Nutrient-rich diets increase food security, only if proper water quality is guaranteed

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Introduction

- In areas with poor water quality, the promotion of nutrient-rich diets with perishable food (like fruits, vegetables and fish), can deteriorate food safety.

- Growing pressure on water resources leads to increase in use of (untreated) wastewater for crop production.

- Food systems activities affect water quality; water quality influence food security.

- To ensure nutrition-rich diets increase consumers health, an integrated approach which combines food system and water system thinking is need.
Food system approach

Source: Van Berkum et al. (2018)
Water pollution of **food production** was mainly described in the literature.

Few cases were found for **food processing**, especially effect of waste from abattoir on water quality.

**Food consumption**: nitrogen and phosphate, and pathogens from human faeces (WASH)

- **Water pollution** directly from food systems indirectly induce other contaminations:
  - Nitrogen and phosphate induce algae blooming $\rightarrow$ mycotoxins
  - Antibiotics in water resources $\rightarrow$ antibiotic resistant pathogens
Contamination of fruits and vegetables by water quality along the food system

Agriculture: pollution from irrigation water (like heavy metals and pathogens) might contaminate produced crops
Contamination of fruits and vegetables by water quality along the food system

On markets: washing crops with polluted water on markets or at home might contaminate crops
Contamination of fruits and vegetables by water quality along the food system

On markets and processing industry: cross-contamination if water is not refreshed sufficiently
Contamination of fruits and vegetables by water quality along the food system

On markets and processing industry: cross-contamination if water is not refreshed sufficiently
Contamination of fruits and vegetables by water quality along the food system

On market and at home: lack of access to safe tap water indirectly affects food safety
On market and at home: lack of access to safe tap water indirectly affects food safety → Faecal-oral contamination
Contamination of fruits and vegetables by water quality along the food system

Food preparation influences food contamination depending on the type of contaminant
Contamination of fruits and vegetables by water quality along the food system

Food preparation influences food contamination depending on the type of contaminant
Effect of water pollution on fish, seafood and seaweed

Production of **proteins** from fish and seaweed are encouraged towards **nutrition-rich diets**

**Fish** and **seaweed** are prone to heavy metal accumulation

**Shellfish** contaminated with pathogens from wastewater

Cyanotoxins from algae blooming (induced by high concentrations of nitrogen and phosphate) affect **fish production**
Discussion

- **Wastewater use for irrigation** has a mixed effect on crop production
  - Phosphate and nitrogen *increase production*
  - Heavy metals and pathogens might *affect food safety*

- **Differences** in water quality between Africa and Asia explain how food is contaminated locally

- **WASH** is a crucial element in food systems:
  - *Human waste* is part of food system, how it is treated effects food security
  - From a food system perspective, *potable water* is often overlooked as an essential element of food security
Our analyses provide comprehensive insights on the effects of interactions between water quality and food systems on food security.

More collaboration between water managers, agronomists, food technologists and nutritionists is needed towards common goals healthy diets and food safety.

More research is needed between the link of WASH and food security including drinking water in the food system, and how WASH can be used to improve food safety.
Thank you for attention

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