

ACMSF Horizon Scanning workshop 2023

ACMSF Horizon Scanning workshop 2023

Horizon Scanning Workshop (June) 2023

In this guide

[In this guide](#)

1. [ACMSF Horizon Scanning Workshop 2023 summary of discussions and outputs](#)
2. [HS 2023 Changes in methods of food production and new food technologies](#)
3. [HS 2023 Changes in consumer behaviour and preference](#)
4. [HS 2023 Challenges associated with changes in the sizes of vulnerable groups](#)
5. [HS 2023 Annex 1](#)

PDF

[View ACMSF Horizon Scanning Workshop 2023 summary of discussions and outputs as PDF](#) (360.38 KB)

Introduction

The ACMSF Committee held a horizon scanning workshop in London on the 22nd of June 2023. The focus of the workshop was to determine how climate change is likely to affect the microbiological safety of food in the UK. Members were asked to identify emerging issues around a series of specific questions relating to climate change. The workshop followed a similar format to previous years with a

mixture of breakout groups and plenary sessions and included guest speakers Pete Falloon and Matt Gilmore from the Met Office and The Quadram Institute respectively.

Key issues were identified by members during discussion in breakout groups and the plenary session was used for the Committee to agree a prioritized list of recommendations based on their potential for understanding and reducing foodborne illness. This paper summarizes the main outputs and discussions from the workshop including challenges and corresponding actions highlighted by the Committee.

Members were asked the following question:

How in your opinion is climate change likely to affect the microbiological safety of food in the UK via the following areas?

Please consider:

- Both trends (higher average temperatures) and increasing frequency of extreme weather events (flooding, drought, forest fires)
- Timescales (0-10 years, 10-20 years, 20+ years)
- Indicators: how will we know if the effect is happening?
- Likelihood and magnitude of effect
- New as well as existing hazards
- Key evidence gaps
- How CC might affect, and be affected by/mitigated by, other drivers
- Any recommended actions for the ACMSF, the FSA, other government departments and agencies, and external stakeholders.

Annex 1 includes the comments members provided before the workshop. The secretariat sent the questions to the Committee members before the workshop which members provided responses to. This document guided the discussions at

the workshop.

Priority actions identified by Members.

General Actions

Specific actions to climate change associated challenges, highlighted by the Committee, are listed in the tables below. However, there are several actions which have widespread implications across multiple sectors, in tackling microbiology safety concerns in food as a result of climate change. These broadly fall into three categories: information gathering to predict and plan for specific risks, education of consumers and collaboration, particularly with other government departments.

For example, in order to prepare for the impacts on food safety the Committee highlighted the need to work with the Met Office to receive the greatest possible warning of extreme weather events and plan preparations ahead of time to develop a rapid response capability. Furthermore, a need to identify and collate information on imported foods and develop scope to source similar foods from other countries, or move to UK production, if supply issues arise, was emphasized. Any indicators of concern to be monitored need to be agreed between government departments; and discussions must be held on how to handle these collaboratively. Surveillance to identify emerging pathogens needs to be carried out and insight must be gained from other country's experience and approach to climate change mitigations with particular reference to food safety.

A range of risk factors Identified by this information gathering process can be mitigated by proper education to consumers and manufactures. These might include consumer awareness of safe food practices in a warmer climate or rising cold chain management awareness to industry.

Many of the actions discussed in this report, would benefit from cross government collaboration. This is particularly relevant where there could be agreement on key factors to monitor as surveillance priorities for specific aspects of climate change impact, and the data to capture for them, so that research and other work can then be easily collated or combined to increase the power of detection.

Priority emerging issues identified by Members and associated actions.

The emerging challenges highlighted by the Committee are summarised in the tables below and are focused around the five key areas put to the Committee:

- Challenges associated with disruption to food supply chains
- Changes in methods of food production and new food technologies
- Changes in consumer behaviour and preferences
- Challenges associated with changes in the sizes of vulnerable groups
- Anything else

The points raised have been split into *direct* challenges, which are a result of climate change, and *indirect*, which may be compounded by, but are not a direct result of, climate change.

Challenges associated with disruption to food supply chains.

