

Emerging Infectious Diseases and Antimicrobial Resistance
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Lecture – 12
Introduction of Food Safety and Food Borne Diseases

Hi everyone. I am Dr. Debdutta Bhattacharya working as Scientist, I am a microbiologist and working at ICMR-RMRC, Bhubaneswar. So, I will be giving a lecture on the Introduction of food safety and food borne diseases in the context of One Health.

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So my lecture will cover introduction about the topic on Food safety, food safety in the context of sustainable development goals 2030, food hazards and its types, food borne illnesses, common food borne pathogens, their source, symptoms and prevention, key principles of food hygiene and food safety in the context of One Health approach.

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Food Safety (Food hygiene)

- Food safety refers to routines in the preparation, handling and storage of food meant to prevent foodborne illness and injury.
- Scientific method/discipline that describes how to handle, prepare, and store food in order to avoid food-borne illness
- From farm to factory to spoon, food products may encounter any number of health hazards during their journey through the supply chain.
- Food that we eat at our home or outside provides nutrients necessary for our well being and conduct of our everyday activities.
- However we all know that some of us sometimes fall sick from the food we eat.
- A food borne illness is a disease that is carried or transmitted to us by food.



The food safety as we all know refers to the routines in the preparation, handling and storage of food meant to prevent foodborne illnesses and injury. Food hygiene is a scientific method or discipline that describes how to handle the food, prepare and store food in order to avoid its contamination which will result in food borne illnesses. From the farm or field to factory to our table, food products encounter a number of health hazards during the entire journey or entire process of the supply chain.

Food that we eat at our home or outside provides us necessary nutrients which are required for our healthy growth, for our well being and conduct of our everyday activities. However, we all at some point of a time in our lifespan are infected with some certain food borne pathogens and have fallen sick. A food borne illness is a disease that is carried or transmitted to us by food.

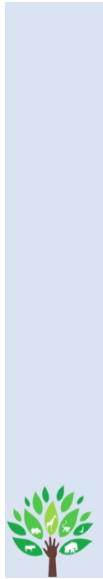
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The sustainable development goal of 2030 by United Nations consists of 17 goals are the blueprint to achieve a better and more sustainable future for all and call for actions by all countries poor, rich and middle income to promote prosperity while protecting the planet. Food safety is fundamental to SDG 1 that is no poverty, 2 that is zero hunger, 3 that is good health and well being, 6 that is clean water and sanitation, 8 that is decent work and economic growth.

The 12 that is responsible consumption and production, 17 that is partnerships for the goal. And any compromise of the food safety and hygiene will compromise the sustainable development goals set by the United Nations.

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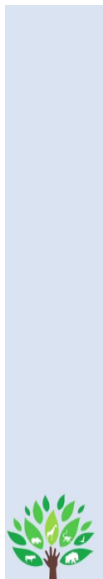
THE FOOD SAFETY AND STANDARDS ACT, 2006

- ✓ The Food Safety and Standards Act, 2006 received the assent of the President on 23rd August, 2006, and is published for general information:-**FOOD SAFETY AND STANDARDS ACT, 2006 No. 34 OF 2006.**
- ✓ It is an Act to consolidate the laws relating to food and to establish the Food Safety and Standards Authority of India for laying down science based standards for articles of food and to regulate their manufacture, storage, distribution, sale and import, to ensure availability of safe and wholesome food for human consumption and for matters connected therewith or incidental thereto.



The Food Safety and Standard Act 2006 received the Assent of President on 23rd August 2006 and is published for general information as food safety and Standard Act 2006, number 34 of 2006. It is an act to consolidate the laws relating to food and to establish the Food Safety and Standards Authority of India for laying down science based standards for articles of food and to relate their manufacture, storage, distribution, sale and import to ensure availability of safe, wholesome food for human consumption and for matters connected therewith or incidental thereto.

