

# Global Challenges in Food Safety and Agriculture

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Photo from: [www.oalgroup.com](http://www.oalgroup.com)



Cover photo from Food Safety Magazine Dec. 2011/Jan. 2012

# What we need to know about food safety:

1. How is food safety defined?
2. What are primary global concerns?
3. Where are improvements in food safety needed most?
4. Who will be affected by these improvements?
5. How is food safety controlled?
6. What is the most effective way to apply food safety principles?
7. What challenges exist in implementing safe food practices?

# Food safety - a scientific discipline describing handling, preparation, and storage of food in ways that prevent foodborne illness

## Major causes of foodborne illness



[www.lifesciencesindex.com](http://www.lifesciencesindex.com)

### Foodborne Pathogens

- Bacteria
- Viruses
- Parasites
- Prions

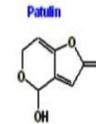
Pesticide residues



Chlorpyrifos  
Endosulfan,  
Vinclozolin,  
...



Mycotoxin



[www.wageningenur.nl](http://www.wageningenur.nl)

### Chemical Contamination

- Naturally occurring toxins
- Heavy metals
- Organic pollutants



[www.pointblank7.in](http://www.pointblank7.in)

### Adulteration

- Intentional or unintentional
- Biological
- Chemical
- Physical

# Where do food contaminants come from?

- Air
- Water
- Soil
- Storage/Packing materials
- Processing/cooking equipment
- Animals
- Food handlers



# Contaminated food consumption causes over 200 diseases

## Foodborne Pathogens

- Diarrhea
- Meningitis
- Liver Disease
- Loss of Pregnancy
- Neurodegenerative Disease

## Chemical Contamination

- Compromised Immune System
- Abnormal Development
- Kidney Damage
- Cancer
- Diarrhea

## Adulteration

- Heart Damage
- Liver Damage
- Ulcers
- Blindness
- Diarrhea

- Gary Ades, et.al. (2012) The Food Safety Challenge of the Global Food Supply Chain. Food Safety Magazine. Dec. 2011/Jan 2012.

- Moor, J.C., et.al. (2012) Development and application of a database of food ingredient fraud and economically motivated adulteration from 1980 to 2010, Journal of Food Science, 77(4), 118-126.

# What are the deadliest infectious diseases?

- ▶ HIV kills 2.6 million people per year
- ▶ The second leading cause of death rarely talked about – Diarrhea
- ▶ ~2 billion cases of diarrhea per year
- ▶ Diarrheal disease kills 2.4 million people per year
- ▶ Diarrhea is the leading cause of malnutrition in children under 5

(World Health Organization)

## Diarrhea: Common Illness, Global Killer

*Diarrhea kills 2,195 children every day—more than AIDS, malaria, and measles combined.*



**2,195**

Children die daily of diarrhea — that's like losing nearly 32 school buses full of children each day