Direct Challenges from climate change:

Challenge

Possible actions

Drought

1. During periods of drought the impact of water scarcity and microbiological quality of both irrigation and drinking water may drive consumers to less robust/secure sources. Water scarcity could also lead to loss of food production (e.g., almond production in California could be wiped out due to water shortage) or increase food contamination risk (e.g., STEC in leafy greens spread by desiccated sheep faeces from neighbouring fields).

1.1 The FSA should establish and strengthen links (either directly or via e.g., Defra) with experts who have worked, or currently work, in countries already experiencing regular droughts, to share lessons learned. For example, what risks do they find are increased by drought and how, and what mitigations are most effective (or ineffective) at mitigating them?

1.2 The FSA should commission a review of microbiological risks most likely to increase as a result of climate change risks in countries from which we import food.

1.3 FSA to provide an update to the committee on sources of imported foods and identify alternative sources of key products from countries affected by climate change.

1.4 FSA Incidents and Policy teams should review preparedness measures e.g., rapid response capability in the context of climate risks, for example considering the potential for multiple incidents to occur simultaneously as a result of single extreme weather events.

Flash Flooding

2. More thundery downpour in summer could lead to animal/human waste runoff in rivers affecting water safety for consumption. Increased incidents of flooding require a better understanding of pathogens that are associated with sewage and flooding. The risks of increased flooding are compounded by lack a of resources in government agencies and lack of enforcement e.g., raw sewage.

2.1 The FSA should establish closer working relationships with water authorities & water research as well as other organisations able to provide insight into e.g., flooding risks in arable areas.

Consumer education/advice

2.2 The FSA should consider preparing consumer messaging about the food safety risks from products that may be affected by flooding/sewage.

2.3 The FSA should consider commissioning research on the effectiveness of consumer washing of vegetables to increase confidence in current consumer advice (or update it, as appropriate).

3.1 Similarly, to the action under “drought”, the FSA should consider establishing and strengthening links (either directly or via OGDs) with experts who have worked, or currently work, in countries already experiencing warmer climates, to share lessons learned. For example, what risks do they find are increased by increasing temperatures and how, and what mitigations are most effective (or ineffective) at mitigating them? For example, any effects on microbiological safety of efforts to reformulate certain foods for higher temperatures (e.g., chocolate)

Risk assessment

3.2 When performing risk assessments, the FSA should where appropriate consider how the assessed risk might be affected by higher ambient temperature in processing facilities.

Increasing Temperatures

3. Increasing temperatures require better temperature control in the cold chain (domestic and industrial) to avoid impacting microbiological safety and quality of food. Small Medium Enterprises (SME) are likely to struggle the most with the challenges of maintaining the cold chain. Extreme climate events will also stress bacteria, leading to viable but non-culturable cells (VBNC) or adaptations that may affect virulence. Challenges in sharing whole genome sequencing (WGS) data, cross government communication and standardization of methods needs to be addressed.

Disease/AMR surveillance

3.3 The FSA should consider establishing sentinel sites to monitor emerging pathogens in different parts of the supply chain, as well as strengthening cross-government links to share surveillance data, and the use and interpretation of WGS, to determine the impact of climate change on foodborne disease and antimicrobial resistance (AMR).

3.4 The FSA and other relevant departments and agencies (APHA/Defra, UKHSA/DHSC) should continue collaborations and activities initiated

Rising Sea Temperatures

4. Increasing sea temperatures may have an impact on the microbiological safety of fish and/or shellfish or increase microalgae (phytoplankton blooms).

Fraud / Compliance

5. Increasing food fraud risks, for example, wilful disregard of the increasing need for hygiene and temperature controls impacting microbiological safety. Failure to meet with compliance standards may become more frequent due to disjointed actions taken by different agencies to deal with common problems affecting different parts of supply chains. Supply of peppers & tomatoes (crop shortages) affected UK availability of product earlier this year. This may lead to acceptance of riskier products to the market.

4.1 The FSA should consider supporting sampling projects and/or industry activities to monitor for changes in emerging microbiological risks associated with fish and shellfish.