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Sources of contamination

- ✓ Complex and multiple operations in a food system increase the chances of contamination.
- ✓ By the time the food reaches us, it has several opportunities to become contaminated.
- ✓ Multiple foods handling from food grower to processor to supplier to finally us multiplies the chances of food contamination.
 - At the source - food grower, food processor, food packaging – through poor control methods or mishandling.
 - Most if not all food products go through additional steps of warehousing and storage, distribution and retail thus adding to another ladder for food to become contaminated.
 - Finally, the food reaches the final food processing facility or our homes, and it is here that we need to protect it from the point of receiving, through storage to its preparation for its intended use and upto consumption by us.

Complex and multiple operations in a food system increases, the chance of contamination in the

food products. By the time the food reaches us from the field to the plate, it has gone through several opportunities to become contaminated. Multiple foods handling from food grower to processor to supplier to finally us multiplies the chances of food contamination. At the source, food grower, food processor, food packaging through proper or improper or poor control methods or mishandling.

Most if not all food products go through additional steps of warehousing and storage, distribution and retail thus adding to additional ladder for food to become contaminated. Finally, the food reaches the final food processing facility or our homes and it is here that we need to protect it from the point of receiving, through storage to its preparation for its intended use and up to consumption by us.

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Food Hazards

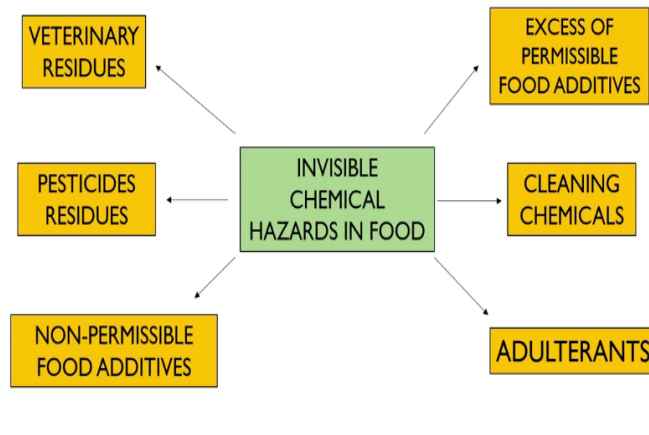
- Through errors/carelessness in purchasing, receiving, storage, preparing/cooking, packaging, storage of cooked products and service.
- Every food producer needs to be aware of the fact that they are selling a food product which is a biological material and is, therefore susceptible to degradation or spoilage.
- The food hazard is defined as:
 - "A biological, chemical or physical agent in, or condition of, food with the potential to cause an adverse health effect".*
- The food safety hazards are generally of three types: chemical, physical & biological, .*



Food hazards are the errors or carelessness in purchasing, receiving, storage, preparing, cooking, packaging, storage of cooked products and services in the food industry. Every food producer needs to be aware of the fact that they are selling a food product which is a biological material and is, therefore susceptible to degradation or spoilage by various sources. A food hazard is defined as a biological, chemical or physical agent in, or condition of, food with the potential to cause an adverse health effect. Food safety hazards are generally of three types; chemical, physical and biological.

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Chemical Hazard



The chemical hazards include veterinary residues, most of the farm the eggs are contaminated from this leftovers of the chicken or ducks or poultries, pesticide residues in the field based products, non-permissible food additives, excess of permissible food additives, cleaning chemicals which are used to clean the food products and adulterants that is added to the food to increase their value, increase their taste or increase their sellable values.




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Physical Hazard




Physical hazards that are involved in food borne contamination that are the various stone particles, cigarette and beedi ashes mixed with food, the broken glass, plastic, insects, hair or sometimes threads and some cotton fibers.

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Biological Hazards

- Biological Hazards are microorganisms and their toxic metabolites which can cause illness when transmitted to humans through food.
- Bacteria, virus, molds, naturally occurring toxins (Usually too small to be seen by the naked eye)
- Some can grow on food causing spoilage, others constitute a hazard to human through illness

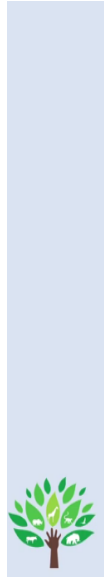


- Soil & Water
- Plants/Products
- Utensils/Equipment
- GI Tract
- Food Handlers
- Animal Feeds
- Animal Hides
- Air & Dust
- EVERYWHERE!

