

# Food Safety 101

Environmental Health Activity 1

- ▶ Safe food is essential for our health and well-being but each year, it is estimated that 600 million people get sick and 420,000 people die because of contaminated food.
- ▶ Let's take a quick look at food safety, an important public health issue.
- ▶ We'll look at what makes food unsafe, how it happens, what it leads to, and how we can
- ▶ prevent it. Food can become unsafe when it gets contaminated.

## What?

- ▶ Contaminants can be: biological - due to micro-organisms or their products This includes bacteria, viruses, parasites or fungi. Some of these produce toxins that can lead to illness. Prions are protein molecules that have the potential to cause severe disease.
- ▶ Contamination could also be due to chemicals - like heavy metals; for example: lead, mercury or arsenic; compounds such as polychlorinated biphenyls, and detergents...or physical - such as plastic, stones or glass.

# WHAT?



# CONTAMINANTS

## BIOLOGICAL



Salmonella  
Campylobacter  
E. Coli  
Listeria

### BACTERIA



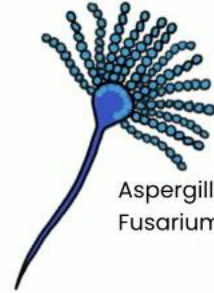
Norovirus  
Hepatitis A/E  
Rotavirus

### VIRUSES



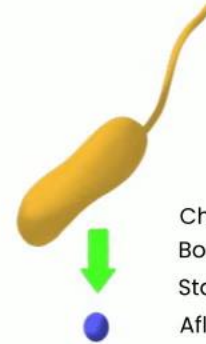
Giardia  
Cryptosporidium  
Ascaris

### PARASITES



Aspergillus  
Fusarium

### FUNGI



Cholera toxin  
Botulinum toxin  
Staph. toxin  
Aflatoxin

### TOXINS

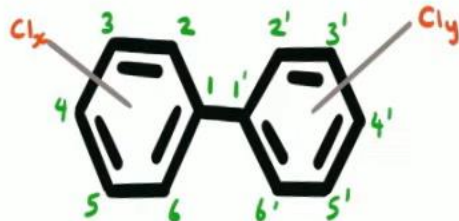


### PRIONS

## CHEMICAL

As  
Pb Hg

### HEAVY METALS



### PCBs



### DETERGENTS

## PHYSICAL



### PLASTIC



### STONES



### GLASS



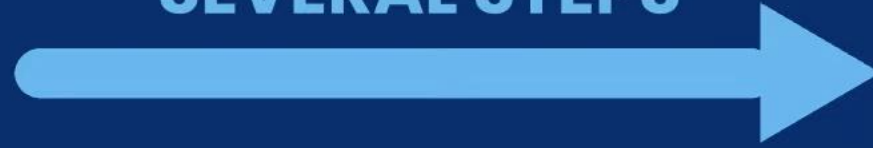
## How?

- ▶ Getting food from where it is produced to where it is consumed requires several steps.
- ▶ This is called a food supply chain.
- ▶ Production involves raising animals or growing the plants that we use for food, although some could be caught or harvested from the wild.
- ▶ The processing step is where plants, animals or their products are converted and packaged into a form that we buy as food.
- ▶ The distribution step is where the food gets from the farm or processing plant to the consumer usually through retail stores.
- ▶ The preparation step involves getting food ready to eat.
- ▶ Contamination can happen at any of these steps.