**1 in 9**

Child deaths are due to diarrhea

**801 thousand**

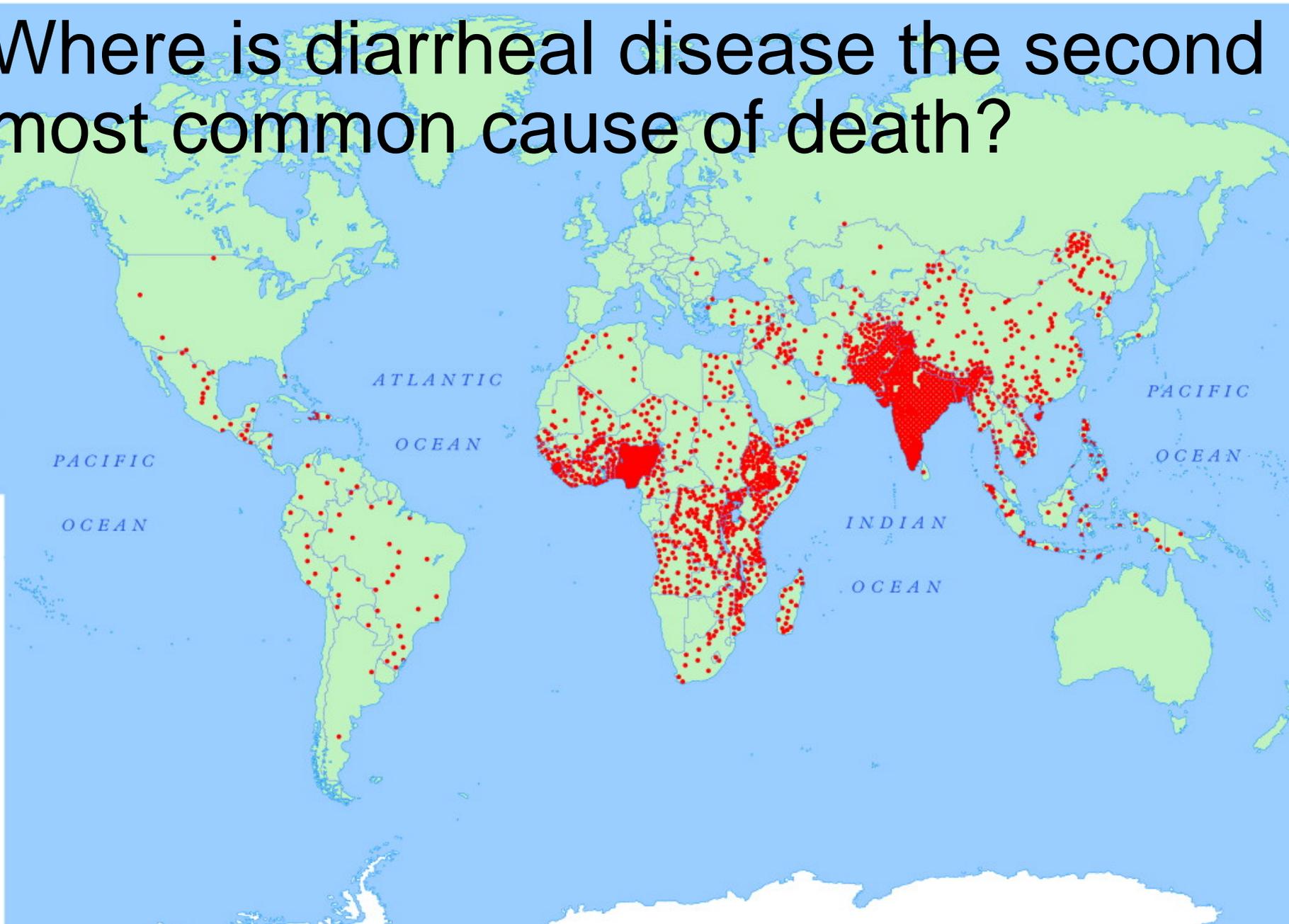
Child deaths from diarrhea every year

**Diarrheal disease** is the second leading cause of death among children under the age of 5.



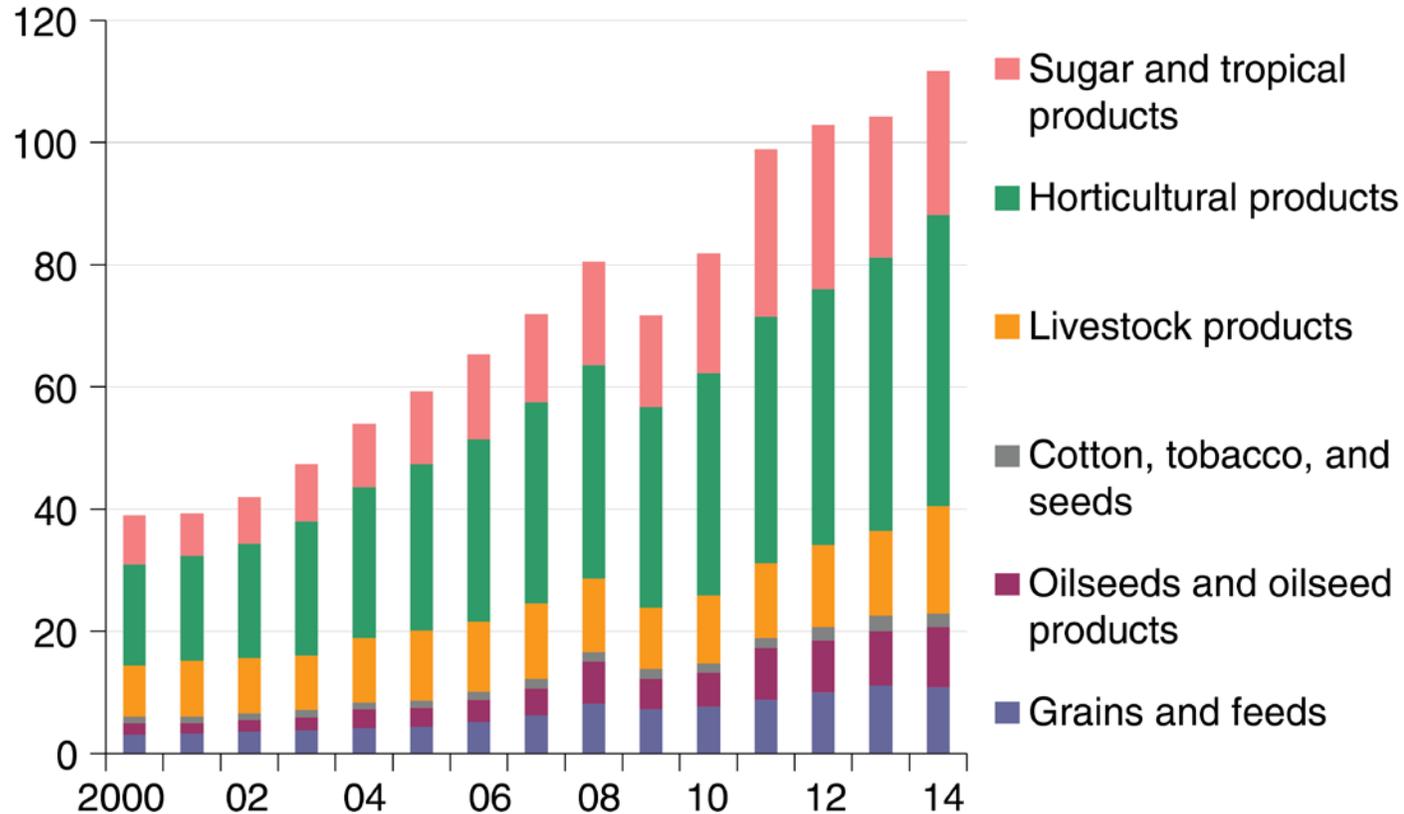
# Where is diarrheal disease the second most common cause of death?

- Worldwide distribution of child deaths
- Each dot represents 5000 child deaths
- Also areas with most significant food safety concerns
- Significant opportunity for international cooperation



## U.S. agricultural imports, 2000-14

\$ billion



Source: USDA, Economic Research Service using data from U.S. Department of Commerce, U.S. Census Bureau, Foreign Trade Database.