4.2 The FSA should work with UKHSA to identify opportunities to monitor levels of domestically acquired *Vibrio* infections in humans.

4.3 The FSA should consider commissioning research into the effects of sea temperature on the exposure of UK consumers to waterborne viruses (e.g., norovirus)

5.1 The Micro Risk Assessment team should consider reviewing the work the National Food Crime Unit (NFCU) does to ensure these controls are accurately represented in RAs. For example:

- Review of food 'fraud' risks and controls
- Review current and future focus and/or controls on monitoring the chill chain.
- Review regulatory and enforcement controls for new market entrants.

Food Import Disruption

6. Countries outside UK will likely be similarly impacted by climate change so may not be able to supply the UK with same food types or quantities typically seen.

6.1 Identify possible food import disruption in advance and look at mitigating measures. For example, look for other sources for similar food types or look at moving to UK production.

Indirect challenges from climate change:

Challenge

Sustainability

1. The tension between microbial food safety and food waste/sustainability issues have been increased by climate change and the cost-of-living crisis. This includes the balance between microbiological food safety and shelf-life and energy considerations during all stages of food chain and other steps towards sustainability such as reducing food packaging.

Possible actions

1.1 The FSA should continue consumer education about how home storage behaviours change the risk from food hazards.

1.2 The FSA should strengthen the links between the ACMSF and the ACNFP to ensure that new and changing risks relating to new foods and processes are fully understood.

1.3 The FSA should use its influence to ensure that food safety, particularly microbiological safety, is factored into decisions about legislation changes for packaging and shelf life.

Challenge

Possible actions

Labour Availability

2. The Impact on labour availability, in UK from Brexit and possible labour shortages from exporting countries may also disrupt supply chains and lead to shortages of certain food types.

2.1 The FSA should consider collaboration with industry to identify challenges relating to labour shortages.

ACMSF Horizon Scanning workshop 2023

Horizon Scanning 2023

In this guide

[In this guide](#)

1. [ACMSF Horizon Scanning Workshop 2023 summary of discussions and outputs](#)
2. [HS 2023 Changes in methods of food production and new food technologies](#)
3. [HS 2023 Changes in consumer behaviour and preference](#)
4. [HS 2023 Challenges associated with changes in the sizes of vulnerable groups](#)
5. [HS 2023 Annex 1](#)

Changes in methods of food production and new food technologies

Direct challenges from climate change:

Challenge	Possible actions
-----------	------------------

Novel Foods

1. The novel foods sector is growing rapidly, which has in part been driven by a sustainability agenda triggered by increased awareness of climate change as well as, in the UK, by factors such as EU Exit. Novel foods such as alternative proteins may carry a lower risk of some hazards typically considered for meat, such as *Salmonella* or *Campylobacter*. However, it is not always clear what new or increased risk may be associated with such novel foods or novel processes. Robust processes for approval will mitigate this challenge, but novel foods approved in other regions by local competent authorities may be sold illegally and promoted via social media. Furthermore, new business entrants with less experience of safe food production may be less aware of safety measures they need to comply with.

The FSA should consider the following evidence through commissioned research, assessment and/or review of risk management

- 1.1 Ways to generate evidence to support assessment and associated regulatory food production processes e.g., cultured plant-based foods.
- 1.2 Take action to maintain and improve ACMSF and ACNFP to identify common microbiological safety of dossiers for novel foods and processes.
- 1.3 Ensure that exposure data and hazard for foods and processes is considered for pathogen growth.
- 1.4 Consider the potential microbiological products that are produced using novel
- 1.5 Improve data capture during outbreak processes, not just food type.

Manufacturer regulation

9.6 FSA should consider developing guidance for manufacturers on validation for new current guidance if already in place

New Farming/Fertilisation Methods

10 Various changes in farming practices to cope with increasing challenges associated with climate change may affect the microbiological safety of food. For example, the increased use of biodigesters and resulting impact on microbiological safety of wastewater and fertilization. Similarly, the development of vertical farming may be of concern due to the closed loop nature of its operation and especially with the recycling of irrigation water (e.g., Listeria risk). Also, the impact on need, and availability, of artificial fertilizers is driving an increased use of natural fertilizers. This may result in more animal waste runoff on agricultural crops and water during flooding. The use of animal by-products for use in animal feeds is also a concern.