# HOW?



SEVERAL STEPS



**FOOD SUPPLY CHAIN**

**PRODUCTION**



**PROCESSING**



**DISTRIBUTION**

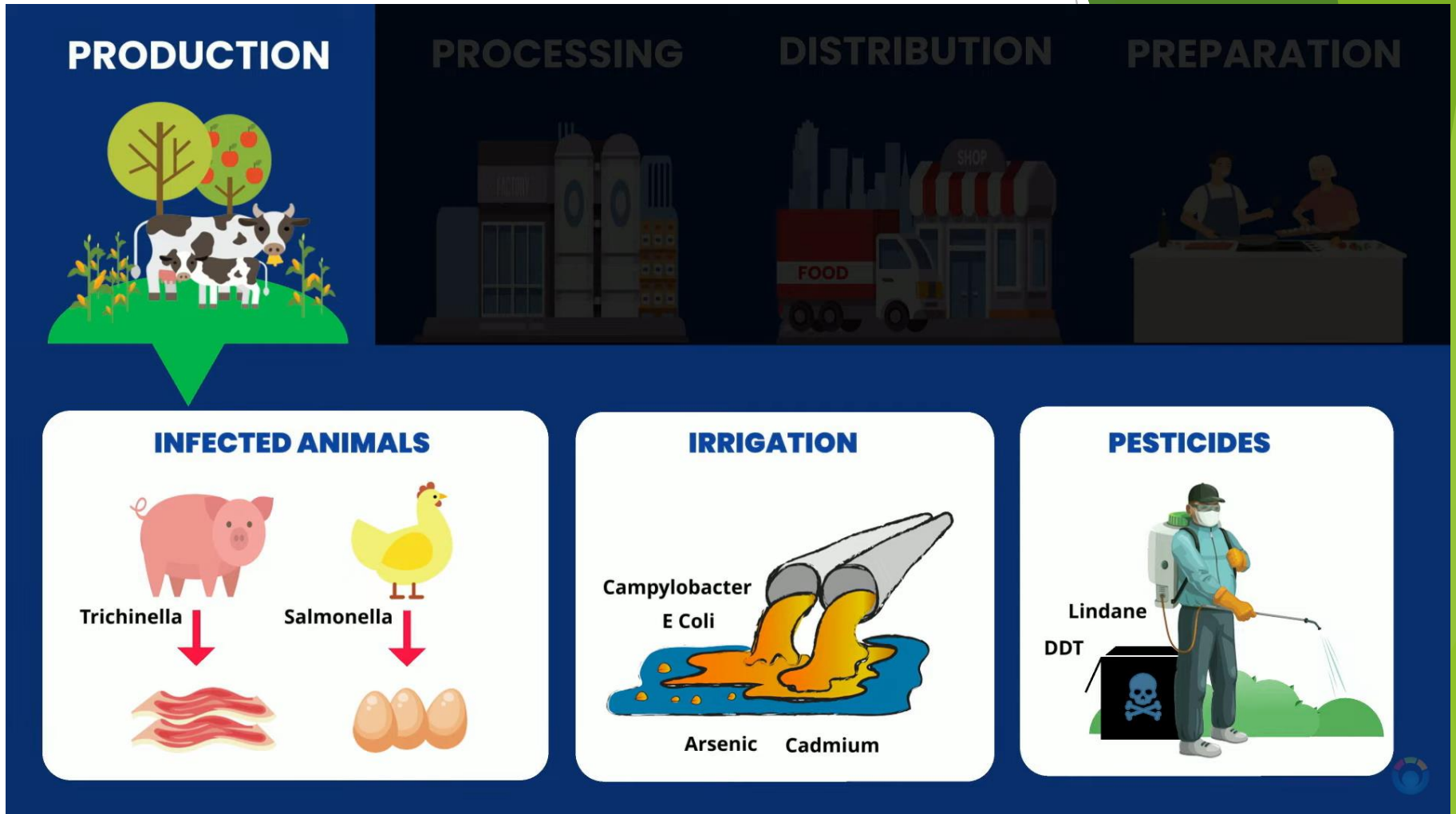


**PREPARATION**





- ▶ Let's take a look at some examples.
- ▶ At the production step, contamination can happen if animals are infected and transmit pathogens to their meat or to animal products such as eggs or milk.
- ▶ If the water used to irrigate fruits and vegetables contains pathogens or chemicals. Or if there is inappropriate use of pesticides which can lead to toxic pesticide residues in food.



In the processing step, contamination can happen:

- ▶ During the slaughtering process if pathogens from the animal's gastrointestinal system contaminates the meat product During processing, where pathogens, chemicals, or even physical contaminants such as glass could enter food.
- ▶ For example, when contaminated water is used or when surfaces are not cleaned properly.
- ▶ Food adulteration is the fraudulent practice where unnecessary, inferior or toxic, chemical or physical compounds are intentionally added to food to improve its appearance, taste, reduce cost or make it last longer.



