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Role of Food in Climate Change: Healthy diets for a healthier planet

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Abstract

"Climate change has happened because of human behaviour, therefore it's only natural it should be us, human beings, to address this issue. It may not be too late if we take decisive actions today." -Ban Ki-moon, Secretary-General, United Nations

Climate change refers to the changes in weather patterns and temperature over a period of time. These shifts can be natural, due to changes in the sun's activity or large volcanic eruptions. The main greenhouse gases responsible for causing climate change are carbon dioxide and methane. Humans are to blame for global warming, according to climate scientists who have demonstrated that nearly all global heating in the past 200 years can be attributed to human activities. The process of growing, processing, transporting, distributing, preparing, consuming, and sometimes disposing of food generates greenhouse gases that contribute to climate change by trapping heat from the sun. Approximately one-third of all human-induced greenhouse gas emissions can be attributed to food production. Among food types, animal-based products, particularly red meat, dairy, and farmed shrimp, are known for their high greenhouse gas emissions. Exploring alternative proteins, like plant-based meat and dairy substitutes, insect-based proteins, and cell-based or cultivated meat, shows great promise and is experiencing growing demand, financial investment, and technological innovation. To reduce emissions from animal agriculture, improving feeds and feeding techniques can help decrease methane production during cattle's digestion and minimize gases released from decomposing manure.

Key Words- Climate Change, Food Production Techniques, Green House Gases, Food and Nutrition Security

Introduction

Climate change refers to the changes in weather patterns and temperature over a period of time. These shifts can be natural, due to changes in the sun's activity or large volcanic eruptions. However, since the 1800s, human activities have become the primary driver of climate change, mainly due to the burning of fossil fuels such as coal, oil, and gas. The burning of fossil fuels produces greenhouse gas emissions that act as a blanket around the Earth, trapping the sun's heat and leading to rising temperatures. The main greenhouse gases responsible for causing climate change are carbon dioxide and methane. These gases are emitted through activities such as driving a car using gasoline, heating buildings with coal, clearing land, and deforestation activities.

The main sectors contributing to greenhouse gas emissions include energy, industry, transportation, buildings, agriculture, and land use. These activities are collectively responsible for the increase in greenhouse gas concentrations in the atmosphere, leading to changes in the Earth's climate.

Humans are to blame for global warming, according to climate scientists who have demonstrated that nearly all global heating in the past 200 years can be attributed to human activities. These activities involve the release of greenhouse gases into the atmosphere, which is causing the Earth to warm at a rate faster than any time in the last two millennia.

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The Earth's average surface temperature is currently 1.2°C warmer than it was in the late 1800s, prior to the industrial revolution, and is warmer than it has been in the past 100,000 years. The most recent decade (2011-2020) has been recorded as the warmest on record, with each of the last four decades surpassing the temperatures of any previous decade since 1850.

While many associate climate change with rising temperatures, this is just the initial aspect of the larger picture. The Earth functions as a connected system, where changes in one aspect can have widespread effects on others. The impacts of climate change now encompass severe consequences such as prolonged droughts, water scarcity, devastating wildfires, higher sea levels, increased flooding, melting polar ice caps, powerful storms, and a reduction in biodiversity.

The link between food and climate change- The food we consume and how it is produced have a significant impact not only on our health but also on the environment. The process of growing, processing, transporting, distributing, preparing, consuming, and sometimes disposing of food generates greenhouse gases that contribute to climate change by trapping heat from the sun. Approximately one-third of all human-induced greenhouse gas emissions can be attributed to food production. Among the various factors contributing to food-related greenhouse gas emissions, agriculture and land use play a significant role. Emissions from agriculture and land use include methane produced during cattle digestion, nitrous oxide released from fertilizers used in crop production, carbon dioxide emitted when forests are cleared to make way for farmland expansion, and other agricultural emissions stemming from manure management, rice cultivation, burning crop residues, and the use of fuels on farms.

While the majority of food-related greenhouse gas emissions come from agriculture and land use, a smaller portion is attributed to activities such as refrigeration and food transport, industrial processes like paper and aluminum production for packaging, as well as food waste management.

The Impact of Climate Change on Food and Nutrition Security- While increased concentrations of CO2 can enhance crop growth, the emissions of CO2 are causing frequent climatic fluctuations such as intense heat, severe weather, and droughts. These changes pose a significant threat to key crops like wheat and maize. Without successful adaptation measures, global yields may drop by as much as 30% by 2050, as projected by some studies. Countries already grappling with issues like violence, pollution, and deforestation are expected to face the harshest consequences.