And the most important is the biological hazards that are caused by microorganisms or their toxic metabolites which can cause illness when transmitted to humans through food. This includes bacteria, viruses, molds, naturally occurring toxins by some bacteria and they are usually very small to see by a naked eye. Some of this can grow on food causing spoilage, other constitute a hazard to human through illness.

The microorganisms which can contaminate the food are present everywhere. It is present in soil, it is present in water plants products, the utensils that we use, the equipment that are used for handling the food, the GI tract, the food handlers, animal feeds, animal hides, the air, dust everywhere.

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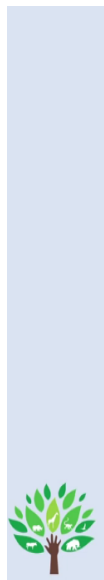
What Foods Are Most Likely to be Contaminated?

- raw meat and poultry
- raw eggs (even in uncooked brownie, cake, or cookie dough)
- unpasteurized milk
- raw shellfish
- unwashed raw fruits and vegetables
- unpasteurized fruit juice



The most common foods which are likely to be contaminated are raw meat and poultry, raw eggs which are used in making the brownie, cakes or cookies, unpasteurized milk, raw shellfish, unwashed raw fruits and vegetables and unpasteurized fruit juices.

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Foodborne illness

- Foodborne disease (FBD):** A disease commonly transmitted through ingested food. FBDs comprise a broad group of illnesses, and may be caused by microbial pathogens, parasites, chemical contaminants and biotoxins (WHO, 2016).
- Globally, an estimated 600 million persons fall ill after eating contaminated food, and 420,000 die annually, resulting in 33 million disability-adjusted life years lost (WHO, 2020).
- Every year, India witnesses an estimated 100 million foodborne illnesses and 120,000 foodborne illness-related deaths occur, and 8 million disability-adjusted life years are lost (Kumar et al., 2021).
- Foodborne illness outbreaks and acute diarrheal diseases accounted for nearly 40% of all reported outbreaks under India's Integrated Disease Surveillance Project (IDSP) during 2011–2017.

Food borne illnesses are diseases commonly transmitted through ingested food. Food borne diseases comprise a broad group of illnesses that may be caused by microbial pathogens, parasites, chemical contaminants, or the biotoxin produced by these pathogens. Globally, it is estimated that about 600 million people fall sick by eating contaminated food and 4.2 lakh die annually resulting in 33 million disability-adjusted life years lost.

Every year, India witnesses an estimated of 100 million foodborne illnesses and 1.2 lakh foodborne illness-related deaths and 8 million disability-adjusted life years are lost. Foodborne illness outbreaks are acute diarrheal diseases account for nearly 40 percent of all reported outbreaks as per the IDSP that is integrated disease surveillance program of the country during 2011 to 2017.

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Modes of food borne illness

- ✔ **Food infection/Food Poisoning:** results from ingestion of live pathogenic organisms which multiply in the body and cause disease.
- ✔ **Food intoxication:** Some bacteria produce harmful toxins which are present in food even if pathogen has been killed

Modes of foodborne illnesses are food infection or food poisoning which results from ingestion of live pathogenic organisms which multiply once they enter our body and the food intoxication. Some bacteria produce harmful toxins which are present in the food even if the pathogens are killed.