10.1 FSA should consider establishing partnerships with OGDs to learn about proper treatment and commissioning wastewater treatment plants to minimize impact on food safety.

10.2 The FSA should consider conducting research for indoor and vertical farming and provide recommendations for proactive risk management.

10.3 The FSA should consider organizing a stakeholder exercise to map potential risks to food safety from vertical farming.

ACMSF Horizon Scanning workshop 2023

Horizon Scanning 2023

In this guide

[In this guide](#)

1. [ACMSF Horizon Scanning Workshop 2023 summary of discussions and outputs](#)
2. [HS 2023 Changes in methods of food production and new food technologies](#)
3. [HS 2023 Changes in consumer behaviour and preference](#)
4. [HS 2023 Challenges associated with changes in the sizes of vulnerable groups](#)
5. [HS 2023 Annex 1](#)

Changes in consumer behaviour and preference

Challenges

Customer Behaviours in Related to Warm Weather

10 There is a lack of preparedness in consumer behaviours for changes in climate effects in relation to warm weather. For example, handling of leftovers, doorstep delivery and cold chain maintenance. Certain behaviours such as leaving chicken out to thaw should be addressed. Similarly, a change in food preferences in relation to warm weather needs to be addressed, for example, a move to consumption of more salads and barbecues.

Possible actions

11.1 The FSA should consider consumer messaging and education around safe food practices in warmer climate.

11.2 The FSA should consider strengthening communication with, and providing guidance for, the food industry on cold chain management.

11.3 The FSA should consider a behavioural survey on consumer habits during summer barbecues.

Challenges

Industrial Practices in Related to Warm Weather

12 There is also a potential lack of preparedness in industrial practices in relation to warm weather. For example, standard practice by direct delivery from 'local' suppliers (e.g., door to door milk delivery) may no longer be suitable.

Possible actions

12.1 FSA should consider contacting Defra labelling teams to identify opportunities for supporting industry in exploring the potential of temperature abuse packaging labels.

12.2 FSA to update committee on education, guidance, and legislation/enforcement currently in place for manufacturers, particularly for on-line sales or dark kitchens.

12.3 The FSA should consider educating food businesses on the importance of additional controls for products that weren't previously heat-treated (e.g., sale of raw milk)

ACMSF Horizon Scanning workshop 2023

Horizon Scanning 2023

In this guide

[In this guide](#)

1. [ACMSF Horizon Scanning Workshop 2023 summary of discussions and outputs](#)
2. [HS 2023 Changes in methods of food production and new food technologies](#)
3. [HS 2023 Changes in consumer behaviour and preference](#)
4. [HS 2023 Challenges associated with changes in the sizes of vulnerable groups](#)

Challenges associated with changes in the sizes of vulnerable groups.

Direct challenges from climate change:

Challenges

Possible actions

Climate Related Stress

10 Vulnerable populations may experience climate-related stresses (heat, dehydration) which make them more susceptible to infection.

10.1 The FSA should consider working with other government departments to help promote targeted consumer messaging to educate vulnerable groups or caregivers on the risk of climate related stresses, such as dehydration and heat stress.

Challenges

Ageing Population

11 There is risk of a disproportionate impact of climate change and food poverty on ageing and pregnant groups. In particular the ageing population is most at risk of not taking precautionary action to mitigate risks and least able to respond i.e., less likely to leave home in extreme weather conditions (heat) to shop and so buying more home delivery. This may lead to an increased purchase of ambient higher risk foods e.g., powdered milk.

The increasing size of vulnerable populations combined with the potential increase in microbiological food contamination related to various climate change factors may result in a multiplication of risk. To best target vulnerable groups to circumvent risk and change behaviour there is a need to define what a vulnerable group is. For example, the link between nutritional status and vulnerability needs to be better understood.

Possible actions

11.1 The FSA should consider commissioning research into the effects of ageing on vulnerability to foodborne disease.

11.2 The FSA should obtain, or commission research to generate, evidence to identify groups likely to be particularly vulnerable to increased risks as a result of climate change, and then identify approaches to targeting relevant advice to them.

