising Livestock and Poultry for Meat Is so Resource-Intensive." *Food Tank*, 28 Nov. 2016, <https://foodtank.com/news/2013/12/why-meat-eats-resources/>.

bodily functions can also be harmful to the environment.³⁴ This means that when people buy large amounts of meat, there is going to be greater meat-sourced food waste, which will come with an even larger amount of water waste.

However, there are still ways to reduce the amount of food waste. Although putting food scraps in compost is a better alternative to landfill, it is not the solution to food waste. While compost has become more available in the past decade due to its popularization, compost continues to lack facilitated access. Compost, like many things, has its pros and cons. If people composted all of their food waste, trash collection would not have to occur as frequently. Currently, 22% of solid waste in the US is food that could have been composted. If the food waste were redirected to compost, there would be less of a need for space in landfills. Additionally, the decomposition of food in soil fertilizes it so that the soil can be put back into the food cycle and serve as healthy soil to grow new food. Furthermore, compost does not produce methane whereas decomposing food in landfills will. Instead compost produces carbon dioxide, a much better alternative.³⁵ Nevertheless, while compost is a better alternative than throwing food waste into landfills, it is better to reduce food waste so that the release of carbon dioxide can be avoided.

It is important to begin with the reduction of food waste and the many ways that this issue can be tackled. Lowering the amount of food waste has economic benefits for individuals, food industry institutions, and sanitation services. For households, reducing food waste lowers the amount of money spent on food by buying only what is needed and will be eaten. While meat is generally a more expensive food item, the reduction of meat-heavy diets could also aid in the lowering of food waste in households due to how easily meat can spoil. Reducing meat consumption would also reduce food waste from the crops grown for animal feed and the water waste attributed to the raising of the animals. The food industry would need to spend less money on food disposal if food waste was reduced. Food can be donated to organizations that specialize in ending hunger.³⁶ Furthermore, it is environmentally important to cut down on food waste in order to relieve a strain on our natural resources and to cut down on greenhouse gas emissions. According to an article about food waste published by Harvard University, there are many ways that the food industry can reduce their food waste and encourage less wasted food in households. Some examples



³⁴ "The Water Footprint of Beef: Industrial vs. Pasture-Raised." *Water Footprint Calculator*, 10 June 2020, <https://www.watercalculator.org/footprint/water-footprint-beef-industrial-pasture/>.

³⁵ Peter Dizikes | MIT News Office. "Study: For Food-Waste Recycling, Policy Is Key." *MIT News | Massachusetts Institute of Technology*, <https://news.mit.edu/2017/study-food-waste-recycling-policy-key-0817>.

³⁶ Randy Bell, Michigan State University Extension. "Reducing Food Waste Has Economic, Environmental and Social Benefits." MSU Extension, 21 Jan. 2021, https://www.canr.msu.edu/news/reducing_food_waste_has_economic_environmental_and_social_benefits.

that the article gives are for supermarkets to swap out “buy-one-get-one-free” sales to “half-off” sales so that the food that may seem less commercially appealing could cost less. This could avoid the necessity of the food being thrown out when it passes its “sell by” date. Other solutions include governments educating the public about the importance of composting and minimizing food waste. It is possible to even encourage farmers and food packing companies to distribute their goods to food pantries and food banks instead of disposing of food, with tax credits as an incentive. In order for schools to lower their amount of food waste, they can allow their students to pick and choose what and how much they want when serving food.³⁷

In essence, food waste continues to be an issue and mass food production continues to have negative consequences on the environment. All the while, people around the world are suffering from food insecurity. Compost, while being a better option than food waste being put in landfills, is only a better alternative for food that needs to be thrown away. However, reducing food waste is the best option for minimizing the environmental impacts that food waste has on the planet. It is important to be mindful of the water usage that goes into food production, especially in meat production, to avoid it becoming water waste when food is thrown away.

³⁷ “Food Waste.” *The Nutrition Source*, 4 Sept. 2019, <https://www.hsph.harvard.edu/nutritionsource/sustainability/food-waste/>.

INNOVATION AND NEW TECHNOLOGY

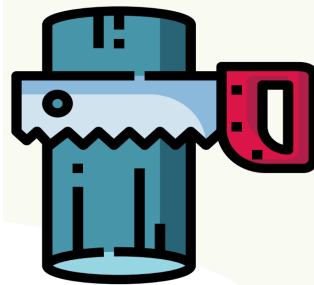
Xuan Lan Tran

While the world's population is expected to grow to 9 billion in 2050,³⁸ climate change's effects on our planet are worsening. Though food systems are responsible for 1/3 of global greenhouse gas emissions, climate change has worsened agricultural production by 21% since 1961. Deforestation for agriculture has released carbon and is responsible for 10% of global emissions.³⁹ Keeping these facts in mind, solutions for the agricultural sector have many requirements to meet. Though genetically modified organisms, or GMOs, are a hotly

debated topic, they are necessary for sustainability in the agricultural industry. The countries with the largest populations do not have enough arable land to respond to their populations' growing needs. In China, a nation which holds 20% of the world's total population, only 7% of the total landmass is agriculturally viable land. Unfortunately, in countries where there is more arable land, the situation is not much better. 64% of Africa's total landmass is agriculturally viable, but due to the effects of global warming, this land may no longer be fertile enough for farming.

GMOs and their ability to be part of a sustainable food supply should be approached in the context of these issues. Over 70% of global soy production is genetically modified: 91% in the US, 63% in Brazil, and 99% in Argentina. Based on statistics regarding the soy sector, GMOs will be a key feature of feeding the growing population. The use of GMOs raises income for producers by cutting costs by 68%.⁴⁰ Genetically modified soybeans are also being created for resistance to Asian Soybean Rust (ASR), a fungal infection that lowers crop yields.⁴¹

climate change has worsened agricultural production by **21%**



Deforestation is responsible for **10%** of global emissions

³⁸ Gyamfi, Isaac. "The Future of Sustainable Global Food Supply: Is GMO an Option?" *The Future of Sustainable Global Food Supply: Is GMO an Option? | International & Executive Programs | UC Berkeley*, 2017, <https://iep.berkeley.edu/content/future-sustainable-global-food-supply-gmo-option>

³⁹ Kovak, Emma, and Robert Paarlberg. "CRISPR and the Climate." *Foreign Affairs*, 17 Nov. 2021, https://www.foreignaffairs.com/articles/world/2021-11-17/crispr-and-climate?utm_medium=promo_email&utm_source=lo_flows&utm_campaign=register_email_welcome&utm_term=email_1&utm_content=20211201

⁴⁰ Gyamfi, Isaac. "The Future of Sustainable Global Food Supply: Is GMO an Option?" *The Future of Sustainable Global Food Supply: Is GMO an Option? | International & Executive Programs | UC Berkeley*, 2017, <https://iep.berkeley.edu/content/future-sustainable-global-food-supply-gmo-option>

⁴¹ Sullivan, Jay. "The Future of Eating: How Genetically Modified Food Will Withstand Climate Change." *Natural History Museum*, 22 Apr. 2021, <https://www.nhm.ac.uk/discover/the-future-of-eating-gm-crops.html>

Many crops have benefited from GMOs. CRISPR is a new gene editing invention that allows countries to decarbonize their croplands. Insect resistant and genetically modified Bt (*Bacillus Thuringiensis*) crops increase yields by about 25% globally.⁴² By sequencing the wheat genome, scientists can now breed variations that withstand harsh weather and disease as a result of climate change. In 2019, researchers in Delaware increased maize yield by 10% through genetic modification, boosting photosynthesis with larger leaves and better efficiency of nitrogen use. “Scuba rice”- which can withstand flooding caused by climate change- has been successful in Southeast Asia. Genetic modification also helps cut gas emissions. While rice paddies produce large amounts of methane, combining rice with a barley gene helps reduce methane emissions and increases yields by 10%.

The University of Sheffield is altering rice crops to lose less water and become more resistant to extreme heat or humidity by lowering stomatal density. Dr. Haiyan Xiong at the University of Cambridge works to introduce drought resistance from highland rice into lowland rice in order to help the agricultural industry adapt to climate change.⁴³ GMOs also decrease the use of herbicides and insecticides, both of which can cause negative ecological impacts, aiding in environmental sustainability.⁴⁴ This reduced usage is equivalent to removing 1.6 million cars from the road. However, governments remain hesitant to relax regulations on CRISPR and GMO technologies, hindering their social acceptance and ability to live out their potential in sustainability.⁴⁵

Another important part of genetic modification is gene cataloging to find plants that best suit changing weather conditions. “What we're doing is giving the breeders the toolkits they need to be able to put together different genes and strains, to make a strain that's suitable for their environment,” says Mark Tester, a professor with the King Abdullah University of Science and Technology in Thuwal, Saudi Arabia. Using gene cataloging, farmers can plant quinoa plants that are short and thin in order to withstand extreme weather. Likewise, they are able to catalog plants that are more drought tolerant.⁴⁶



⁴² Kovak, Emma, and Robert Paarlberg. “CRISPR and the Climate.” *Foreign Affairs*, 17 Nov. 2021, https://www.foreignaffairs.com/articles/world/2021-11-17/crispr-and-climate?utm_medium=promo_email&utm_source=lo_flows&utm_campaign=register_email_welcome&utm_term=email_1&utm_content=20211201.