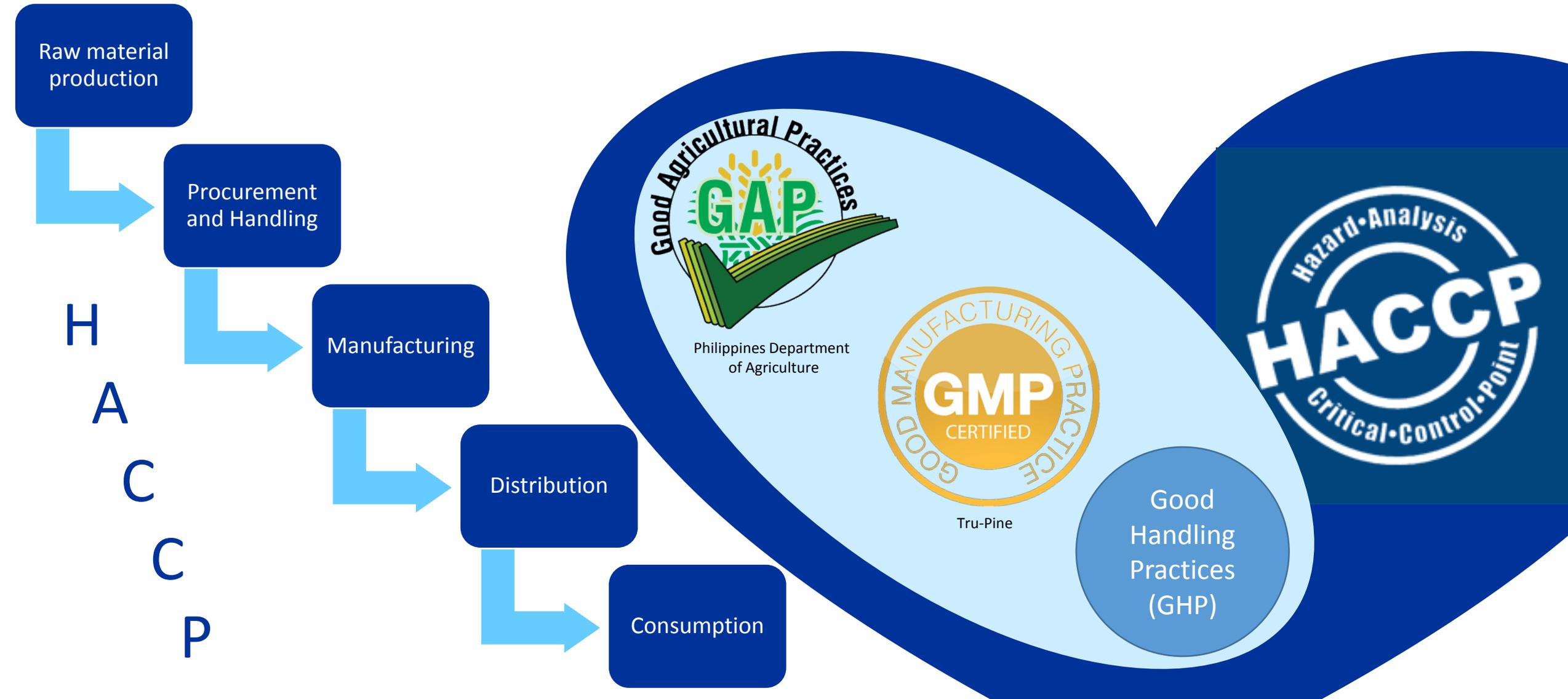
The problem is not isolated to developing countries

- Asia has emerged as a major source of U.S. imports
- 70% of shrimp consumed in the U.S. is imported from Asia - 58% from India, Vietnam, China, Indonesia
- More than 40% of U.S. agricultural imports are horticultural products

# Establishing food safety standards is an ongoing international effort



# Governments define and regulate science-based food management systems



Regulations are only as good as the resources available to enforce them – ultimately, individuals implement change