11.3 The FSA should consider reviewing the definition of vulnerable group as the associated mitigation will depend on why they are vulnerable.

11.4 The FSA is advised to review the food safety advice targeted at vulnerable groups and manufacturers/food service in preparation of foods for vulnerable groups.

11.5 The FSA should work with the NHS to identify to develop consumer guidance and education.

11.6 The FSA should look to develop a categorisation of vulnerabilities for consumers to refer to; provide advice on different food groups based on category.

11.7 The FSA should consider supporting research projects looking at the immune response in different populations as well as the development of easy tests for

Indirect challenges from climate change:

Challenges

Possible actions

Obesity

19. Increase in obesity may lead to more co-morbidities.

19.1 The FSA should work to develop consumer advice and guidance aimed at increasing healthiness of diet to reduce vulnerability of population.

Food Poverty

20. Food poverty has increased and may increase in the short term too leading consumers to store food for longer and consume more leftovers.

20.1 The FSA should develop better consumer advice and education on safe food storage.

20.2 FSA should look at carrying out a review on food storage to have a better understanding of what can safely be kept, though it is accepted this is unlikely to be changed by industry without validation.

Migration

21 An increase in migration will see a larger population which needs to be fed, putting further strain on food shortages. Increased migration may also increase novel food consumption.

21.1 The FSA should consider supporting surveillance to monitor changes in population size and the effect on food supplies.

21.2 FSA should consider future proofing new regulations on imported foods against any new and emerging threats from novel goods.

Alcoholism

22 Alcoholism is on the rise after the pandemic. Both alcoholism & vaping have a possible impact on vulnerable groups

22.2 The FSA should consider surveillance obesity and use of vaping to monitor the rise in these levels across the population.

ACMSF Horizon Scanning workshop 2023

Horizon Scanning 2023

In this guide

[In this guide](#)

1. [ACMSF Horizon Scanning Workshop 2023 summary of discussions and outputs](#)
2. [HS 2023 Changes in methods of food production and new food technologies](#)
3. [HS 2023 Changes in consumer behaviour and preference](#)
4. [HS 2023 Challenges associated with changes in the sizes of vulnerable groups](#)
5. [HS 2023 Annex 1](#)

Anything else

Challenges

Chemical use and AMR

20 The impact of response to microbiological stability issues may drive increased chemical use and AMR.

Possible actions

23.1 The FSA should continue its regular surveillance of AMR on food a range of food products and consider supporting surveillance to monitor chemical use in food production.

Challenges

Possible actions

Loss of Agricultural Land

21 Loss of agricultural land (including to solar farms) may drive food production to less safe sources.

21.1 The FSA should work with other government departments to determine the likely extent of the loss.

Drinking Water Quality

22 Increased flooding and/or drought raises concerns over drinking water quality for agricultural use. The use of contaminated water may lead to more animal disease and subsequently more antimicrobial usage. This has the potential to increase the use of antibiotics in livestock despite the recent trends in reduction antibiotic use.

22.1 The FSA should consider carrying out a systematic review to enable a better understanding of how heat stress will affect antibiotic use in livestock by looking at examples from other countries with higher temperatures.

Biofilm Prevention

23 There is an absence of guidance for industry about preventing and removing biofilms despite increasing microbiological challenge in food processing. There is also increased pressure to reduce chemical cleaner use, sending conflicting messaging to manufacturers.

23.1 The FSA should consider developing guidance for industry on preventing biofilm formation by reviewing guidance for manufacturers for biofilm control/removal from other sectors e.g., dentistry.

Challenges

Possible actions

Emerging viruses

24 There is a risk of emerging respiratory viruses such as Covid taking out whole factories due to stall illness. Though this is more HSE issue than a food issue, it could have implications for food shortages.

24.1 FSA should consider working with other government departments to consider preparedness measures for respiratory viruses spread via food.

24.2 FSA should consider carrying out a systematic review to identify possible opportunistic pathogens across various food types.