⁴³ Sullivan, Jay. “The Future of Eating: How Genetically Modified Food Will Withstand Climate Change.” *Natural History Museum*, 22 Apr. 2021, <https://www.nhm.ac.uk/discover/the-future-of-eating-gm-crops.html>.

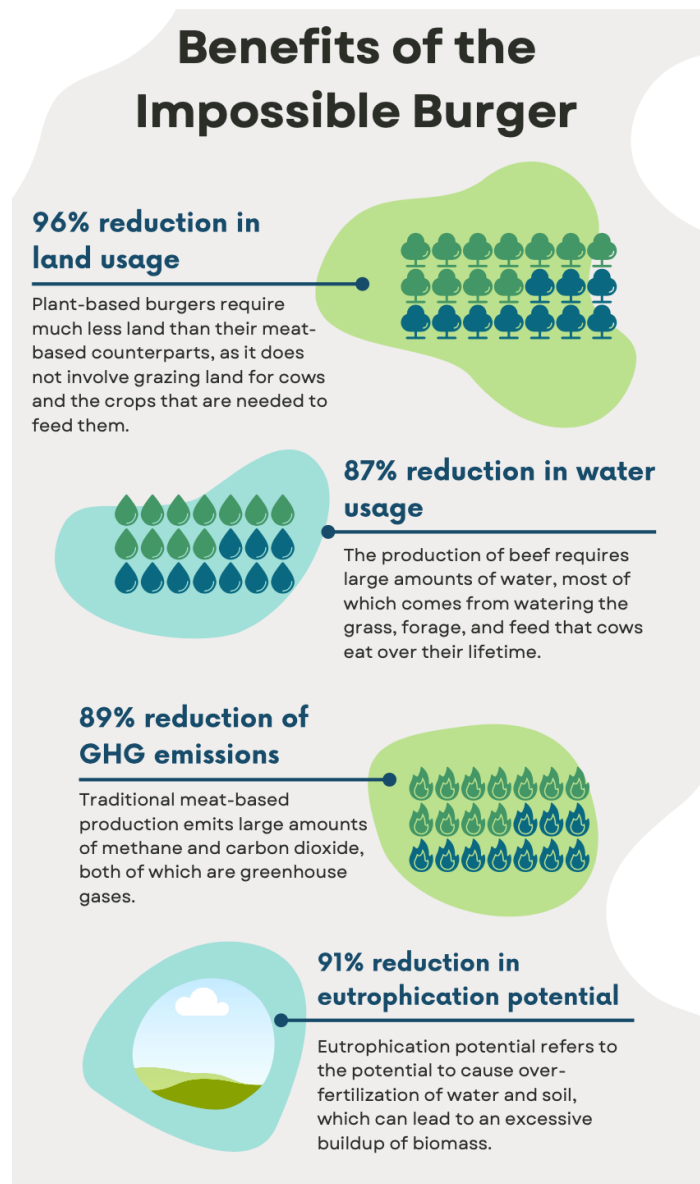
⁴⁴ Gyamfi, Isaac. “The Future of Sustainable Global Food Supply: Is GMO an Option?” *The Future of Sustainable Global Food Supply: Is GMO an Option? International & Executive Programs | UC Berkeley*, 2017, <https://iep.berkeley.edu/content/future-sustainable-global-food-supply-gmo-option>

⁴⁵ Kovak, Emma, and Robert Paarlberg. “CRISPR and the Climate.” *Foreign Affairs*, 17 Nov. 2021, https://www.foreignaffairs.com/articles/world/2021-11-17/crispr-and-climate?utm_medium=promo_email&utm_source=lo_flows&utm_campaign=register_email_welcome&utm_term=email_1&utm_content=20211201.

⁴⁶ Balaraman, Kavya. “Gene Catalogues Aim to Help Crops Survive Climate Change.” *Scientific American*, Scientific American, 22 Feb. 2017, <https://www.scientificamerican.com/article/gene-catalogues-aim-to-help-crops-survive-climate-change/>.

Genetic modification is not the only new innovation on the rise to improve sustainability in the food industry. Indigo Ag is a company encouraging sustainability by pushing for crops that help soil retain groundwater, prevent soil erosion, and retain carbon dioxide. Farmers work with representatives for the company to plan “cover crops” that will not be harvested. The company also helps implement other practices that help with climate mitigation, like the use of non-synthetic fertilizer. As an incentive, Indigo Ag also compensates farmers for using their carbon-absorbing practices with “carbon credits” generated by the amount of greenhouse gasses their farms counteract. With predictive modeling and soil sampling, Indigo Ag can calculate the amount of CO₂ farms have reduced by using these new practices. Each metric ton of carbon absorbed is one carbon credit, and each carbon credit is worth \$27. Globally, farmland could abate up to 570 million metric tons of carbon emissions per year, but due to the difficulty in finding these numbers and proving whether or not the farms truly do absorb claimed amounts of greenhouse gasses, it will be a long time before farmers’ compensation can become a concrete market. Changing practices may also reduce crop yields and have little financial benefit, making some farmers wary of carbon credits.⁴⁷

Finally, plant-based meat lowers water consumption, land use, and greenhouse gas emissions by the food industry. Meat made from plants is more efficient than animal products, even with the processing required to make these products. The impossible burger, a plant-based beef alternative, reduces land usage by 96%, greenhouse gas emissions by 89%, water usage by 87%, and aquatic eutrophication potential by 91%. Animal agriculture takes up 77% of total agricultural land but only supplies 17% of the food supply, making it extremely



⁴⁷ Dunn, Elizabeth G. “The Latest Farm Product: Carbon Credits.” *The New York Times*, The New York Times, 23 Nov. 2021, <https://www.nytimes.com/2021/11/23/business/dealbook/farm-carbon-credits.html>.

inefficient and the largest driver of environmental damage to land. The fishing industry is the largest driver of environmental damage within the oceans, making plant-based foods a necessity. Using farmland to produce plant-based meat products would allow farmers in America to feed over twice as many people. The inefficiency of the meat industry indicates that plant-based meat will become key to a sustainable future.⁴⁸

In conclusion, the current food industry needs to become more sustainable, especially with the expected growth to 9 billion and the climate worsening. Many technologies are already on the rise due to genetically selected organisms, carbon credits, and plant-based meat. A combination of gene modification, incentivizing carbon capture for farmers, and promoting a plant-based diet will serve well to improve sustainability in the food industry.

⁴⁸ “Environmental Benefits of Plant-Based Meat Products: GFI.” *The Good Food Institute*, 20 Apr. 2021, <https://gfi.org/resource/environmental-impact-of-meat-vs-plant-based-meat/#:~:text=Plant%2Dbased%20meat%20emits%2030,from%20the%20entire%20transportation%20sector>.

CLIMATE CHANGE AND ENVIRONMENTAL FACTORS

Amarins Edens

Food insecurity has been an issue in our world for decades, and every year, millions of people die of starvation. Even though the UN and its members are committed to ending hunger by 2030, the issue of starvation and food insecurity has only gotten worse in the past few years. A shocking 720 to 811 million people faced hunger issues in 2020 alone⁴⁹ and, according to CSIS, one in nine people in the world is currently undernourished.⁵⁰ Meanwhile, the issue of global warming has also only continued to worsen. According to the New York Times, there has been an overall temperature increase of 1.2 degrees Celsius since the 1880s,⁵¹ and this number is still rising. The catastrophic effect of this can be seen in the increase in frequency and intensity of extreme weather events. This year alone, we have seen devastating wildfires in California, Greece, and Australia; destructive hurricanes such as Hurricane Ida; and wrecking floods that damaged entire cities, leaving them without electricity for days on end. One can see that these two issues are, in fact, connected to one another when considering the many ways in which climate change has only continued to exacerbate the issue of food insecurity.