Inspectors



Farmers



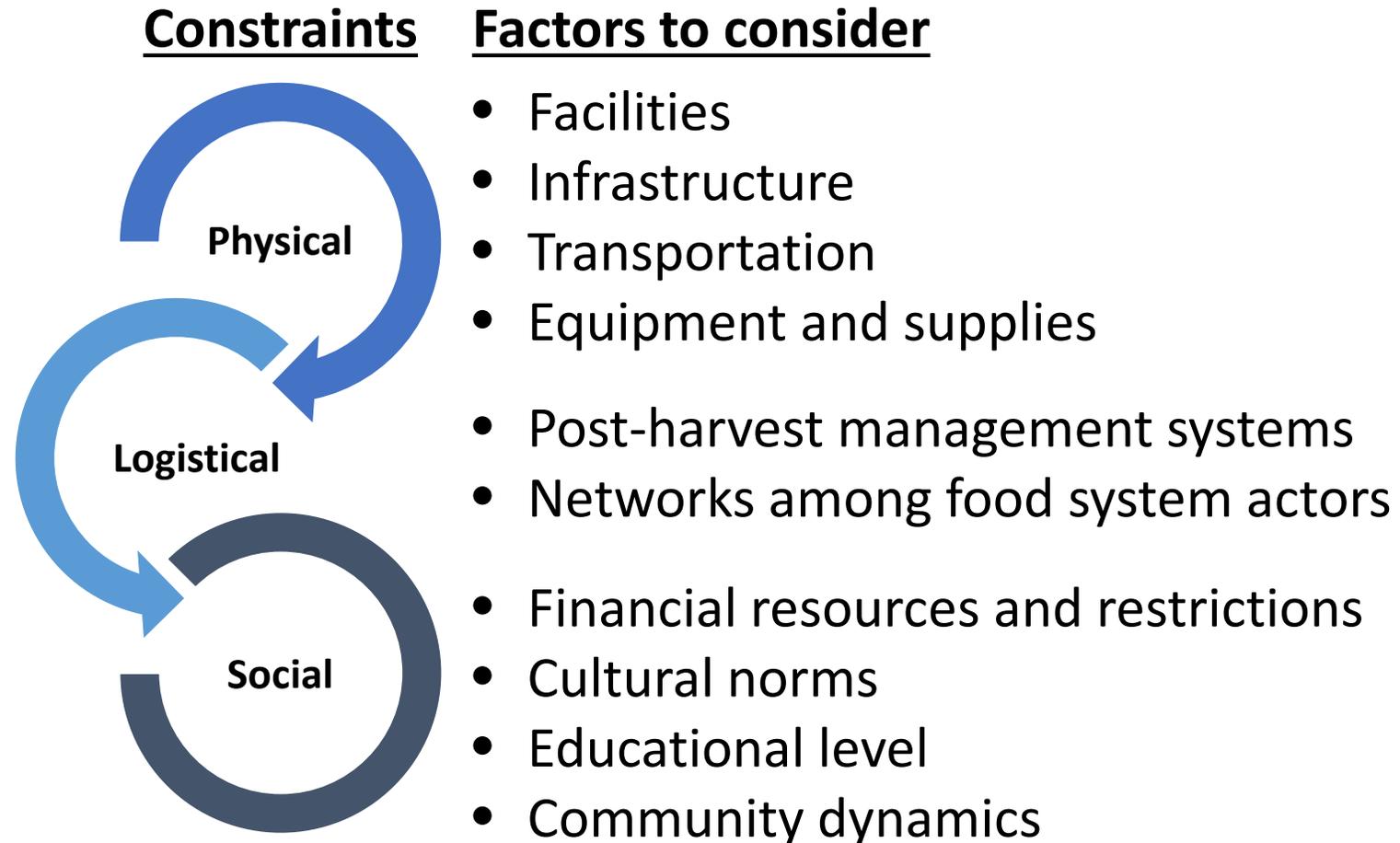
 **USAID** FROM THE AMERICAN PEOPLE  **HORTICULTURE INNOVATION LAB**  **UC DAVIS** UNIVERSITY OF CALIFORNIA

Food Processors



Maier Multimedia Photo Shelter

# Effective implementation of scientifically solid principles requires consideration of wide ranging issues



# Understanding physical constraints

- Inadequate facilities and infrastructure such as absence or shortage of:
  - safe water
  - electricity
  - storage facilities
- Lack of cold storage and transportation





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# Understanding logistical constraints

- Food production, processing, and marketing systems are highly fragmented
- Fragmentation results in many food handlers
- Poor post-harvest handling, processing and storage of food



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# Understanding social constraints

- Many traditional production and handling practices have been effective
- Tradition can conflict with emerging intensive agricultural practices
- Can lead to an inability to cope with rapid change



# Understanding social constraints

- How can new practices build on the extensive local experience?
- How can people be equipped to maintain new technology or practices long-term?
- What incentives can promote expansion and sustain change?

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  7. What challenges exist in implementing safe food practices?
1. The science of how to keep food safe
  2. High incidence of disease with global consequences
  3. Developing countries
  4. Everyone!
  5. Food safety standards, management practices and regulations
  6. Support social change
  7. Physical, logistical and social constraints

# HOW SAFE IS YOUR FOOD?



Food processing



Packaging



Point of sale



Preparation:  
consumers

From farm to plate,  
make food safe

WORLD HEALTH DAY 2015  
[#safefood](#)