# PRODUCTION

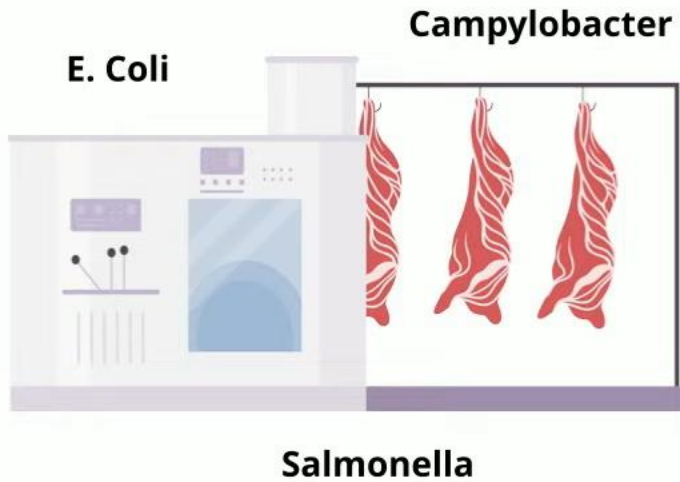
# PROCESSING

# DISTRIBUTION

# PREPARATION



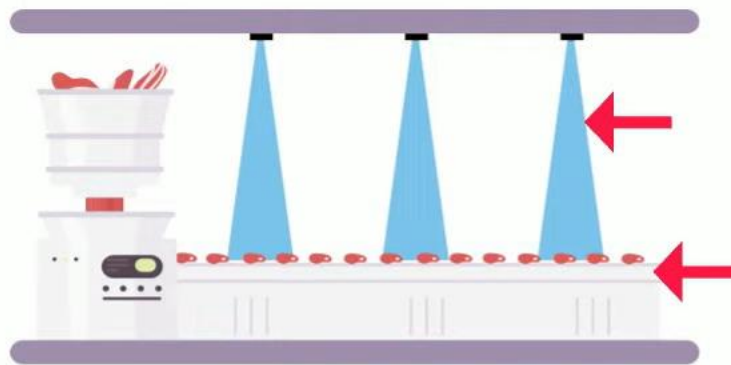
## CROSS CONTAMINATION



## OTHER

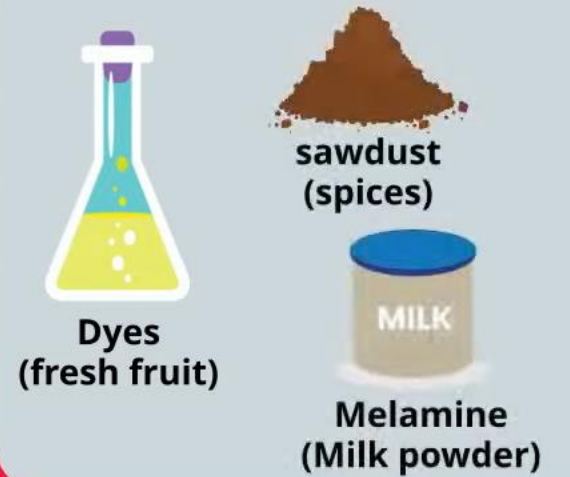
PATHOGENS

CHEMICALS



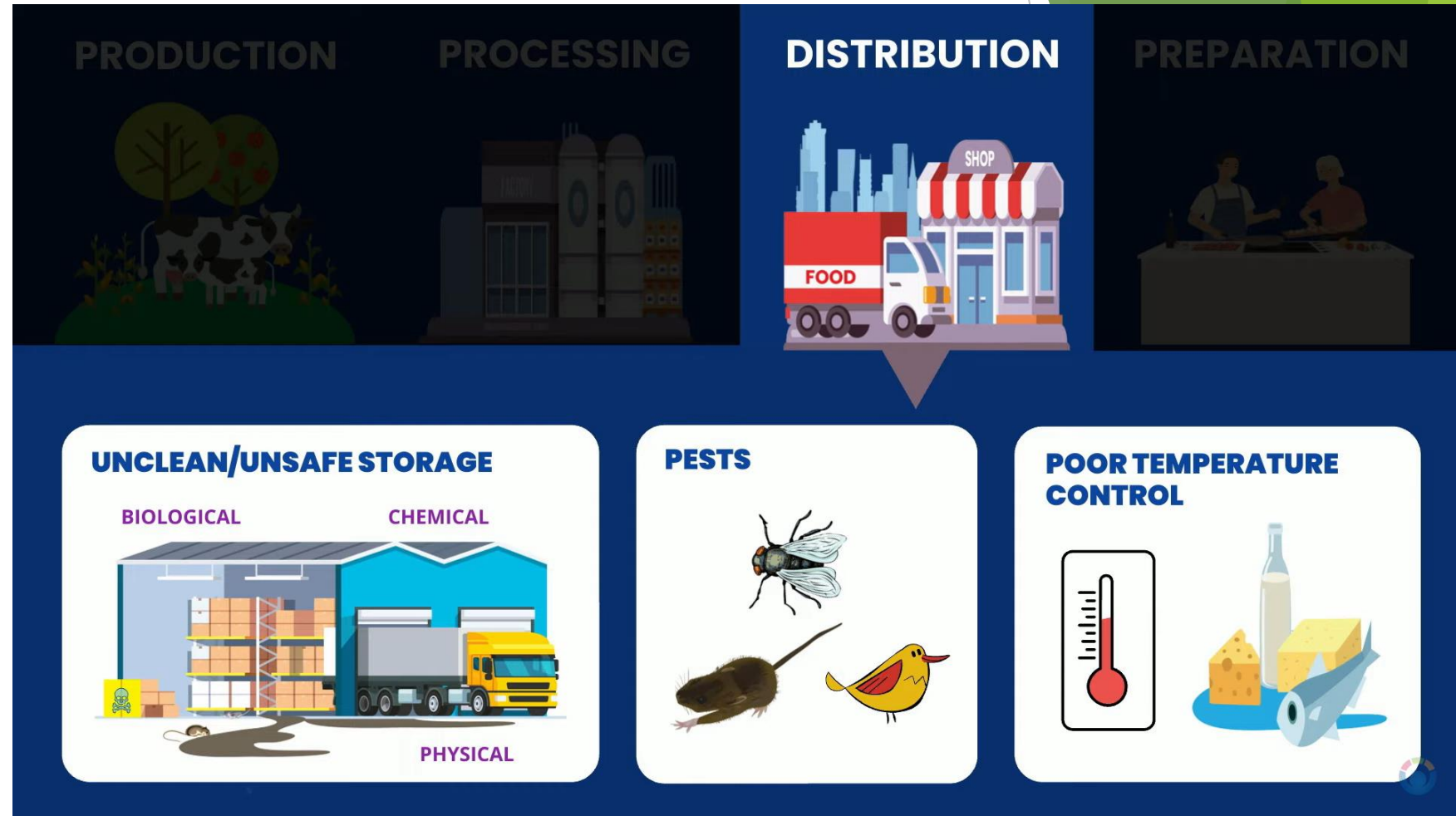
PHYSICAL

## ADULTERATION



Examples of how food can get contaminated at the distribution stage include:

- ▶ Storing food in areas that are not clean or are unsafe, which can lead to the introduction of biological, chemical, or physical contaminants.
- ▶ Pests like rats, insects or birds that can introduce pathogens or physical contaminants like hair or droppings into food. And food that is not stored at the right temperature, which could lead to the growth of pathogens.



Contamination at the preparation stage could be due to:

- ▶ Not washing hands before food preparation - Cross contamination- for example if the same knife is used for cutting raw meat and to prepare food that is not going to be cooked.
- ▶ Not cooking food to the right temperature.
- ▶ From sick food handlers.



- ▶ The food supply chain can be quite complex.
- ▶ Contamination can happen at any number of points in this chain.
- ▶ To add to this complexity is increased globalisation, which means that food may contain ingredients sourced from many different countries. Besides contamination, other ways that food could be potentially harmful are:
  - ▶ If it is not labelled properly - this is of concern for people who have food allergies or, potentially, from consuming food past its expiry date.





▶ Let's have a look at what happens when people eat contaminated food.

### Effects?

- ▶ Contaminated food can lead to over 200 different diseases, depending on the type of contaminant.
- ▶ There can be a range of symptoms, from asymptomatic illness to severe disease, and sometimes even death.
- ▶ Biological contaminants typically cause fever, abdominal pain, nausea or vomiting and diarrhea.
- ▶ These tend to occur hours to days after exposure.
- ▶ There could be a range of complications such as kidney failure, arthritis or miscarriage.
- ▶ Exposure to toxins, not only cause gastrointestinal disease but lead to a variety of health effects such as paralysis or cancer. Prions can lead to fatal neurological disease.