As stated, global warming has caused a significant increase in both the frequency and intensity of extreme weather events. In fact, such disasters annually occur three times as often as they did in the 1970s and 1980s.⁵² For example, in 2020 there were 30 hurricanes significant enough to be named, which more than doubled the 12 per year average. These weather events take their toll on the agricultural sector as it heavily relies on a stable environment for maximized crop production. Between 2008 and 2018, a total of 280 billion USD was lost due to production loss in the sector caused by weather events. Of these events, the most damaging was droughts, which accounted for 34% of crop production loss. Other events which caused damage to crops include floods (19%), storms (18%), earthquakes/landslides (13%), and extreme temperatures (6%).⁵³

An example of how these disasters impact crop production is the current issue of food insecurity in Madagascar. The island is experiencing its worst drought in forty years, which has ruined this year's harvest and left the majority of the population hungry. This issue is particularly affecting southern Madagascar. In the district

⁴⁹ "The State of Food Security and Nutrition in the World 2021." *FAO*, <https://www.fao.org/state-of-food-security-nutrition>. Accessed 31 December 2021.

⁵⁰ Sova, Chase, et al. "Climate Change and Food Security: A Test of U.S. Leadership in a Fragile World." *CSIS*, 15 October 2019, <https://www.csis.org/analysis/climate-change-and-food-security-test-us-leadership-fragile-world>. Accessed 31 December 2021.

⁵¹ Rosen, Julia. "The Science of Climate Change Explained: Facts, Evidence and Proof." *The New York Times*, 6 November 2021, <https://www.nytimes.com/article/climate-change-global-warming-faq.html>. Accessed 31 December 2021.

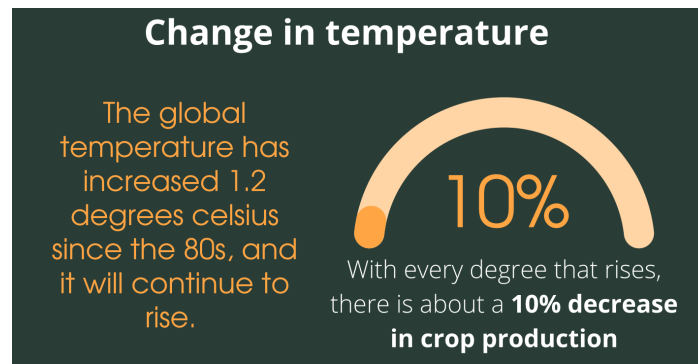
⁵² "Climate Change-Related Disasters a Major Threat to Food Security - FAO." *UNFCCC*, 18 March 2021,

<https://unfccc.int/news/climate-change-related-disasters-a-major-threat-to-food-security-fao>. Accessed 31 December 2021.

⁵³ FAO. "The Impact of Disasters and Crises on Agriculture and Food Security: 2021." *fao.org*, 2020, <https://www.fao.org/3/cb3673en/cb3673en.pdf>. Accessed 31 December 2021.

of Ambovombe, an alarming 27 percent of children are malnourished.⁵⁴ Now, since almost all crops have died, people are turning to anything they can find for food, including cactus leaves, locusts, and other insects. Such multi-year droughts impact agriculture not only by ruining that year's harvest but also by destroying the topsoil, resulting in the land becoming unfarmable for multiple years after.⁵⁵ This example is considered to be the first "climate-change famine" by the UN and shows how much impact the climate can have on food insecurity.⁵⁶

Climate change has caused an increase in temperatures and changes in precipitation patterns, both of which damage crop production as well. Despite technological advancements which allow us to stop relying so heavily on natural rainfall patterns, many farms, especially those in less developed countries, still do. Stable rainfall patterns are essential in order to produce the maximum amount of crops; too much or too little rainfall in a season and sudden anomalies can cause a complete or partial loss of crops. Yet precipitation patterns in the past years have become more unpredictable and therefore, it is occurring more often that farmers cannot sell a large percentage of their crops. Since the industrial revolution, global temperature has risen by about 1.5 degrees Celsius. Crops grow best at a certain temperature, and it is estimated that with every degree rise in temperature, there is about a 10% decrease in crop production.⁵⁷ This means that crop production rates have already begun to drop and will continue to do so as temperatures increase even more.



As shown previously, climate change severely impacts general food production and thereby causes an increase in food insecurity. However, certain parts of society are more affected by this issue. The indigenous Inuit population in Canada, for example, has relied on hunting and gathering in their environment for centuries. Their diet generally consists of what they can find and hunt in their region, such as seals, whales, ducks, caribou, fish,

⁵⁴ Thakral, Shelley. "Madagascar's hungry 'holding on for dear life', WFP chief warns." *UN News*, 23 June 2021, <https://news.un.org/en/story/2021/06/1094632>. Accessed 31 December 2021.

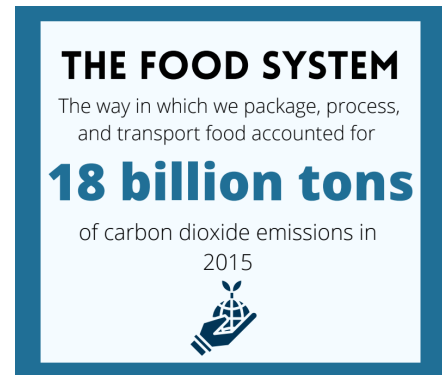
⁵⁵ Sova, Chase, et al. "Climate Change and Food Security: A Test of U.S. Leadership in a Fragile World." *CSIS*, 15 October 2019, <https://www.csis.org/analysis/climate-change-and-food-security-test-us-leadership-fragile-world>. Accessed 31 December 2021.

⁵⁶ Harding, Andrew. "Madagascar on the brink of climate change-induced famine." *BBC*, 24 August 2021, <https://www.bbc.com/news/world-africa-58303792>. Accessed 31 December 2021.

⁵⁷ Sova, Chase, et al. "Climate Change and Food Security: A Test of U.S. Leadership in a Fragile World." *CSIS*, 15 October 2019, <https://www.csis.org/analysis/climate-change-and-food-security-test-us-leadership-fragile-world>. Accessed 31 December 2021.

and berries.⁵⁸ In a 2005 study, it was found that 65% of Inuit households still get at least half of their meat products through hunting. However, things in the region are changing. The region of the arctic is one of the fastest-warming places in the world.⁵⁹ There are more extreme swings in temperature, winter is about 6 weeks shorter than a few years ago, and the ice coverage of the sea in the region is only a third of what it used to be. This has heavily impacted the Inuit diet. New species have invaded due to the increased temperatures of the ocean, causing seals to keep their distance from the shore. The ice coverage of the ocean disappears earlier, reducing access to seals, which are traditionally hunted using a technique that requires ice layers.⁶⁰ Reduced access to prey has caused food insecurity among a large percentage of Inuit families. Overall, it was found that over a third of Inuit households lack access to safe and healthy food for these reasons.⁶¹

Although it is clear how climate change impacts food security, this also happens the other way around. The food system— as well as the ways in which we package, process, and transport food— accounted for approximately 18 billion tons of carbon dioxide emissions, or 34% of the overall emissions in 2015.⁶² Roughly two-thirds of this is due to the agricultural sector. According to a report about carbon emissions in our food system in 2015, approximately one-third (31.8%) of the emissions in this sector comes from land usage.. Production processes account for about 39% of the total emissions, of which the largest cause is the production of fertilizers. The rest of the emissions come from transportation (5%), processing (3.5%), and others such as packaging.⁶³



These issues of climate change and food insecurity combined only exacerbate existing inequalities amongst countries. Generally, it is ‘developed’ countries that emit the most greenhouse gasses. Historically, the US has been the country with the highest emissions, and the European Union also has a history of high emissions.⁶⁴ Additionally, the US has the highest emissions per person, followed by Canada. These developed countries are clearly those that contribute the most to climate change, yet they are not the ones being damaged most by its effects. When looking at big disasters, they impact developing countries stronger than developed ones, despite the fact that their emissions are significantly lower. Madagascar, for example, only contributes 0.1% to global emissions, yet, as discussed before, it is currently suffering through a nation-wide famine which is severely

⁵⁸ Flaherty, Robert. “Inuit.” *The Canadian Encyclopedia*, 8 June 2010, <https://www.thecanadianencyclopedia.ca/en/article/inuit>. Accessed 31 December 2021.

⁵⁹ Mercer, Greg. “Sea, ice, snow ... it's all changing': Inuit struggle with warming world.” *The Guardian*, 30 May 2018, <https://www.theguardian.com/world/2018/may/30/canada-inuits-climate-change-impact-global-warming-melting-ice>. Accessed 31 December 2021.

⁶⁰ “Inuit.” *Minority Rights Group*, <https://minorityrights.org/minorities/inuit/>. Accessed 31 December 2021.

