Food and Agriculture Organization of the United Nations

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Food Safety and Climate Change in Caribbean SIDS

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A few Reflections on Readiness for Food Safety Management in the context of Climate Change

- We are not ready!
- Many countries in the region are working to come up to speed to deal with “the present”
- Poor awareness of what is changing far less what to do about it.
- Siloed, narrow thinking does not help – institutional environment is unsupportive of One-Health approaches
- Value chain innovation is expanding faster than food control system maturity
- Many stakeholder groups need to get onboard to driving change…

Climate Change and Food Security

- Impact food security by adversely affecting agricultural production and yield, and disrupting supply chains
- Elevated temperatures, alternation of severe drought periods and heavy rains, soil quality degradation, rising sea levels and ocean acidification, among others, have serious implications for various biological and chemical contaminants in food by altering their virulence, occurrence and distribution.
- Rapid globalization of the food supply chains facilitates amplification of foodborne hazards along the way providing opportunities for local foodborne incidents to become international outbreaks.

FOOD SAFETY AND CLIMATE CHANGE IN CARIBBEAN SIDS

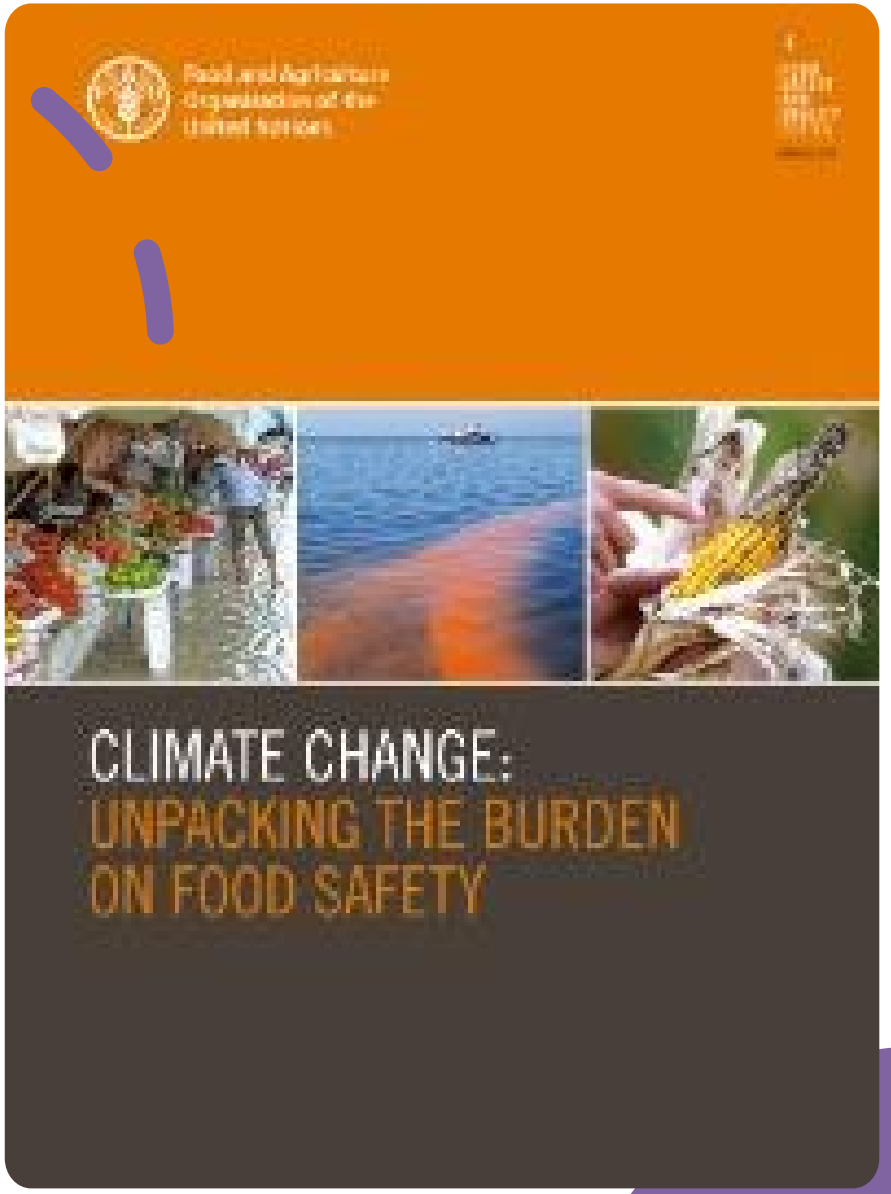
Food Safety and Climate Change

In 2008, FAO published a pioneering report entitled Climate change: Implications for food safety, which provided a broad overview of the various effects of climate change on the food safety landscape.

