



Food and Agriculture Organization
of the United Nations

Climate Change Implications for Global Food Safety



MUNIR_UZ_ZAMAN/AFP/GETTY IMAGES

Vittorio Fattori and Keya Mukherjee

Food Systems and Food Safety Division, FAO, Rome

17 November 2020

Changing Food Systems: more complexities in Food Safety...





Illustration by
Michael Sloan

According to the United Nations Framework Convention on Climate Change (UNFCCC), Climate Change refers to a

'change of climate (global temperatures, precipitations, wind patterns and other measures of climate) that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods'

Food and Agriculture in relation to Climate Change

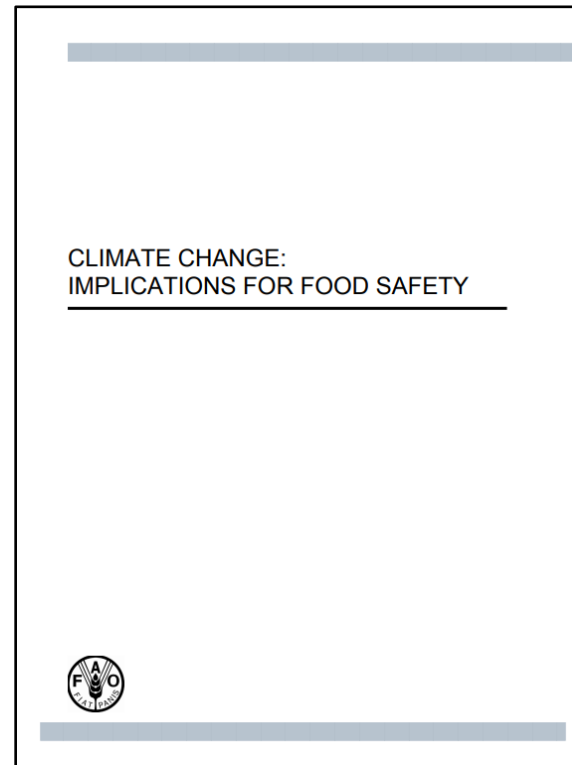
- According to a recent IPCC report, if temperatures rise by 1.5 °C above pre-industrial levels this century, 122 million additional people could experience extreme poverty by 2030, mainly due to higher food prices and declining health
- Between 2006 and 2016, 26% of the total damage and loss caused by climate-related disasters in developing countries was in the agriculture sector



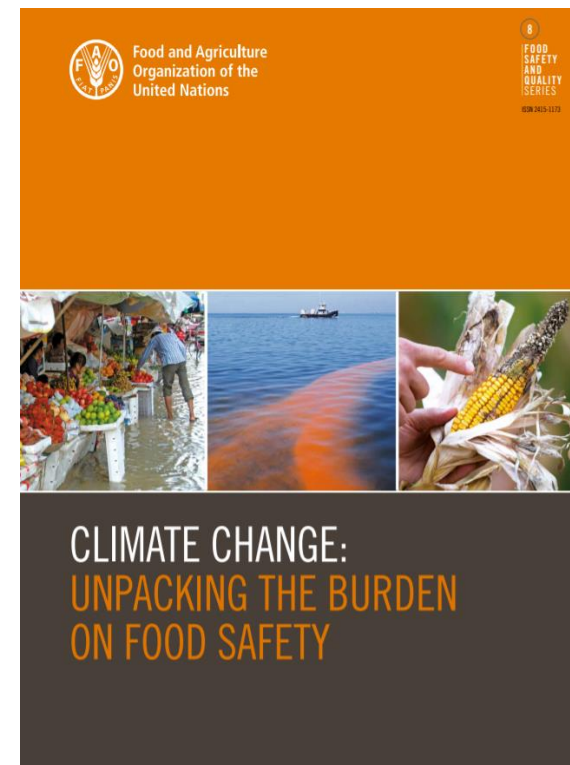
- Climate change is expected to bring additional burdens on water systems, intensifying competition for water, affecting regional water, energy, fisheries and food security, as well as affecting public health

- In developing countries, up to 83% of all damage and loss caused by drought, which climate change is expected to intensify, is absorbed by agriculture
- Currently, one-third of the food we produce is lost or wasted. This costs up to USD 2.6 trillion per year, including USD 700 billion in environmental costs and USD 900 billion in social costs

While the impacts of climate change on food security are well known, the effects on food safety receive less attention