⁶¹ Struzik, Ed. “Food Insecurity: Arctic Heat Is Threatening Indigenous Life.” *Yale E360*, 17 March 2016, https://e360.yale.edu/features/arctic_heat_threatens_indigenous_life_climate_change. Accessed 31 December 2021.

⁶² Doucet, Providence. “Food systems account for over one-third of global greenhouse gas emissions.” *UN News*, 9 March 2021, <https://news.un.org/en/story/2021/03/1086822>. Accessed 31 December 2021.

⁶³ Crippa, M., et al. “Food Systems are Responsible for a Third of Global Anthropogenic GHG Emissions.” *nature*, 8 March 2021, <https://www.nature.com/articles/s43016-021-00225-9#citeas>. Accessed 31 December 2021.

⁶⁴ Gillis, Justin, and Nadja Popovich. “The U.S. Is the Biggest Carbon Polluter in History. It Just Walked Away From the Paris Climate Deal. (Published 2017).” *The New York Times*, 1 June 2017, <https://www.nytimes.com/interactive/2017/06/01/climate/us-biggest-carbon-polluter-in-history-will-it-walk-away-from-the-paris-climate-deal.html>. Accessed 31 December 2021.

damaging its economy and people. Developing countries are impacted more due to their original climate, which is generally more tropical, and thus an increase in temperatures makes it comparatively more intolerable for humans and crops.⁶⁵ Low-income countries have also suffered more damage in the agricultural sector when compared to higher-income countries. According to the FAO, these countries have lost over 108 million USD from damage in the agricultural sector due to climate change.⁶⁶



Our global population is predicted to increase to about 9.6 billion people by 2050, and therefore, our food demand will increase by between 60% to 100%.⁶⁷ Similarly, unless we immediately stop the emission of all greenhouse gasses, climate change is deemed to worsen in the future as well. Both of these factors combined can only mean one thing: if we don't take action, food insecurity will skyrocket, and a large percentage of our global population will suffer from food insecurity. These two issues go hand-in-hand, and if we do not do anything about them, they will cause us to be stuck in a feedback loop forever.

⁶⁵ Rosen, Julia. "The Science of Climate Change Explained: Facts, Evidence and Proof." *The New York Times*, 6 November 2021, <https://www.nytimes.com/article/climate-change-global-warming-faq.html>. Accessed 31 December 2021.

⁶⁶ FAO. "The Impact of Disasters and Crises on Agriculture and Food Security: 2021." *fao.org*, 2020, <https://www.fao.org/3/cb3673en/cb3673en.pdf>. Accessed 31 December 2021.

⁶⁷ "Food Security, Climate Change and the Sustainable Development Goals | United Nations." *the United Nations*, <https://www.un.org/en/academic-impact/food-security-climate-change-and-sustainable-development-goals>. Accessed 31 December 2021.

HEALTH EDUCATION

Anna Gurney

Students spend the majority of their adolescence in school, therefore, its environment is monumental to forming a healthy lifestyle which sets these students up for success. As this environment is such a large part of their lives, it has a huge influence on these students' lifestyle. Diet and nutritional education is important in fueling a healthy lifestyle which will allow for a longer life. However, some diets in many schools across the United States negatively impact students and their education. There have been proven connections between poor diet and decreased test scores. Additionally, childhood obesity and other diet related illnesses have led to premature deaths. Poor eating and physical inactivity also lead to key educational issues such as behavioral problems, short-term thinking, lack of motivation, and disengagement from learning. To solve this problem, schools should implement a nutrition education program which is strategic in its way of positively guiding students through the growth of their nutrition knowledge and eating habits.⁶⁸

Nutrition education walks students through the importance of an active lifestyle and healthy diet while also explaining how to achieve them. This includes reading food labels and knowing what should and should not go inside of your body, while maintaining a healthy relationship with a diverse set of food groups.¹ Nutrition education can be implemented throughout the school day without a designated period. The CDC recommends counting with pictures of fruits and vegetables,⁶⁹ learning about fractions through recipes, and including messages about nutrition through morning announcements, school assemblies, and materials sent home to parents and guardians.



It is important to teach nutrition in schools as it affects students' health. It has been proven that poor diet and lack of physical activity have many negative effects. The U.S. Department of Health and Human Services reported that these reasons are responsible for more than 1,200 deaths a day— as many premature deaths as cigarettes. The Early Childhood Longitudinal Study administered The Food Consumption Questionnaire to

⁶⁸ Center of Disease Control and Prevention. 15 Feb. 2021, www.cdc.gov/healthyschools/nutrition/school_nutrition_education.htm. Accessed 11 Jan. 2022.

⁶⁹ Evans, A., et al., Impact of school-based vegetable garden and physical activity coordinated health interventions on weight status and weight-related behaviors of ethnically diverse, low-income students: Study design and baseline data of the Texas, Grow! Eat! Go! (TGE) cluster-randomized controlled trial. BMC Public Health, 2016. 16: p. 973.

roughly 12,000 fifth grade students.⁷⁰ The aim was to analyze the correlation between a student's quantity of fast food consumption and their grades in their English and Math lessons. The data shows that the students who consumed a higher amount of fast food received significantly lower test scores. Due to the negative effects stemming from the correlation between food and success in schools, there is a critical need for the impetus of nutrition education. Marilyn Briggs, the co-director of the UC Davis Center for Nutrition in Schools, agrees on the need for nutrition education, however, she also states that the US education system is not entirely there yet. "At a policy level, I would advocate for better pay for nutrition services staff, and development of some professional requirements and expectations for anyone who is involved in the preparation of food for children. These would include cooking skills, basic sanitation, and safety training. We're not there yet." While this large shift is necessary, it is much more difficult to achieve due to the changes it would require in funding, staffing and available facilities.⁷¹



Children absorb everything around them. Starting in utero, they learn from their surroundings and environment. In the first five years of a child's life, the child's brain is developing faster than ever. This means what we teach children when they begin elementary school fosters their mindset and approach to nutrition and food. It is crucial to set up a solid foundation that approaches food, diet, and nutrition with a positive mindset that encourages students to be active and knowledgeable about what they choose to put on their plates. Additionally, studies conducted on school students comparing diet and school performance demonstrate healthy eating has a direct connection to healthy behaviors.⁷² The students of schools who participate in elementary school nutrition education have a decreased risk of obesity as well as improved cognitive development.⁷³ It is recommended by the CDC that schools need at least 40-50 hours of nutrition education in order to see a change in behavior, however, most schools only present approximately 8 hours a year.⁷⁴

⁷⁰ Fairclough, S.J., et al., Promoting healthy weight in primary school children through physical activity and nutrition education: a pragmatic evaluation of the CHANGE! randomized intervention study. BMC Public Health, 2013. 13: p. 626.

⁷¹ Briggs, Marilyn, editor. *Center for Ecoliteracy*. 10 Oct. 2010, www.ecoliteracy.org/article/importance-nutrition-education-and-why-it-key-educational-success. Accessed 9 Jan. 2022.

⁷² Tobin, K.J., Fast-food consumption and educational test scores in the USA. *Child Care Health Dev*, 2013. 39(1): p. 118-24.

⁷³ "Nutrition Education in the K-12 Curriculum: The Role of National Standards: Workshop Summary." National Center for Biotechnology Information, 2013, www.ncbi.nlm.nih.gov/books/NBK202124/. Accessed 9 Jan. 2022.

⁷⁴ "What Is the Food and Nutrition Education Act of 2020?" FoodCorp, 13 Feb. 2020, foodcorps.org/food-and-nutrition-education-in-schools-act-of-2020/. Accessed 12 Jan. 2022.

A healthy lifestyle is important for a plethora of reasons, but a healthy diet is important for biological autonomy. With a poor diet comes problems like metabolic diseases, joint and skeletal problems, cardio-vascular issues, hypertension, and obesity. In fostering the ideology of healthy and beneficial habits from a young age, it is possible to reduce the likelihood and severity of these diseases significantly. It is also important to consider the overall state of future societies in accordance to the lowered test scores. As these issues are attracting more attention, they also highlight the growth of unhealthy food consumption. Unlike many issues faced in America today, hunger, diet and nutrition is a societal problem. Therefore, the problem it causes should and can be solved within a societal setting, such as school. While it is important these lessons be taught from a young age⁷⁵ to prevent any issues, it is also important they are taught to all ages to limit the continuation of said habits.



⁷⁵ No Kid Hungry. nokidhungry.org/what-we-do/early-childhood. Accessed 13 Jan. 2022.