The adverse effects of climate change will particularly affect the 2 billion people who currently lack access to sufficient food, notably smallholder farmers and individuals living in poverty. Despite global efforts over the years, hunger and food insecurity persist at alarming levels. In 2019, around 750 million people experienced extreme food insecurity, a number that continues to rise. Climate-related shocks significantly contribute to the increasing levels of undernourishment and food insecurity. According to a recent report by the Children's Climate Risk Index (CCRI), the climate crisis is impacting children worldwide. An estimated 850 million children aged 1-3 are living in areas where environmental and climatic shocks coincide. Children are more vulnerable to the effects of climate change compared to adults due to their need for more food and water relative to their body weight and their lower resilience to extreme weather events. They are also more susceptible to toxic chemicals, temperature changes, and diseases.

India has experienced a rise in average temperatures and an increase in the frequency of intense rainfall events over the past three decades. Estimates from the National Innovations in Climate Resilient Agriculture suggest that rainfed rice yields in India may decline by less than 2.5% between 2050-2080, while irrigated

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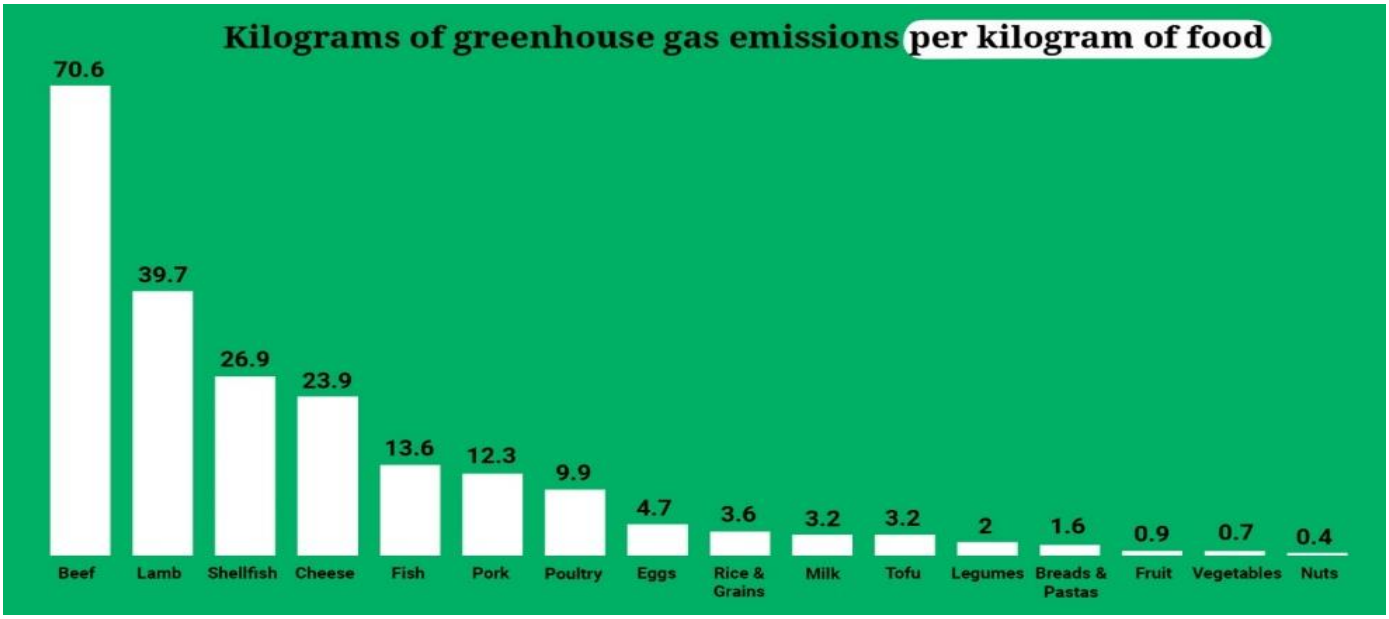
rice yields could decrease by 7%. On a positive note, chickpea production is projected to increase by 54% due to future climatic shifts.

Which foods cause the most greenhouse gas emissions?