2008



2020

FOODBORNE PATHOGENS AND PARASITES



Women collecting water from a communal water pump during floods caused by Cyclone Alia in Bangladesh



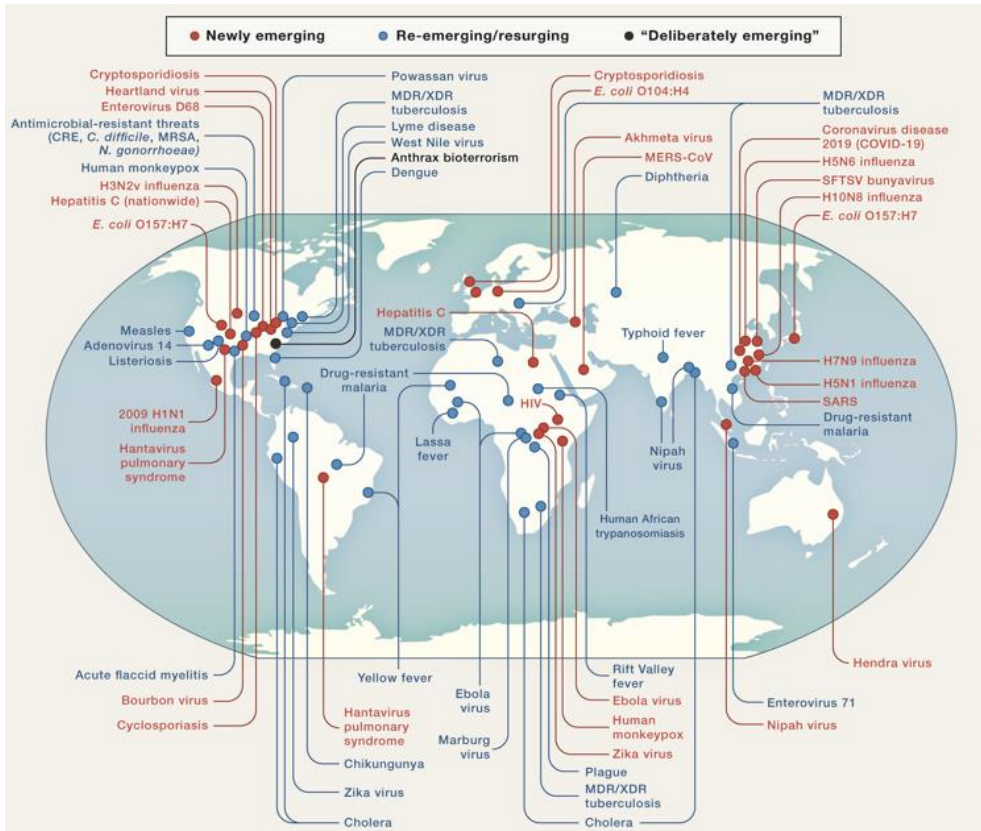
- Evidence to link increasing temperatures to higher incidences of infections by foodborne pathogens like *Salmonella* spp. and *Campylobacter* spp.
- Water scarcity can have an impact on hygienic conditions in food processing plants

- Flooding leads to increased likelihood of outbreaks of waterborne diseases like cholera



Antimicrobial Resistance – a growing threat

What about COVID-19?



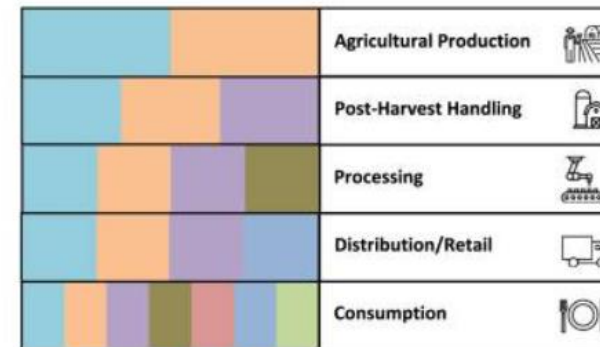
1981 - 2020

No current evidence to suggest direct impact of climate change

No current evidence to suggest that the COVID-19 can be transmitted through food
 Policy and advice for the food sector are available