POVERTY AND ECONOMICS

Alva Lyth Brand

Food access, food insecurity, and the resulting health outcomes are heavily predetermined by the financial affluence or insecurity of a household and/or community. While the affluent have easier access to higher quality and nutrient dense food, lower income individuals are forced to choose cheaper, energy dense food. Lower diet qualities and their poor health outcomes follow a

social gradient; as overall prices increase, the disparities across the socioeconomic gradient tend to increase. The proportion of food cost to household income is disproportionate for high versus low income households. The average American household spends 11% of disposable income on food. Meanwhile, those below the poverty line end up spending up to 35%.⁷⁶

Studies done in higher income countries have found that people with a higher socioeconomic status have easier access to supermarkets, as well as have a higher consumption of fruits and vegetables. People living in areas with more supermarkets, specialized fruit and vegetable stores, and open air markets (in other words those living in wealthier communities) are more likely to have healthier diets. Conversely, lower income communities typically have fewer supermarkets and more fast food stores, putting them at a higher exposure to unhealthy food. Not only do areas with a lower socioeconomic status have a higher number of small local markets and supermarkets, but the food in these stores have been found to have a smaller variety and overall lower quality of food at higher prices.⁷⁷



⁷⁶ "The Correlation between Socioeconomic Status and Healthy Diets: An Overview." *FrieslandCampina Institute*, 15 Sept. 2019, www.frieslandcampinainstitute.com/ng/health/maternal-nutrition/correlation-socioeconomic-status-healthy-diets-overview/. Accessed 7 Dec. 2021.

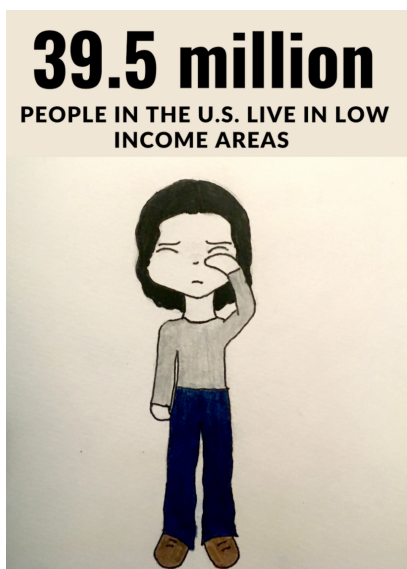
⁷⁷ Costa, B.V.L., et al. "Does Access to Healthy Food Vary According to Socioeconomic Status and to Food Store Type? An Ecologic Study." *BMC Public Health*, 18 June 2019, doi.org/10.1186/s12889-019-6975-y. Accessed 16 Nov. 2021.

The term “supermarket redlining” refers to the phenomenon of supermarket chains closing stores and locations in impoverished neighborhoods. This is essentially the inclination to locate (or relocate) stores in suburban and wealthier areas rather than inner cities and low income neighborhoods. Similarly to other forms of redlining, this practice is motivated by perceived notions of risk of theft, lower demand, and lower profit margins.⁷⁸

According to the Food Empowerment Project, food deserts (also called food apartheid or food oppression) are “geographic areas where residents’ access to affordable, healthy food options (especially fresh fruits and vegetables) is restricted or non-existent due to the absence of grocery stores within convenient travelling distance.” The Food Empowerment Project names two main characteristics of food deserts: transportation and socioeconomic status. In regard to the former, the US department of agriculture found that about 2.3 million people, or 2.2% of US households, live more than an hour away from a supermarket and do not own a car. Others may live in urban areas where not even public transportation allows for convenient access to grocery stores. On top of this, food deserts are most commonly found in Black and Brown communities and low income areas; higher income communities contain about 3 times as many supermarkets as lower income ones do, and white neighborhoods contain about four times as many supermarkets as predominantly Black ones do. Food deserts also tend to contain an overabundance of fast food chains. Urban residents who buy groceries at small neighborhood stores pay between 3% and 37% more than those buying the same products at supermarkets. In New York City alone, an estimated 750 000 people live in food deserts. From 1989 and 2005, the overall price of fruits and vegetables increased about 75%, while the price of fatty foods decreased by 26%. The consequences of long term

limited access to healthy foods are one of the main reasons ethnic minority and low income communities experience higher rates of obesity, type 2 diabetes, and cardiovascular disease, among others.⁷⁹

Food deserts are disproportionately found in high poverty areas with generally smaller populations, higher rates of vacant homes, residents with lower education levels, and higher rates of unemployment. According to a study conducted by Johns Hopkins University, food deserts are also disproportionately found in Black communities. This study found that comparing urban communities with similar poverty levels, Black communities had fewer supermarkets while white communities had more. Interestingly, multiracial communities fell somewhere in the middle. Within a group of nearly 39.5 million people (or 12.8% of the US population) that



⁷⁸ Zhang, Mengyao, and Ghosh Debarchana. "Spatial Supermarket Redlining and Neighborhood Vulnerability: A Case Study of Hartford, Connecticut." *NCBI*, 26 Mar. 2015, www.ncbi.nlm.nih.gov/pmc/articles/PMC4810442/. Accessed 5 Dec. 2022.

⁷⁹ Food Empowerment Project. "Food Deserts." *Food Empowerment Project*, 2021, foodispower.org/access-health/food-deserts/. Accessed 6 Dec. 2021.

have been identified as living in low income/low access areas, researchers have estimated that 19 million people (or 6.2% of the US population) had limited access to supermarkets and grocery stores. Unfortunately, the pandemic has only made things worse. In a 2020 food insecurity update from Brookings, nearly 10% of parents with only children aged 5 or younger reported having insufficient food for their families and insufficient resources to buy more.⁸⁰

There is an increasing awareness that health outcomes and disparities are more guided by social determinants than medical care. People are mostly influenced by social, economic, and physical conditions that they spend the most time in. Within these social determinants, poverty and food insecurity are the most prominent, and have the most prominent correlation with the most severe and expensive health problems in the United States. Low income or poor communities have been found to have fewer resources related to health, such as full service grocery stores supplying affordable, nutritional food. These communities also tend to have higher environmental risks, such as water quality and poor housing conditions.⁸¹

The pandemic has highlighted and exacerbated food insecurity through a rise in unemployment rates, the loss of access to school meals, and unreliable food supply chains. Food insecurity rates among all households doubled from February 2020 to May 2020. Likewise, food insecurity has tripled within households with children. Although geographic access to food is well established as the reason for food deserts, the primary factor driving food insecurity is financial insecurity. Even before the pandemic, an estimated 10.5% percent of US households faced food insecurity. During the pandemic, this statistic substantially increased among lower-income households, with 34.9% of households living below the poverty line facing food insecurity.⁸²

Financial insecurity and socioeconomic status have heavy influences on a household's food access due in large part to the relationship between location and income. This is often fueled by what is called 'supermarket redlining' as well as 'food deserts' which describe phenomena and/or locations where supermarkets are in scarcity. As a result, these events drive up prices as well as decrease the variety of food options available to those in a community. Since fast food is generally cheaper, lower-income families tend to resort to unhealthier options, whereas more affluent families can afford more expensive fruits and vegetables. This also has heavy racial disparities, with more Black and brown communities living in food deserts with higher prices and less access to healthier food options.

⁸⁰ Annie E. Casey Foundation. "Food Deserts in the United States." *Annie E. Casey Foundation*, 13 Feb. 2021, www.aecf.org/blog/exploring-americas-food-deserts. Accessed 6 Dec. 2021.

⁸¹ *The Impact of Poverty, Food Insecurity, and Poor Nutrition on Health and Well-Being*. Food Research and Action Center, Dec. 2017, frac.org/wp-content/uploads/hunger-health-impact-poverty-food-insecurity-health-well-being.pdf. Accessed 8 Dec. 2021.

⁸² George, Caroline, and Adie Tomer. "Beyond 'Food Deserts': America Needs a New Approach to Mapping Food Insecurity." *Brookings*, 17 Aug. 2021, www.brookings.edu/research/beyond-food-deserts-america-needs-a-new-approach-to-mapping-food-insecurity/. Accessed 4 Dec. 2021.

THE FAST FOOD INDUSTRY

Andrea Martinez

The pros and cons of the fast food industry are reputable in the modern day. Despite warnings about the chemicals, fast food places such as McDonalds are cheap and addicting. The flavors and costs are things that have made fast food restaurants such as Chick fil-a, Wendy's, McDonald's, and Burger King so reputable. This industry is so popular that its market size (by revenue) as of 2021 is 296.6 billion dollars.⁸³ But along with the pros, there are also cons that come with the colossal industry. Some are well known, such as the stigma behind unhealthy foods and fake advertisements. But there are others, such as the unethical farming methods that are not talked about as often. Truthfully, the fast food industry has various immoral qualities that are overlooked by society..