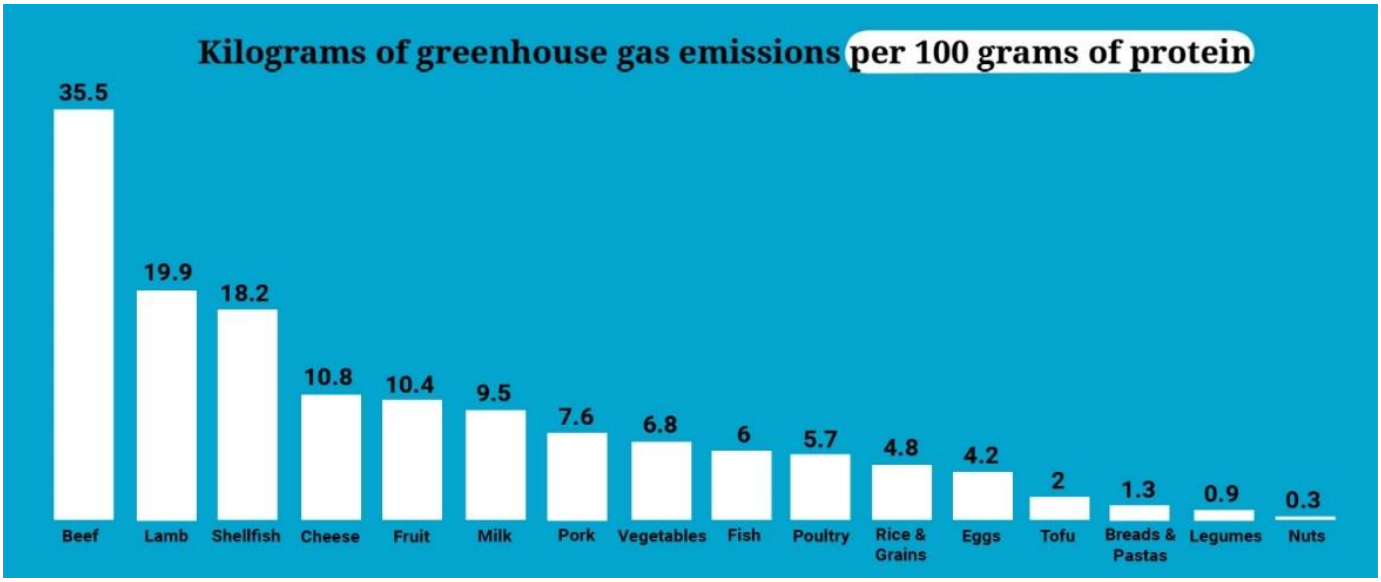
Greenhouse gas emissions from food are measured by their emissions intensity, which is typically expressed in kilograms of "carbon dioxide equivalents" per kilogram of food, per gram of protein, or per calorie. Among food types, animal-based products, particularly red meat, dairy, and farmed shrimp, are known for their high greenhouse gas emissions. The reasons behind this include:



1. Meat production often necessitates vast expanses of grasslands, which are established by clearing forests, leading to the release of carbon dioxide stored in trees.

2. Cows and sheep emit methane during digestion of grasses and plants.

3. Waste from cattle on pastures, as well as chemical fertilizers used for cattle feed crops, emit nitrous oxide, a potent greenhouse gas.



4. Shrimp farms commonly replace coastal areas once covered by mangrove forests, which absorb significant

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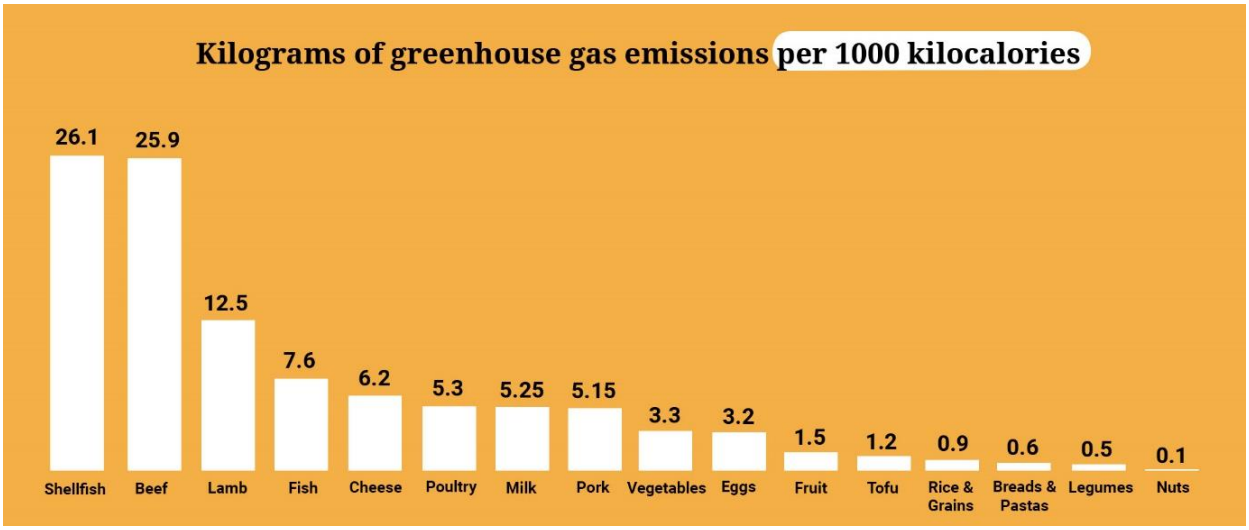
amounts of carbon. The significant carbon footprint of shrimp or prawns largely stems from the release of stored carbon into the atmosphere when mangroves are cleared for shrimp farming.