Safety Measures during the COVID-19 Pandemic

Be Healthy	Wash Hands	Disinfect Surfaces	Working Environment	Preparation	Delivery	Social Distance
<ul style="list-style-type: none"> Stay home if sick Check for symptoms like fever, cough, difficulty breathing Cover your mouth with a tissue or sleeve when coughing or sneezing 	<ul style="list-style-type: none"> Wash hands often with soap and water for at least 20s Avoid touching your eyes, nose and mouth with unwashed hands Use a 60% alcohol-based sanitizer 	<ul style="list-style-type: none"> Disinfect high touch surfaces with proper products (e.g. 62-71% ethanol) Use sanitizers according to label instructions Follow protective measures 	<ul style="list-style-type: none"> Apply proper disinfection of toilet areas Develop open plan work spaces Use window ventilation 	<ul style="list-style-type: none"> Separate raw from cooked products Wash fruits and vegetables thoroughly before eating Cook food in appropriate temperatures (>70°C) 	<ul style="list-style-type: none"> Try to use "no touch" deliveries Maintain time and temperature controls Ensure that transport containers are cleaned and sanitized 	<ul style="list-style-type: none"> Stay at least 2 m from other people Do not gather in groups Stay out of crowded places and avoid mass gatherings



What about COVID-19?

FAO's response in the food safety arena



Food and Agriculture Organization of the United Nations

14 April 2020

Food safety in the time of COVID-19

OVERVIEW

Presently, there is no evidence that the virus responsible for the current COVID-19 pandemic is carried by domestic food-producing animals, such as chickens, ducks, other poultry, pigs, cattle, camels, horses, sheep, goats, rabbits, guinea pigs or fish. While live animals can be a source of pathogens, all types of food can potentially be contaminated through contact with contaminated equipment, surfaces or environments. Proper cleaning and the prevention of cross-contamination are critical in the control of foodborne illnesses. The application of sound principles of environmental sanitation, personal hygiene and established food safety practices will reduce the likelihood that harmful pathogens will threaten the safety of the food supply, regardless of whether the food is sourced from intensive agriculture, small stakeholders or wildlif.

KEY MESSAGES

- There is no evidence that animals or food of animal origin can transmit the virus COVID-19 to humans.
- Preventing contamination in the food chain will reduce foodborne illness and reduce the likelihood of the emergence of novel diseases such as COVID-19.
- Legally traded wildlife products can be safe for consumption if safe food handling and preparation practices are followed.

People cannot contract COVID-19 from foods of animal origin

Presently, there is no evidence that the virus responsible for the current COVID-19 pandemic is carried by domestic food-producing animals such as chickens, ducks, other poultry, pigs, cattle, camels, horses, sheep, goats, rabbits, guinea pig or fish.

Based on nucleic acid sequence analysis, bats are presumed to be the most likely reservoir for the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the virus responsible for COVID-19. To date, there are no documented cases of direct bat-to-human transmission, hence other wildlife species may be involved as intermediate hosts between bats and humans. However, no evidence is yet available to identify with certainty either the involvement of other wildlife species or the path of transmission between other wildlife species and humans. While transmission of the disease has only been reported as a result of human-to-human transmission, knowing which wildlife species contributed to the initial animal-to-human of the virus remains a critical question to prevent the virus from reappearing once the current pandemic is under control.

Consumption of cooked meat (of domestic or wild origin), eggs and milk are not considered a means for acquiring the disease. However, contamination of the food supply with other pathogens, such as *Salmonella* spp., *Campylobacter* spp., *Escherichia coli*, and *Listeria*

COVID-19 and food safety: guidance for food businesses

Interim guidance
7 April 2020




Background

The world is facing an unprecedented threat from the COVID-19 pandemic caused by the SARS-CoV-2 virus (referred to as the COVID-19 virus). Many countries are following the advice from the World Health Organization (WHO) regarding the introduction of physical distancing measures in one of the ways in which transmission of the disease can be reduced. The application of these measures has resulted in the closure of many businesses, schools, and institutes of education, and restrictions on travel and social gatherings. For some people, working from home, teleworking, and on-line or internet discussions and meetings are now normal practices. Food industry personnel, however, do not have the opportunity to work from home and are required to continue to work in their usual workplaces. Keeping all workers in the food production and supply chains healthy and safe is critical to surviving the current pandemic. Maintaining the movement of food along the food chain is an essential function to which all stakeholders along the food chain need to contribute. This is also required to maintain trust and consumer confidence in the safety and availability of food.