One major con of the fast food industry is that it has the ability to exacerbate food insecurity. Food insecurity is the lack of a reliable and consistent access to healthy and nutritious food.⁸⁴ To have food security, you require time and money.. Fast food places, however, require less money and time because they are cheap and can be found anywhere, making them appealing to people that just don't have time to cook and clean for themselves. Those appeals can make people overlook the harmful effects of fast food.. In fact, 80% of college students who don't have time or money make their decisions on what they eat based on the price and convenience. An additional reason for why people love fast food is because they can form strong emotional bonds to the restaurants they frequent daily. They love the comfort of having a fast food place that will be everywhere, no matter where they go in the United States. All of these causes conclude in a growing amount of unhealthy diets and obesity in Americans (which has increased by 70% in the past 30 years⁸⁵) and also exacerbated food insecurity.⁸⁶

**80% OF AMERICANS PICK A
PLACE TO EAT BASED ON
PRICE AND CONVENIENCE**



The next unethical aspect is one we are all familiar with. Seeing something on TV that captivates a watcher, makes them overcome with disappointment when they open the packaging to the reality of what it looks like. This is mostly common with food products, and especially fast food products. The people in charge of advertising have developed methods to make their food look irresistible on TV and on social media. In fact, after the food is “styled”, it's barely food anymore, and just merely a prop. Food stylists use an arrangement of different

⁸³ “19 US Fast Food Industry Statistics [2022]: Revenue, Trends, and Predictions.” Zippia, <https://www.zippia.com/advice/us-fast-food-industry-statistics/#:~:text=The%20market%20size%20of%20the%20fast%20food%20restaurant%20industry%20is,5.8%25%20from%202020%2D2021.>

⁸⁴ “Food Insecurity Definition & Meaning.” Merriam-Webster, Merriam-Webster, <https://www.merriam-webster.com/dictionary/food%20insecurity>.

⁸⁵ HealthLeaders. “US Obesity Rates Reach Historic Highs.” HealthLeaders Media, <https://www.healthleadersmedia.com/us-obesity-rates-reach-historic-highs>.

⁸⁶ Catherine Keske Associate Professor. “Fast Food Is Comforting, but in Low-Income Areas It Crowds out Fresher Options.” The Conversation, 25 Feb. 2022, <https://theconversation.com/fast-food-is-comforting-but-in-low-income-areas-it-crowds-out-fresher-options-136227>.

instruments such as tweezers, toothpicks, small blow torches, glue, glycerin, paint, oil and more to further manipulate the on-screen image of their food.⁸⁷ They even substitute food with inedible products that mimic the traits of the food they are displaying. For example, engine oil is used instead of pancake syrup because it doesn't seep into the pancake and disappear like regular syrup, making it more convenient for a photoshoot.⁸⁸ This is just one example amongst a multitude of different clever food styling tricks used in the modern day media.



Due to the mistreatment that livestock receive before becoming food at a fast food restaurant, the fast food industry also is responsible for animal abuse through the practice of factory farming. Factory farming is a farming method in which large amounts of livestock are crammed into an immense industrialized farm for their whole lives. This method maximizes the production at the lowest cost possible.⁸⁹ Many of the birds in these farms have to undergo genetic manipulations which make them unnaturally large and heavy, and since their bodies are not built to sustain the weight, a lot end up with broken limbs.⁹⁰ Factory farming doesn't just affect the animals, but the environment as well. When so many animals are confined in such close quarters, their large quantities of litter are left to ferment and release toxic gasses.⁹¹ In fact, 37% of global methane emissions are due to factory farming. Apart from increasing air pollution, the animal litter also finds its way into nearby waterways, which disrupt ecosystems and wildlife with the harmful bacteria.⁹² All in all, factory farming is a highly unethical way of food production.

Lastly, fast foods tend to be extremely unhealthy. These products are packed with extra calories and sugars that can lead to health problems in the future such as diabetes, respiratory issues, and reproductive issues along with many others. The daily consumption of fast food can also lead to diabetes. When you ingest carbohydrates, these sugars are released into your blood as glucose which, in turn, makes your blood glucose

⁸⁷ Katie Little. "Why Restaurant Meals Don't Look like the Ads." CNBC, CNBC, 19 May 2014, <https://www.cnbc.com/2014/05/19/why-restaurant-meals-dont-look-like-the-ads.html>.

⁸⁸ "Opinion: Food Advertisers Should Stop Creating Fake Food Commercials." Los Angeles Times, Los Angeles Times, 21 Dec. 2019, <https://highschool.latimes.com/arnold-o-beckman-high-school/opinion-fake-food-commercials-are-a-crime/>.

⁸⁹ "Factory Farm Definition & Meaning." Merriam-Webster, Merriam-Webster, <https://www.merriam-webster.com/dictionary/factory%20farm>.

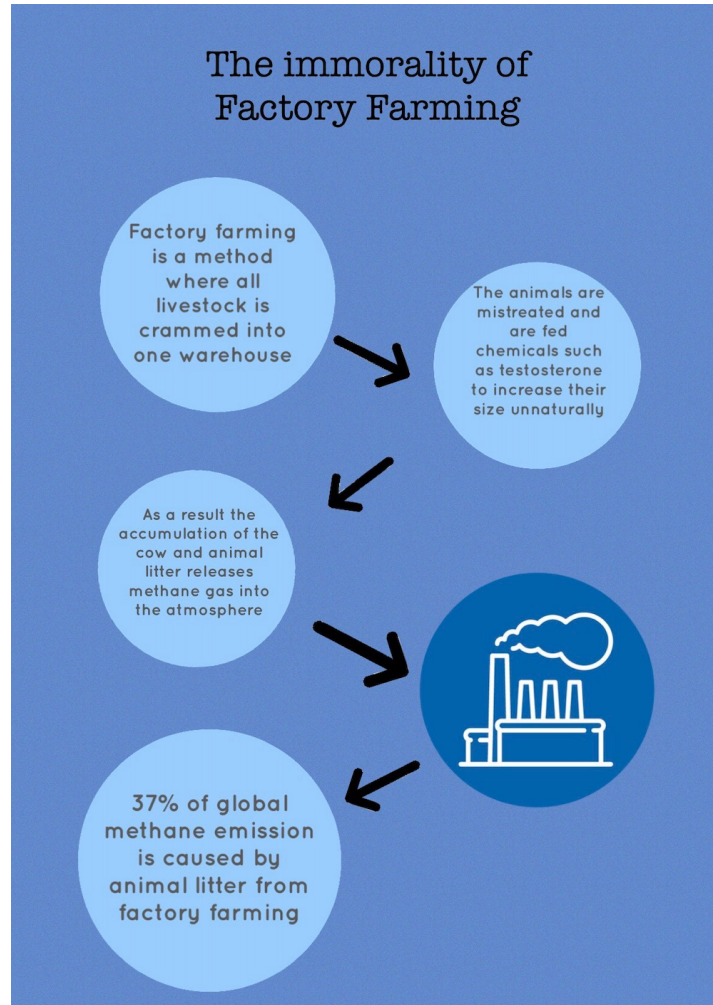
⁹⁰ Agarwal, Nimisha. "McDonald's Animal Cruelty: How Do They Kill Their Chickens?" Sentient Media, 26 Oct. 2021, <https://sentientmedia.org/mcdonalds-animal-cruelty/>.

⁹¹ "FACTORY FARMING AND THE ENVIRONMENT: IMPACTS ON THE PLANET." Thehumaneleague.org, <https://thehumaneleague.org/article/factory-farming-and-the-environment>.

⁹² Lynch, Kip. "The Threat of the Fast-Food Industry: Its Horrible Environmental Practices Are Wholly Unsustainable." The Threat of the Fast-Food Industry: Its Horrible Environmental Practices Are Wholly Unsustainable, 12 Apr. 2021, <https://tripod.domains.trincoll.edu/opinion/the-threat-of-the-fast-food-industry-its-horrible-environmental-practices-are-wholly-unsustainable/>.

levels spike. In response, the pancreas secretes insulin to lower these levels back to normal. Your organs can properly handle these sugar spikes if you are healthy, but if you frequently eat foods with high amounts of carbohydrates, then you will have repeated spikes of blood sugar. Over time, your body's insulin response will start to fail, increasing your risk for type 2 diabetes. Another prime example of a health issue that fast food can cause are respiratory issues. Fast foods contain calories that cause weight gain, which later results in obesity. Obesity increases chances to obtain breathing problems such as asthma and shortness of breath. Lastly, processed foods can have a chemical called phthalates. These chemicals have the ability of interrupting or tampering with hormones, and those interruptions have the ability of causing reproductive issues that include birth defects.⁹³ Sadly, a lot of these facts are overlooked by fast food consumers because they are infatuated by the taste and cheap price.