Disease Spread by Wildlife

28. Continued concern of transmission of disease from wildlife into commercial animals (e.g., avian influenza spread from wild bird populations into commercial poultry).

28.1 The FSA should consider commissioning research surveys for surveillance/monitoring, of migratory birds and changing flight / pathogens and rodent populations (rural and urban).

Annex 1

How in your opinion is climate change likely to affect the microbiological safety of food in the UK via the following areas?

Please consider:

- **Both trends (increasing temperature) and increasing frequency of extreme weather events (flooding, drought, forest fires)**
- **Timescales (0-10 years, 10-20 years, 20+ years)**
- **Indicators: how will we know if the effect is happening?**
- **Likelihood and magnitude of effect**
- **New as well as existing hazards**
- **Key evidence gaps**
- **How climate change might affect, and how its effects might be affected by/mitigated by, other drivers**
- **Any recommended actions for the ACMSF, the FSA, other government departments and agencies, and external stakeholders.**
-
- **Challenges associated with disruption to food supply chains**

Possible interacting drivers: animal and plant disease outbreaks, geopolitical issues, shortages of materials or resources.

Member A

1. Trends and increasing frequency of extreme weather events - Cold winters and flooding have already affected UK winter/spring food production, reducing yield and quality (and associated sewage contamination risk); similarly hot, drought weather has impacted on summer/autumn crops, reducing yield and/or quality - affecting use of poor-quality irrigation water (compounded by ongoing water companies' sewage overflows into streams and rivers used for water abstraction). Even worse for imported foods, particularly food produced in areas of southern Spain and Portugal.
2. Timescales - Happening now and will only get worse.
3. Indicators - Reduced yields (reports by NFU), poorer shelf life (reports by BRC), increased reports of animal disease and AMR (reports by APHA) and foodborne disease and AMR (reports by UKHSA).
4. Likelihood and magnitude of effect - Highly likely, particularly for immunocompromised patients or animals already stressed by drought and heat.
5. New as well as existing hazards - Changes in migratory patterns of birds and bats, increasing virus risk when they feed or defaecate on crops, as well as the usual bacterial zoonoses. Increasing arthropod-borne diseases moving to warmer northern climes affecting animal health.
6. Key evidence gaps include influence of Climate Change on increased AMR and One Health; and fungal blites stressing crops and reducing quality and shelf life, and susceptibility to bacterial pathogens.
7. How climate change might affect, and how its effects might be affected by/mitigated by, other drivers - Shortage of water for human and animal drinking as well as for crop irrigation will cause increasing civil and inter-government strife, animal deaths and human migratory patterns.

- **Changes in methods of food production and new food technologies**

Possible interacting drivers: vertical farming, “blue food”, new food packaging technologies, pressure to shift to sustainable food practices, alternative proteins (insect- and plant-based, cultured meat).

Member A

1. Vertical farming will need massive increase in scale to cope with UK consumer demand, coupled with new technologies to continuously recycle the irrigation water (adding essential nutrients and removing by-products, and sterilising the water e.g., perhaps UV treatment). The infrastructure such as renewable electricity supply will also need to be installed. Consider increased mushroom production to replace meat as this becomes scarcer and more expensive? New algal growth technologies powered by solar energy to produce protein for animal and fish feed, or directly to human. We have discussed insect-based protein production in previous ACMSF meetings, and this is likely to continue.

2. Can fish farming be increased sustainably without harming the marine environment and relying on more antibiotic use driving AMR? Warmer sea temperatures might lead to increased *Vibrio* contamination of fish and shellfish, increasing the risk of foodborne disease (and sea bathing). Indeed, until sewage treatment companies make the massive investment necessary, the risk of faecal pathogens being actively expelled into rivers and coast lines, thereby contaminating fish and shellfish farming sites, remains high.

Member B

3. The threat and also direct impact of climate change on availability of raw materials and food and the potential effect on increased food prices will continue to drive the sustainability agenda. This may lead to reduced processing of food i.e. optimised production techniques, reduced preservation, etc, as well as pressures to increase shelf life of food and also reduced protection of food i.e. packaging. Such combinations can increase microbiological risk and tools to support informed, risk-based developments like these would be useful.