The food industry should have Food Safety Management System (FSMS) based on the Hazard Analysis and Critical Control Point (HACCP) principles in place to manage food safety risks and prevent food contamination. Food safety FSMS are underpinned by prerequisite programmes that include good hygiene practices, cleaning and sanitation, zoning of processing areas, supplier control, storage, distribution and transport, personal hygiene and fitness to work – all the basic conditions and activities necessary to maintain a hygienic food production environment. The Codex General Principles of Food Hygiene¹ lay down a firm foundation for implementing key hygiene controls at each stage of the food processing, manufacture, and marketing chain for the prevention of food contamination.

If a food business has a FSMS and/or HACCP team established, the members of these groups need to be included in all discussions to review that new interventions are reviewed with food safety in mind. If a business does not have a FSMS and/or HACCP team established, there is need to appoint one person responsible for considering whether food safety risks could arise from additional measures. This designated person must liaise with food safety authorities for advice. There is now an urgent requirement for the industry to ensure compliance with measures to protect food workers from contracting COVID-19, to prevent exposure to or transmission of the virus, and to strengthen food hygiene and sanitation practices.

Potential transmission of COVID-19 via food

It is highly unlikely that people can contract COVID-19 from food or food packaging. COVID-19 is a respiratory illness and the primary transmission route is through person-to-person contact and through direct contact with respiratory droplets generated when an infected person coughs or sneezes. There is no evidence to date of virus in cause respiratory illnesses being transmitted via food or food packaging. Coronavirus cannot multiply in food; they need an animal or human host to multiply.



The most recent advice from the WHO² is that current evidence indicates that COVID-19 virus is transmitted during close contact through respiratory droplets (formed on coughing or sneezing) and by fomites.^{3,4} The virus can spread directly from person-to-person when a COVID-19 case coughs or sneezes, producing droplets that reach the nose, mouth, or eyes of another person. Alternatively, as the respiratory droplets are too heavy to be airborne, they land on objects and surfaces surrounding the infected person. It is possible that someone may become infected by touching a contaminated surface, object, or the hand of an infected person and then touching their own mouth, nose, or eyes. This can happen, for instance, when touching door knobs or shaking hands and then touching the face.

Recent research evaluated the survival of the COVID-19 virus on different surfaces and reported that the virus can remain viable for up to 72 hours on plastic and stainless steel, up to four hours on copper, and up to 24 hours on cardboard.⁵ This research was conducted under laboratory conditions (controlled relative humidity and temperature) and should be interpreted with caution in the real-life environment.

It is imperative for the food industry to reinforce personal hygiene measures and provide refresher training on food hygiene principles⁶ to eliminate or reduce the risk of food surfaces and food packaging materials becoming contaminated with the virus from food workers. Personal protective equipment (PPE), such as masks and gloves, can be effective in reducing the spread of viruses and disease within the food industry, but only if used properly. In addition, the food industry is strongly advised to introduce physical distancing and strong hygiene and sanitation measures and

COVID-19 and Food Safety: Guidance for competent authorities responsible for national food safety control systems

Interim guidance
22 April 2020

Background

The ongoing COVID-19 pandemic presents an exceptional and unprecedented challenge for competent authorities' with responsibilities for national food safety control systems' to continue conducting routine functions and activities in accordance with national regulations and international recommendations. In many countries, competent authority staff are largely working from home, teleworking being the normal practice, and all face-to-face meetings cancelled or rescheduled as teleconferences. It is challenging to maintain, without interruption, routine activities such as the inspection of food business operations, certifying exports, control of imported foods, monitoring and surveillance of the safety of the food supply chain, sampling and analysis of food, managing food incidents, providing advice on food safety and food regulations for the food industry, and communicating on food safety issues with the public.

To preserve the integrity of the national food safety control system and to support international trade and the food supply chain, each competent authority will need to prioritize critically important services during the ongoing COVID-19 pandemic. These may include introducing temporary suspensions of low-risk control activities that do not immediately affect the supply of safe food. Temporarily suspending low-risk control activities will allow authorities to continue to safeguard the health and safety of their staff while reinforcing efforts in areas of higher risk and towards activities that are critical to the safety of food. Depending on national priorities, some competent authorities may decide to prioritize selected activities, for example, inspection of high-risk food businesses, export certification, import control services, food incident management or investigation of food complaints. It is important that competent authorities continue to monitor developments regarding the COVID-19 pandemic and respond by making the necessary adjustments to their work programmes and continue to deliver critical services that preserve the integrity of their food safety systems.