In conclusion, the fast food industry has qualities that are unethical and unhealthy. The fact that they have farming methods that endanger the environment and mistreat their livestock, advertisements that trick people into buying into an image of freshness, health risks, and can exacerbate food insecurity proves that this is not an industry that has the overall wellbeing and health of their customers as their best interest at heart.



⁹³ Pietrangelo, Ann. "13 Effects of Fast Food on the Body." Healthline, Healthline Media, 17 Sept. 2018, <https://www.healthline.com/health/fast-food-effects-on-body#digestive-and-cardiovascular-systems>.

COVID-19

Hamad Abushahab

Food security has long been a primary concern for humanitarian aid organizations as countries all across the globe struggle with providing their populations with adequate measures of nutritious food. The lack of food security has been extremely obstructive to the growth and development of many countries. The ongoing COVID-19 pandemic has had a noticeable impact on the issue of food security. This pandemic has disrupted global food supply chains, resulting in an increase in worldwide food insecurity. COVID-19 has also resulted in the access to food aid supplied to populations in low-income countries to be restricted, causing nationwide famines and hunger rates to spike ferociously. This disruption in food supply chains has shown governments that they need to have better measures to ensure food security for their own populations. This article will explore these aspects, as well as explicitly paint the picture of how COVID-19 has globally impacted the food market.⁹⁴

COVID-19 has increased food insecurity by disrupting food supply chains and reducing incomes. For developing countries who have been coping with food insecurity through international aid, this disruption has been detrimental and has reversed

a lot of the progress that has been made. The disruption of food chains caused not only these countries to suffer due to the lack of goods which they were supposed to be receiving, but it also impacted countries which had to decrease their production rates due to global quarantines.

HUNGER RATES SPIKE

A Un report in July 2021 reported that global hunger rates spiked in 2020 with 2.3 billion people lacking year round access to adequate food

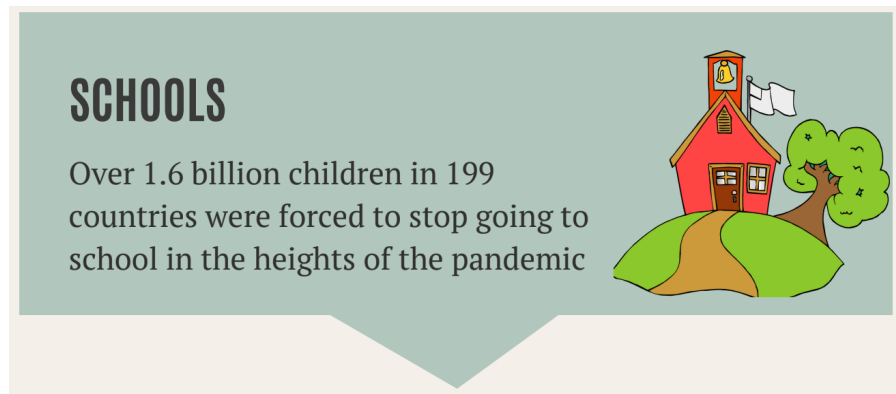


The disruption of food supply chains have increased consumer demands and caused prices to rise dramatically.⁹⁵ This problem has only aggravated the severity of food insecurity for 821 million people living in low-income countries who, prior to the pandemic, had been spending most of their monthly incomes on food. In July of 2021, a UN report stated that due to the COVID-19 crisis, global hunger rates spiked with 2.3 billion people lacking year-round access to adequate food. Likewise, 1.6 billion children in 199 low-income countries were forced to stop going to school during the heights of the pandemic. As a result a significant portion of these children (specifically 370 million spread throughout 150 countries) now lack access to the nutritious meals they were receiving at school through national feeding programs or UN agencies. While the world food prices fell for the

⁹⁴ Shih, Willy C. "Global Supply Chains in a Post-Pandemic World." *Harvard Business Review*, Sept. 2020, hbr.org/2020/09/global-supply-chains-in-a-post-pandemic-world. Accessed 1 Jan. 2022.

⁹⁵ "COVID-19 Brief: Impact on Food Security." *U.S. Global Leadership Coalition*, 12 Aug. 2021, www.usglc.org/coronavirus/global-hunger/. Accessed 1 Jan. 2022.

first time since the start of the pandemic in June of 2020, these numbers are still 39.9 percent higher than they were prior to the COVID-19 outbreak.⁹⁶



COVID-19 has impacted food security in the long term by exposing how some countries are too dependent on the exports they receive from others. This applies to many countries that are food insecure, as one of the main ways they were able to cope with the issue was through international aid. When the COVID-19 pandemic struck, global quarantines decreased the rate at which countries were able to export goods. This resulted in governments needing to reassess how much they rely on food imports coming from other countries. Over the course of the pandemic “COVID-19 has caused governments to receive significant pressure to increase their domestic production, rethink strategies of replenishment and lean inventories, and finally reduce their dependence on risky sources.” (Willy C. Shih Harvard Business review). In other words, COVID-19 demonstrated to nations across the globe just how important food security is, how vulnerable countries dependent on external aid are to crises that cut off their aid, and how important it is to be able to sustain demand within their borders.⁹⁷

In closing, COVID-19 has had a strong impact on the food security of the world. The pandemic has undone much of the progress countries have made over the past few years. COVID-19’s impact on food security has served as a reminder for many nations how unstable and potentially dangerous it can be to rely on international aid and food supply chains to battle hunger in their countries.⁹⁸ As a result of food supply chains being compromised, many countries that previously struggled with food insecurity have been left in difficult positions.

⁹⁶ "COVID-19 Brief: Impact on Food Security." *U.S. Global Leadership Coalition*, 12 Aug. 2021, www.usglc.org/coronavirus/global-hunger/. Accessed 1 Jan. 2022.

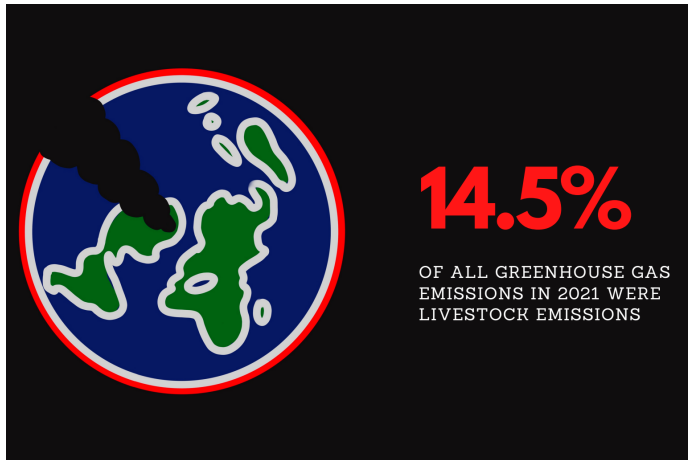
⁹⁷ Shih, Willy C. "Global Supply Chains in a Post-Pandemic World." *Harvard Business Review*, Sept. 2020, hbr.org/2020/09/global-supply-chains-in-a-post-pandemic-world. Accessed 1 Jan. 2022.

⁹⁸ "COVID-19 Brief: Impact on Food Security." *U.S. Global Leadership Coalition*, 12 Aug. 2021, www.usglc.org/coronavirus/global-hunger/. Accessed 1 Jan. 2022.

THE MEAT INDUSTRY

Millicent Honor

The meat industry is detrimental to the environment due to its impacts on the atmosphere, on animal safety, and on land and oceans. In 2021, livestock emissions contributed to 14.5% of all greenhouse gas (GHG) emissions.⁹⁹ Greenhouse gases such as carbon dioxide, methane, and water vapour are crucial to keeping the world at a temperature suitable for life. These greenhouse gases absorb infrared radiation that the Earth's surface



emits and reradiates it back.¹⁰⁰ The reason that greenhouse gases are frequently portrayed negatively is because humans disrupted the natural balance during the start of the Industrial Revolution. Anthropogenic emissions have produced too many of the typically positive greenhouse gases, causing an excess of heat. To understand, the net emissions of greenhouse gases caused by anthropogenic activity increased by 35% from 1990 to 2010 and carbon dioxide levels increased by 42%.¹⁰¹

Animals are raised in what are called concentrated animal feeding operations (or CAFOs). CAFOs, also known as factory farms, are the extensive industrial agricultural facilities that raise livestock in high density for the consumption of meat, eggs, or milk. These operations contain many animals in small enclosures, having a range between 1,000 to 15,000 beef cattle and up to 82,000 hens.