In 2020, FAO released a publication, Climate change: Unpacking the burden on food safety in 2020- highlights linkages between climate change and various foodborne hazards that can enter the food chain.

- foodborne pathogens,
- algal blooms
- mycotoxins

Current project focuses on identifying any such trends in the Caribbean using the Bahamas, Barbados and Trinidad and Tobago as Case Studies.




CLIMATE TRENDS

Climate Observations

Atmospheric Temperature: Annual mean has increased by ~2.1ºC, at a rate of 0.28ºC per decade over the period 1946 – 2019

Sea Surface Temperature: Increases of 0.08ºC per decade in TTs coastal waters during the JJA season for the period 1960 - 2006

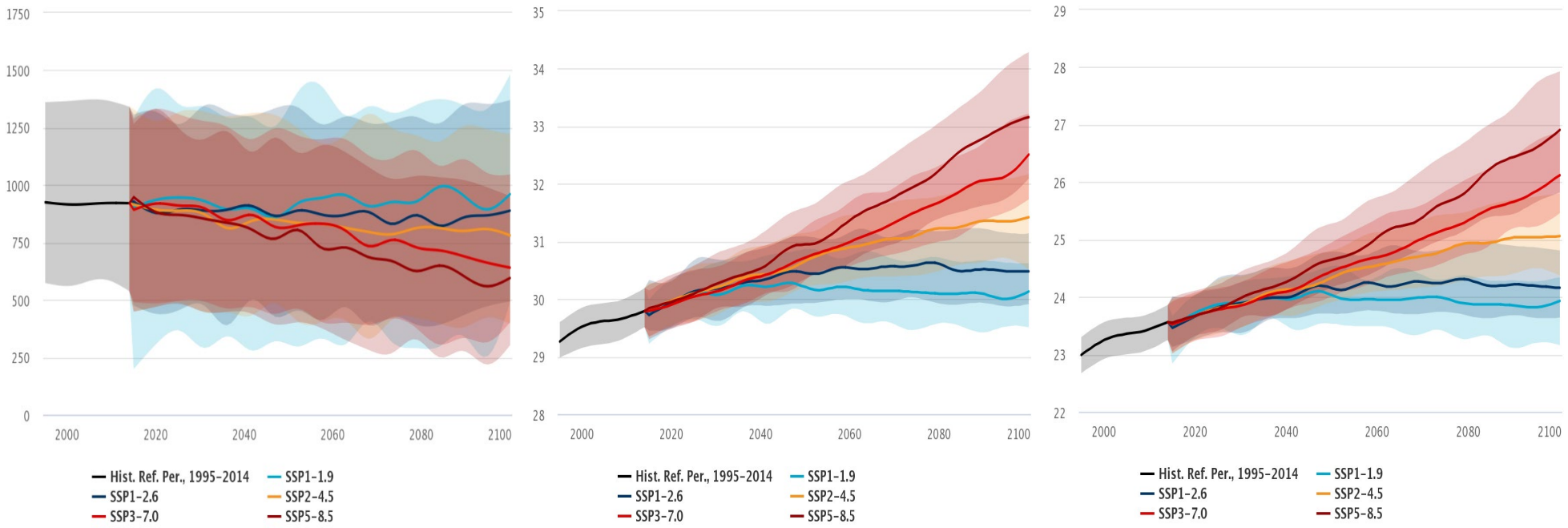
Rainfall Totals: In recent years, there has been a general drying trend

Rainfall Intensity: Intense rainfall contributing a greater percentage to total precipitation

Rainfall Seasonality: Shifts – a wetter (early) dry season and a drier (early) wet season

Climate Variability (ENSO 3.4): There is no discernible trend in the variability, seasonality or persistence of this mode

Climate Projections



Precipitation **Maximum Temperature** **Minimum Temperature**

Figure 3: Average annual projected climatologies for Trinidad and Tobago for three (3) variables over the period 2000 to 2100, under Shared Socioeconomic Pathways (SSPs): SSP1-1.9, SSP1-2.6, SSP2-4.5, SSP3-7.0, SSP5-8.5 using a multi-model ensemble, based on the reference period 1995-2014. Climate projection data is from the global climate model compilations of the Sixth phase of the Coupled Model Inter-Comparison Project (CMIP6).