4. New production methods such as vertical farming are likely to increase dramatically especially in the provision of ready to eat fresh produce and also commodity crops. Similar novel processes such as cultured meat and dairy products all need clear industry or regulatory guidance to ensure these

- **Changes in consumer behaviour and preferences**

Possible interacting drivers: food poverty and inequality, changes in food storage/preparation practices, changes in consumer diets influenced by health or sustainability issues

Member A

1. Increases in food prices will inevitably drive food poverty, with consumers looking for “bargains” (poor attribution and adulteration mislabelling, and dubious quality; altered close to or exceeded “use by date”) and also storing food for longer if bought in bulk to reduce cost. Continuing high cost of electricity will lead to increasing the refrigeration temperature to save money, exacerbated by increasing global temperatures. More dried or canned food processing to increase shelf life but problems of scale up?

Member B

2. It is hard to see that the consumer behaviours seen in recent years will not continue such as online shopping, meal delivery, the desire to be more thrifty by reducing wastage through use of leftovers or consuming food beyond expiry dates.

Member C

3. Where food supplies are insecure, people may shift to less healthy diets and may consume more “unsafe foods” – in which chemical, microbiological and other hazards pose health risks. Increasing demand for fresh poultry, coupled with intensive production practices could continue to lead to transmission within and between poultry flocks and amplification of clones may be driven by limited use of antibiotics (e.g., tetracyclines) for disease outbreaks and individual cases. Increasing demand for fresh produce, coupled with increased risk for these foods due to contaminated irrigation water and absence of intervention methods in their preparation prior to consumption may also lead to an increasing number of cases of illness linked to these foods.

Member D

28. Challenges associated with changes in the sizes of vulnerable groups

Potential examples to consider: ageing population, poor nutrition of displaced groups

Member A

1. Increased costs and reduced food quality will result in less consumption and poorer nutritional value, particularly affecting the ageing population and pregnant women with higher nutritional needs.

Member B

2. The key issue is whether climate change per se is likely to increase the vulnerability of groups and / or increase the number of individuals who are in vulnerable groups in the UK. It is possible that the impact on weather may prove to be a confounding factor in increasing vulnerability i.e., hot or cold weather stress factors that lead to greater vulnerability to foodborne disease, but this would need to be extreme to have such an effect.

3. Secondly, the question infers an anticipated increase in vulnerable groups presumably due to ageing, but it is not entirely clear whether this will materialise (clearly ageing will but will vulnerability to foodborne disease?) and this may need exploration in itself.

Member C

4. The increasing ageing population in the UK will likely lead to more cases of foodborne illness, due to lack of awareness of effective controls and individuals not following cooking/preparation instructions. Increases in the chilled food market would be one area to focus on here.

Member D

5. The ageing population will continue to put added pressure in relation to infections more severe in this risk group (e.g., *Listeria monocytogenes*).

- **Anything else?**

What are other important issues or challenges that the Committee may face in the next 10-20 years?

Member A

1. Increased temperature might force farmers to house animals and poultry inside more often to conserve water and food (if grass and silage become short), and reduce animal heat stress, leading to increased pathogen infection rates due to close stocking rates and changes in diet.
2. Changes from using antibiotics to treat animals and humans to other antimicrobial agents (previously nisin but antimicrobial peptides are now being proposed) poses a future risk of new resistance patterns emerging and entering the food chain.

Member B

3. Concerns have been raised that the recent COVID-19 pandemic could be dwarfed by pandemics from more virulent pathogens e.g., coronavirus or avian flu virus strains. The Committee may wish to consider the prospect of what would controls might be needed if future pandemic viruses could be more readily spread via food.

Member C

4. Covering areas such as algal blooms, impact of mycotoxins – will be overlap with remit of other committees so good coordination is key to dealing with these effectively.
5. Increasing pressure on public health resources (e.g., NHS etc) may result in less effective surveillance of foodborne disease in the UK and fewer food monitoring surveillance studies which reflect the current status of risks in the food chain – this is a concern. If we are not monitoring effectively, it will be more difficult to identify changes and then react to these in a timely manner.