The challenges facing national competent authorities arise from:

- implementing contingency plans;
- reduced capacity to maintain a fully functioning food safety inspection programme resulting from the reallocation of staff to national COVID-19 emergency response teams, staff working from home, and staff illness and self-isolation;
- reduced food testing capacity of food laboratories reassigned to COVID-19 clinical testing;
- increased risk to the integrity of the food supply chain from food fraud;
- need to respond to an increasing number of queries and questions from Ministers, the food industry, consumers, and the media.

Competent authorities have a critical role to play during this pandemic as working with all sectors of the food industry so that producers and processors can continue to operate effectively and keep safe food supply lines open.

This guidance aims to address some key issues, namely, how to ensure the effectiveness of a reduced food safety inspection programme in mitigation of risk, and temporary measures that can be introduced to contain widespread food safety risks and reduce serious disruptions to national food safety programmes.

Multi-agency cooperation and contingency planning

All competent authorities should have emergency response or contingency plans in place following FAO/WHO guidance⁷ and be able to put them in action. Competent authority contingency plans should include details of the roles and responsibilities of the central, regional, and local competent authorities and mechanisms for cooperation and collaboration during times of crisis. Contingency plans should include details of how to prioritize the delivery of essential services; the organizations of operational teams for information management, communication, risk assessment and risk



Food and Agriculture Organization of the United Nations

FAO COVID-19 Response and Recovery Programme



Trade and food safety standards Facilitating and accelerating food and agricultural trade during COVID-19 and beyond

The Issue

The COVID-19 pandemic will have an unprecedented impact on global and regional trade. According to the World Trade Organization (WTO), world merchandise trade in 2020 could fall by as much as 32 percent. The current situation is unlike any other food or health crisis in modern times, with simultaneous supply and demand shocks that are global in nature. Labour shortages due to curtailed mobility are affecting all aspects of the food and agriculture supply chains, from production, to processing and retailing, leading to both immediate and longer-term risks for food production and availability.

At the same time, the significant scale of the economic recession, amid widespread job losses and reductions in income and remittances, is raising serious concerns about hunger and malnutrition. The most vulnerable groups are already poor and food insecure, particularly in countries affected by multiple crises (extreme weather variability, the locust plague and plant and animal disease), which are seeing significant currency depreciation (notably commodity-dependent economies), and those affected by conflict, where supply chain distribution and logistics links are already fragile. All this has prompted many countries to take various measures to protect their populations from the crisis.

Ad hoc trade restrictions have been a common feature of the immediate policy response, both import restrictions due to food safety concerns that are not necessarily science based and export restrictions due to concerns about domestic food availability and market uncertainty. Such measures have proven to exacerbate the situation and cause disruptions in supply chains. Therefore, to mitigate the impacts of shocks, such as COVID-19, instead of restricting trade, it is actually crucial to facilitate and enhance trade, both within and among regions, and improve access to markets.

This requires strategic orientation towards intra and interregional trade partners, compliance with trade requirements, in particular sanitary and phytosanitary (SPS) standards and international regulations, such as those on illegal, unreported and unregulated (IUU) fishing, and improving efficiency in moving goods across borders. In this regard, the catch-up potential could be significant for many developing countries, which face challenges in accessing key target markets, including those in their immediate vicinity as evidenced by low levels of intraregional trade.

The issue of accessing export markets typically results from policy barriers and limited policy coordination, for example, low harmonization and mutual recognition of SPS compliance procedures, limited use of digital solutions in the application of trade procedures and ad hoc and unpredictable trade restrictions. Access to markets is also hampered by physical constraints, such as low productive capacity, limitations in laboratory capacity to assess compliance with food safety standards and underdeveloped marketing and trade infrastructure.

Budget
USD 50 million

Time frame
2020–2024 (four years)

SDGs

Related FAO policy notes on COVID-19

- Agrifood markets and trade policy in the time of COVID-19
- Food Safety in the time of COVID-19
- COVID-19: Channels of transmission to food and agriculture

ALGAL BLOOMS



Health warning about fishing from water containing toxic *Alexandrium* sp. in Australia

Climate change is enabling various species that form harmful algal blooms (HABs) to expand to new areas, most of which are not prepared to meet the challenges associated with their detection and surveillance



- An overabundance of fertilizer application combined with more frequent and intense precipitation are leading to increased eutrophication in waterbodies, resulting in algal blooms

- Warming temperatures widen the seasonal windows for certain HABs, enabling them to persist for longer periods