Source: *Climate Change Knowledge Portal*

Climate Projections

Temperature:

- Increases in both maximum and minimum temperature under SSPs 2, 3 and 5, particularly from the 2030s. For average single-day maximum of daily maximum: Inconsistency across the SSPs, ranging between -0.12ºC under SSP1-1.9 and +1.9ºC under SSP 3-7.0 across all seasons

Rainfall:

- Inconsistency across SSPs and seasons. Small increases during the dry season up to end of 2030s under SSP1-1.9. Progressive decreases under SSP3-7.0 and SSP5-8.5 (up to 60%) across all seasons

Rainfall Intensity:

- Increased proportion of total rainfall occurring in intense events

Climate Variability (ENSO, AMM, AN, AWP):

- Increased frequency and/or magnitude of modes

Climate Change Impacts on Food Safety

CLIMATE VARIABLES	CLIMATE IMPACTS
ATMOSPHERIC TEMPERATURE	■ Persistence, distribution and prevalence of bacteria, viruses, parasites, harmful algae, fungi and their vectors. Increased production of mycotoxins. ■ Interference with plants' ability to obtain and utilize moisture. Along with decreased moisture, this can lead to restriction of root growth, limiting nutrient acquisition and content - "junk food effect"
RAINFALL	**Flood:** ■ Transport of foodborne pathogens: contamination of food chain and water supplies ■ Mobilisation of contaminated river sediments: enters oceans resulting in increased dissolved organic matter (DOM) ■ Waterlogged conditions result in decreased soil O_2, possible phytotoxin accumulation, leaf chlorosis and decreased soil mineral nutrient accessibility **Drought:** ■ Changes in plant water use efficiency and water availability. Decreased transpiration rates, reduced mass flow of nutrients and a shift in nutrient allocation affecting nutrient uptake
OCEANIC TEMPERATURE	■ Warmer and browner (due to increased levels of DOM) water results in less nutritious organisms at the base of the aquatic food web and can expose fish and humans to more methylmercury ■ Increased growth of biotoxin-producing algae interacts with fertilizer runoff to become concentrated in shellfish
CARBON-DIOXIDE	■ Increased levels result in "carbohydrate dilution" – an increase in carbon assimilation relative to mineral concentration. Production of more simple carbohydrates such as glucose at the expense of other important nutrients such as protein, zinc and iron.

Main Concerns

The cause of most FBD outbreak is unknown due to the absence of proper surveillance or diagnostic programs necessary for detecting the occurrence and/or identifying the responsible pathogen.

Between 2002 -2016, there was a 31% increase in FBD outbreak among the 21 CARPHA member states including Trinidad and Tobago (CARPHA 2022).

Caribbean country has a high rate of street vending.

The most common foodborne parasites in T&T are *Cryptosporidium spp., Giardia intestinalis, Cyclospora cayetanensis, Toxoplasma gondii; Trichinella spp. and Anisakis spp.; Diphyllobothrium spp., Taenia spp, Salmonella, Campylobacter,* and *E. coli.*

Main Concerns

Children under five years, the elderly, and the immunocompromised are most at risk of becoming infected and developing complications associated with Salmonellosis.

E. coli O157 has been isolated from raw oysters, condiments/spices, and raw oyster cocktails (72 roadside vendors across western Trinidad)

One study revealed that 10% of fresh produce exceeded the internationally acceptable maximum residue limits (MRLs) for the respective organophosphate pesticides

Main Findings

- Underreporting and under-diagnosis of FBD.
- Limited information on the relationship between foodborne illnesses and climate e.g., increase rainfall, natural disaster.
- No epidemiological testing to determine the microorganism
- No monitoring of food handlers to ensure adherence of food safety practices
- Economic Cost of Food borne illness
- Multiple agencies involved in food safety in some territories which does not align with CARICOM policy directive for each member state to have a National Agricultural Health and Food Safety Agency (NAHFSA).

Critical Issues

Limited effective monitoring/surveillance programmes (food and environment)

- apparent rises in cases of ciguatera … ;
- use of wild meat;
- condition of wet market

Limited cross-sectoral collaboration for a ‘one-health vision’

- Attempts are being made by CAHSFA to advance good agricultural practices for crops; for feed, animals and the environment through the **Caribbean Agricultural Early Detection and Response System (CAEDRS)** which is currently being developed.
- Regional and national policies are also being advanced in a similar manner as it relates to good practices in agriculture, Integrated Water Resources Management (IWRM) and Wastewater management and reuse, all of which will have implications on food safety and the relation of an effective one health approach.

Water Scarcity acts as a driver for innovation – Integrated systems; aquaponics and aquaculture

- CREW+ Project
- Wastewater Reuse (GIZ)

Recommendations

- The finalizing and implementing of the National Food Safety Policies.
- Consideration should be given to incorporate traceability systems and mandatory recall into the Food Safety System.
- Adopt a preventative approach (HACCP, GAPs and GMPs).
- Establishment of a monitoring and evaluation unit in the appropriate institution to monitor foodborne diseases and accurately report cases.
- Research Institutions and Developmental organization support required.

Thank You