A high-density of animals in a confined space leads to a large production of waste. In 2012, livestock raised by the United States' largest CAFOs produced 39 million tons of manure, resulting in enormous impacts on the environment. Farmers often apply too much liquid manure and urine to soil, which causes it to fail to absorb the phosphorus and nitrogen. The excess leaks into the waterways and empties into the sea, triggering algae overgrowth that releases harmful toxins that impact both people and the environment.¹⁰²

Animal manure also contributes to the spread of pathogens. Salmonella, anthrax, ringworm, tetanus are just a few of more than 150 these pathogens that could impact human health. Although the majority of people can recover from these pathogens, 20% of the US population is classified as a risk group, whether they are immunocompromised, pregnant, or elderly. The high confinement of animals raises the chances of a potential

⁹⁹ "Major cuts of greenhouse gas emissions from livestock within reach." Food and Agricultural Organization of the United Nations, www.fao.org/news/story/en/item/197623/icode/. Accessed 1 Jan. 2022.

¹⁰⁰ Mann, Michael E.. "greenhouse gas". Encyclopedia Britannica, 29 Oct. 2021, <https://www.britannica.com/science/greenhouse-gas>. Accessed 1 Jan. 2022.

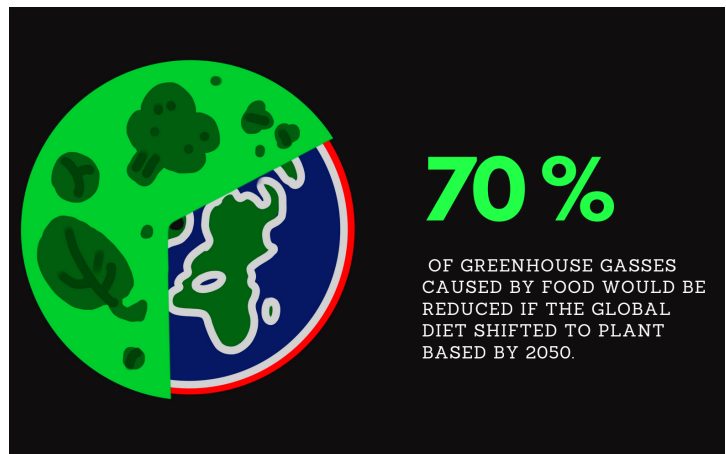
¹⁰¹ "What is the Greenhouse Gas Effect?" CLEAR Center, 23 Oct. 2019, clear.sf.ucdavis.edu/explainers/what-greenhouse-gas-effect. Accessed 1 Jan. 2022.

¹⁰² "Industrial Agriculture 101." NRDC, 31 Jan. 2020, www.nrdc.org/stories/industrial-agriculture-101. Accessed 1 Jan. 2022.

pathogenic transfer, which can be difficult to detect among asymptomatic animals.¹⁰³ These bacterias, which cannot be treated by antibiotics, have allowed the probability for new viruses to develop, which can mutate through human transmission (both the H1N1 and COVID-19 being examples).¹⁰⁴

CAFOs have embedded animal cruelty into the process of raising livestock. When it comes to breeding female pigs, also known as sows, animals face incredible cruelty. When pregnant, sows are held in gestation crates, which are metal enclosures that are not much larger than the size of the pig. They are held there for four months, crammed to the point that they are unable to turn around to see their offspring, who are taken shortly after. Chickens are mutilated from a young age; they are debeaked at birth. The process of debeaking— or slicing off portions of the beak¹⁰⁵ - is to prevent the birds from pecking each other, a behaviour only typical in CAFOs and presumed to be caused by stress. When looking at the statistics of the harmful effects the meat industry has on the environment, the solution seems simple — vegetarianism. As of 2020, 48% of US plant-based consumers plan to become vegetarian for environmental reasons.¹⁰⁶ However, it is important to understand the impacts of a vegetarian diet. It was recently discovered that for every kilogram of asparagus, 5.3kg of carbon dioxide are produced¹⁰⁷. The reason for this is that the vegetable, which is consumed at 1.83 lbs per capita in the US, is often imported from countries like Peru.¹⁰⁸

Furthermore, milk substitutes are increasingly harmful to the environment. The almond milk industry, for example, experienced a 250% increase in demand from 2010 to 2015. Although almond milk may not affect our world through cows and sows, they are one of the most water-intensive crops to grow. Its impacts large states with droughts, like California, which grows over 80% of the world's almonds.¹⁰⁹ The production of 16 almonds, which is below the recommended serving size, uses an estimated 15.3 gallons of water. In turn, 1.4 billion kilograms of almonds were grown in 2020, which means 87,500,000



¹⁰³ Hribar, Carrie. Understanding Concentrated Animal Feeding Operations and Their Impact on Communities. 2010. CDC, www.cdc.gov/nceh/ehs/docs/understanding_cafos_nalboh.pdf. Accessed 1 Jan. 2022.

¹⁰⁴ Zimmer, Carl. "Newly Discovered Bat Viruses Give Hints to Covid's Origins." The New York Times, 14 Oct. 2021, www.nytimes.com/2021/10/14/science/bat-coronaviruses-lab-leak.html. Accessed 1 Jan. 2022.

¹⁰⁵ "How Are Factory Farms Cruel to Animals?" The Humane League, 5 Jan. 2021, thehumaneleague.org/article/factory-farming-animal-cruelty. Accessed 1 Jan. 2022.

¹⁰⁶ Watson, Elaine. "'Plant-based' plays way better than 'vegan' with most consumers, says Mattson." Food Navigator USA, 19 Apr. 2018, www.foodnavigator-usa.com/Article/2018/04/19/Plant-based-plays-way-better-than-vegan-with-most-consumers-says-Mattson. Accessed 1 Jan. 2022.

¹⁰⁷ Gray, Richard. "Why the vegan diet is not always green." BBC, 13 Feb. 2020, www.bbc.com/future/article/20200211-why-the-vegan-diet-is-not-always-green. Accessed 1 Jan. 2022.

¹⁰⁸ Shahbandeh, M. "U.S. per capita consumption of fresh vegetables by type 2020." Statista, 22 July 2021, www.statista.com/statistics/257345/per-capita-consumption-of-fresh-vegetables-in-the-us-by-type/. Accessed 1 Jan. 2022.

¹⁰⁹ Fleischer, Deborah. "Almond Milk is Taking a Toll on the Environment." UCSF Sustainability, Jan. 2018, sustainability.ucsf.edu/1.713. Accessed 1 Jan. 2022.

times that amount of water was used in almond production, which comes out to 1,338,750,000 gallons of water.¹¹⁰

Despite the drawbacks of vegetarianism, it does have its benefits for developing a sustainable food industry. Vegetarian diets have the greatest impact when it comes to reducing greenhouse gas emissions. As the World Health Organization says, “Reducing livestock herds would also reduce emissions of methane, which is the second largest contributor to global warming after carbon dioxide.” By 2050, if the global diet shifted to plant-based, greenhouse gases caused by food would reduce by 70%.¹¹¹

Ultimately, the meat industry’s shortcomings include contributing to an increase in carbon emissions, polluting our Earth’s water, being a petri dish for new viruses, and performing procedures that are cruel to animals. Despite also contributing to carbon emissions, the vegetarian alternative is astronomically better for the environment. A single meatless day a week could make a big change in the world without disturbing a meat-based diet.

¹¹⁰ O'Connor, Anahad. "Got Almond Milk? Dairy Farms Protest Milk Label on Nondairy Drinks." The New York Times, 13 Feb. 2017, www.nytimes.com/2017/02/13/well/eat/got-almond-milk-dairy-farms-protest-milk-label-on-nondairy-drinks.html Accessed 1 Jan. 2022.

¹¹¹ "Is Meat Bad for the Environment?" CLEAR Center, 23 Oct. 2019, clear.ucdavis.edu/explainers/meat-bad-environment. Accessed 1 Jan. 2022.

AFTERWORD

Food insecurity will remain to be a prevailing issue in our society for years to come. However, it is our responsibility as members of this planet to strive for equity and the fair distribution of food worldwide. Furthermore, it is crucial that we are aware of the sustainable actions that we can take part in by means of assisting our planet and ensuring that we will all be able to live here fortunately with an enduring food supply. The UNIS-UN Executive Committee has invited experts to address the ever-relevant issues and questions that are currently defining our experience in nourishing our global population; from why the impact of food insecurity on specific populations remains, to the plethora of advances being made in creating viable food infrastructure.

We hope that this Working Paper was beneficial in further developing your understanding of the issue of food insecurity. The hope is that after processing this knowledge, you are now able to form your own opinions and unveil solutions to this prevalent issue.

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