# BIOLOGICAL

**Commonly** hours/days after exposure



**Fever**



**Abdominal  
Pain**



**Nausea/Vomiting**

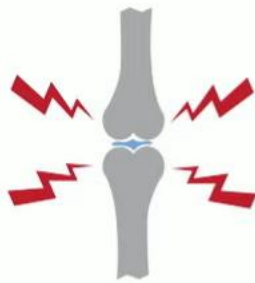


**Diarrhoea**

## Complications



**Kidney failure**



**Arthritis**



**Miscarriage**

## TOXINS

**Gastrointestinal disease**



**Paralysis**



Liver cancer

**Cancer**

## PRIONS



**Neurological disease**





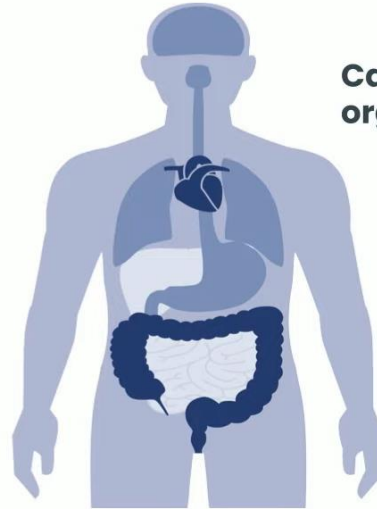
► Chemical compounds can cause short term or long-term effects affecting almost any organ in the body including causing different types of cancers.

► It is usually due to repeated exposure to the chemical over a long period of time.

► Physical contaminants can cause injuries or serve as a way of introducing other types of contaminants.

## CHEMICAL

### SHORT-TERM



Can impact many organs

### LONG-TERM

## CANCER

Usually - repeated exposure over a long time period

## PHYSICAL




## INJURY




Introduce other contaminants

- ▶ Although anyone can be impacted, there are some groups at higher risk.
- ▶ They include: Elderly people, especially those over the age of 65 years, children under 5 years, pregnant women and those who are immunocompromised.
- ▶ At a broader level, unsafe food can: Strain economies due to the cost of illness and reduced productivity.
- ▶ Have an impact on food security - which is availability and access to sufficient, nutritious and safe food.
- ▶ And contribute to the growing issue of antimicrobial resistance.


**Can affect anyone** **High risk groups**




**Elderly**



**Children**



**Pregnant**



**Immuno-compromised**

Antimicrobial Resistance (AMR): Stopping the rise of superbugs! 

## UNSAFE FOOD



**Economy**



**Food security**



**Antimicrobial Resistance**

- ▶ Let's talk about prevention.

## Prevention

- ▶ Food safety is a complex problem that requires action at all levels.
- ▶ At a global level, there are international agencies like the World Health Organization and the Food and Agriculture Organisation that work on initiatives like the “Codex Alimentarius.” This a collection of international standards, guidelines and codes of practice.
- ▶ INFOSAN is a global network of national food authorities that shares information and collaborates on food safety issues.
- ▶ At a national level, governments are responsible for the implementation and enforcement of food standards and codes and ensuring good agriculture and manufacturing practices.
- ▶ They are also responsible for the surveillance and management of foodborne illness and outbreaks.