Plant-based foods, such as fruits, vegetables, whole grains, beans, peas, nuts, and lentils, typically require less energy, land, and water compared to animal-based foods. Additionally, they have lower greenhouse gas emissions.

The article presents three charts illustrating the carbon footprint of various food products. Emissions are compared based on weight (per kilogram of food) or in terms of nutritional units (per 100 grams of protein or per 1000 kilocalories). This comparison allows us to understand the efficiency with which different foods provide protein or energy.



Notes:

- Emissions are measured in kilograms of carbon dioxide equivalents, kgCO2eq, which takes into account not only carbon dioxide but also other greenhouse gases, such as methane and nitrous oxide, by converting them to carbon dioxide equivalents with the same global warming potential.

- Beef combines beef cattle and dairy cattle. | Shellfish and fish are farmed. | Cheese and milk include all dairy, i.e. animal sources such as cow, goat, sheep, buffalo, camel.

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How can food-related emissions be reduced?

Reducing emissions in the food sector requires changes to be made at all stages, from producers to consumers. One effective method is to shift food systems towards plant-rich diets. This involves consuming more plant protein, such as beans, chickpeas, lentils, nuts, and grains, while reducing the consumption of animal-based foods like meat and dairy, as well as less saturated fats such as butter, milk, cheese, meat, coconut oil, and palm oil. These changes can lead to a significant decrease in greenhouse gas emissions compared to current dietary patterns in most industrialized countries.

Exploring alternative proteins, like plant-based meat and dairy substitutes, insect-based proteins, and cell-based or cultivated meat, shows great promise and is experiencing growing demand, financial investment, and technological innovation. However, it is important to recognize that animal products play a crucial role in providing food security, nutrition, and livelihoods for many rural populations worldwide. To reduce emissions from animal agriculture, improving feeds and feeding techniques can help decrease methane production during cattle's digestion and minimize gases released from decomposing manure. Additionally, smaller herd sizes with more productive animals and better agricultural practices like improved manure and fertilizer management, rotational grazing, and land restoration can all contribute to reducing greenhouse gas emissions from the food sector.

Reducing food waste is crucial. Nearly 1 billion tons of food, representing 17 percent of all available food for consumers globally, are discarded annually. The production, transportation, and eventual rotting of this food contribute over 8 percent of global greenhouse gas emissions. If food waste were a nation, it would rank as the third-largest emitter of greenhouse gases in the world.

Conclusion:

What can we do?

Eat Healthier Meals

- Switch to a diet that is more plant-based and balanced, providing energy and nutrients from various food groups while reducing foods that are harmful to the environment.
- Meat and dairy are crucial sources of protein and micronutrients in lower-income countries with limited dietary variety. However, in most high-income countries, transitioning towards a more plant-based diet not only improves health but also significantly reduces environmental impact compared to a typical meat-heavy diet.
- What we eat plays a much bigger role than the food's distance traveled or the packaging it comes in. The greenhouse gas emissions from transportation and packaging make up only a small portion of a food's overall impact.

Reduce Food Waste

- Consider our food purchasing habits, meal preparation, and food disposal methods. When we waste food, we are also squandering the energy, land, water, and fertilizer expended in its production, packaging, and transportation.
- It is important to only purchase what we truly need and make sure to use up all that we buy. Don't hesitate to choose imperfect-looking fruits and vegetables, as it can prevent them from being wasted.

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- By minimizing waste, we can save money, lower emissions, and help in conserving resources for the future generations. If some food does end up being discarded, composting leftovers can aid in reducing the release of methane and CO2 from organic waste.
- Consider trying out sustainable recipes that not only taste great but are also beneficial for wer health and the environment. Many renowned chefs are creating dishes that are both delicious and eco-friendly.
- When shopping, opt for a reusable bag instead of plastic ones. The production, usage, and disposal of plastics contribute to climate change. By utilizing a reusable bag, we can cut down on plastic waste and contribute towards a cleaner environment.

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