HEAVY METALS



Polluted gold mine in Indonesia



- Heavy precipitation events, especially in mining areas, can release various heavy metals into the surrounding areas, compromising food and water quality



- Rice – a major crop known to take up and bioaccumulate arsenic from the soil or irrigation water
- Arsenic accumulates not only in the plant itself but also in the grain that is consumed

METHYLMERCURY



Swordfish, a marine apex predator, on sale in Spain

Global mercury emissions from anthropogenic sources in 2015 were approximately 20% higher than the concentrations in 2010



- Methylation of mercury is temperature-dependent
- Thawing of permafrost is expected to release large quantities of mercury into aquatic systems

- Increased precipitation enhances deposition of inorganic mercury in lakes and oceans



- Lowering pH values increases the microbial uptake of mercury in the oceans

MYCOTOXINS



Inspection of maize in Nepal

Mycotoxin contamination in staple crops is a major health concern and barrier to international trade



- Altered distribution of toxigenic fungi and the appearance of mycotoxins in crops

- Flooding, after heavy precipitation and extreme weather events, affects storage facilities and standing crops, increasing the risks related to mycotoxins

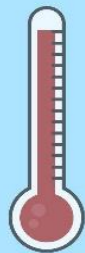


- Plants stressed by pest damage are more predisposed to fungal infections

Climate change effects on food safety hazards – *not* ‘siloed’ impacts

How a single aspect of climate change can make food less safe

Rising temperatures can affect food across the world by



Increasing the incidence of infections by food-and waterborne pathogens



Promoting higher uptake of toxic heavy metals in staple crops



Driving plant pests into new territories, potentially leading to overuse of pesticides



Making plants more susceptible to fungal infections and mycotoxins emerge in new regions



Expanding harmful algal blooms and affecting seafood safety



Food Safety in the face of Climate Change Requires *Shared* Solutions



One Health approach



Greater collaboration among stakeholders



Intelligence gathering and foresight



Early warning and surveillance systems

THE FUTURE OF FOOD SAFETY

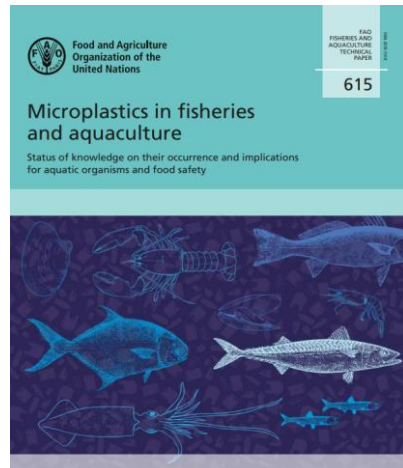
Transforming knowledge into action for people, economies and the environment

International Forum on Food Safety and Trade



Important to invest in approaches that help food safety authorities remain informed of potential challenges before their occurrence. *Proactive, instead of reactive*

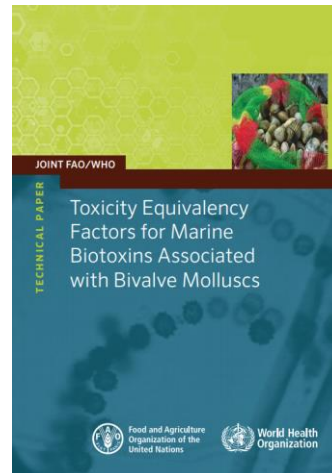
Emerging contaminants: endocrine disruptors, microplastics



Circular economy



Marine biotoxins



Urban agriculture



Technological advancements



Block chain technology

BBC

NEWS

Science & Environment

World's first lab-grown burger to be cooked and eaten

The New York Times

Got Impossible Milk? The Quest for Lab-Made Dairy

Lab-grown food

Conclusions

Safe and nutritious food is the prerequisite for human life and development

- There can be no food security without food safety and climate change threatens both

We need to stay vigilant: food safety requires continued commitment

- More attention is needed to raise awareness of climate change implications for food safety
- More efforts are needed to adequately prepare food supply chains and regulatory systems for the various food safety challenges associated with climate change

The future of food safety will require proactive and forward-looking approaches rather than relying on reactive measures

- Complementing traditional surveillance systems, foresight will help identify and address emerging food safety issues like those triggered by climate change
- Climate change impacts on food safety is a transdisciplinary issue that needs solutions driven by One Health-based approaches

Continued support is necessary: we all need to care

Food Safety is everyone's business



**Food safety,
everyone's
business**





Thank you