# PREVENTION

COMPLEX

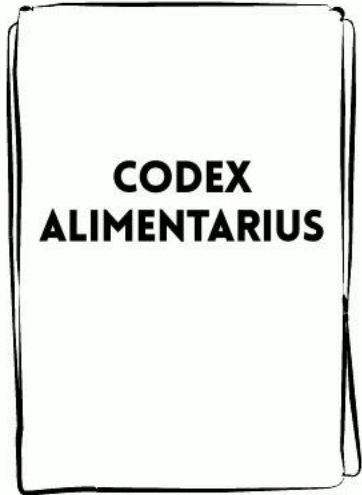
ACTION AT ALL LEVELS

## GLOBAL



WHO

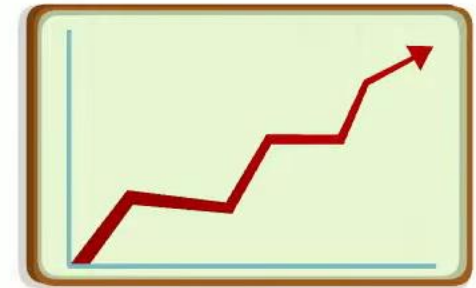
FAO



**INFOSAN**

International Food Safety  
Authorities Network

## NATIONAL

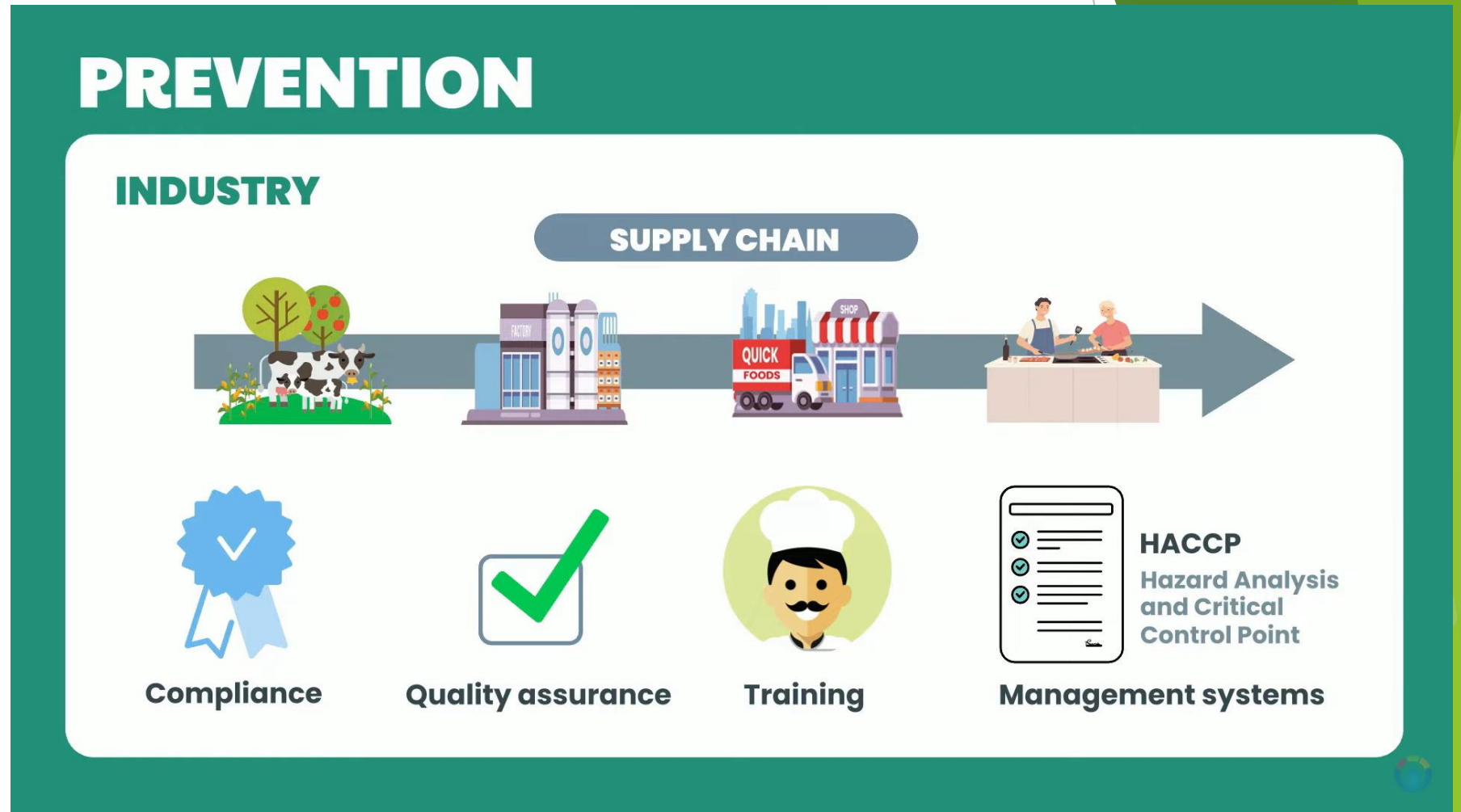


Surveillance and  
Management



► Industry has a crucial role in ensuring food safety at all stages of the supply chain.

► These include compliance with food safety legislation, regulations and standards, having robust quality assurance programs, staff training and having food safety management systems like “HACCP” - Hazard Analysis and Critical Control Point which can be used to identify and control potential food hazards.





► At an individual level - at home or food establishments, there are simple steps that can be taken to reduce the risk of foodborne disease.

► These include keeping hands and preparation areas clean, separating raw and cooked food, cooking thoroughly, keeping food at a safe temperature, and using safe water and raw materials.

# PREVENTION

INDIVIDUAL LEVEL (5 keys to safer food - WHO)

## 1. KEEP CLEAN



## 2. SEPARATE RAW AND COOKED



## 3. COOK THOROUGHLY



## 4. SAFE TEMPERATURE



## 5. SAFE WATER/RAW MATERIALS





***Good luck!***