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General Roles of Microorganisms

- ✔ Spoilage
- ✔ Cause food to become inedible due to changes in color, flavor, odor, appearance or texture.
- ✔ Grow to high levels and break down food components
- ✔ Commensal organisms that have reached high populations (10^5 - 10^7 CFU/g)
- ✔ Different products have different spoilage flora

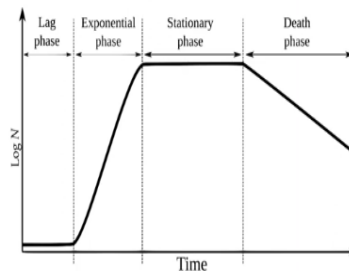
General roles of microorganism; they are involved in the spoilage of the food or its products. Cause food to become inedible due to the change in colour, flavour, odour, appearance or texture. They grow to high levels and break down the important food components. Commensal organisms that have reached high population that is around 10^5 to 10^7 colony forming unit per gram. And the different products have different spoilage flora involved.

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Factors influencing food poisoning

To survive and multiply, bacteria need:

- ✔ Water.
- ✔ Food.
- ✔ Correct temperatures.
- ✔ Time.
- ✔ Sometimes oxygen.



Under favorable conditions, bacteria will multiply by dividing in two every 20-30 minutes.


e.g., A single cell of *E.coli* double itself in every 20mins.

The microorganisms have a S growth curve that it involves a lag phase where it gets adjusted to the environment when it enters to the human body, exponential phase where it starts multiplying,

a stationary phase where the growth is stopped and the death phase where the cells start dying. In this entire growth curve, the most important factors are water, food, the microorganisms need correct temperature, time and sometimes oxygen for aerobic pathogens.

When they get suitable environment which involving these factors, they start multiplying in our body and start causing illnesses through various toxins or various other modes. Under favourable conditions, bacteria will multiply by dividing in two in every 20 to 30 minutes. A single cell of *E. coli* doubles itself in every 20 minutes.

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Common Foodborne Pathogens		
Bacteria	Viruses	Parasites
<i>E.coli</i>	Norovirus	<i>Cryptosporidium parvum</i>
<i>Salmonella</i> sp.	Rotavirus	<i>Giardia lamblia</i>
<i>Staphylococcus aureus</i>	Hepatitis A	<i>Cyclospora</i>
<i>Listeria monocytogenes</i>		
<i>Campylobacter jejuni</i>		
<i>Shigella</i> sp.		
<i>C.botulinum/C. perfringens</i>		

There are some common foodborne pathogens that are involved in food related illnesses of three types; bacteria, viruses and parasites. Bacteria includes *E. coli*, *salmonella*, *staphylococcus*, *listeria*, *campylobacter*, *shigella*, and *clostridium*. Viruses include *norovirus*, *rotavirus* and *hepatitis A*. Parasites include *cryptosporidium*, *giardia* and *Cyclospora*.

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Food borne Pathogens (Bacterial)...

Pathogen	Source	Clinical symptoms	Prevention
<i>E.coli</i>	Raw/undercooked meat and unpasteurized milk.	<ul style="list-style-type: none"> ➤ Symptoms include nausea, vomiting, diarrhoea/dysentery and bloody abdominal cramps; usually lasting 5-10 days. ➤ Can cause death in children and the elderly. 	<ul style="list-style-type: none"> ➤ Thoroughly cook meat ➤ Avoid unpasteurized milk ➤ Wash hands carefully ➤ Wash fruits and vegetables thoroughly, especially those that will not be cooked.
<i>C.botulinum/C. perfringens</i>	Found in improperly canned foods; Also in meats, ham, sausage, and some seafood	<ul style="list-style-type: none"> ➤ Diarrhea ➤ Fever ➤ Stomach tenderness or pain ➤ Loss of appetite ➤ Nausea 	<ul style="list-style-type: none"> ➤ Insure that all foods are properly canned ➤ time temperature guidelines are followed. ➤ Do not buy dented or damaged cans. ➤ Botulism can be fatal.

Coming to the details how they cause, what is the source, clinical symptoms and prevention. We will start with *E. coli*. The common source for *E. coli* are raw, undercooked meat and unpasteurized milk. Clinical symptoms include nausea, vomiting, bloody diarrhea or dysentery, abdominal cramps which lasts for 5 to 10 days. It may cause death in children and in the elderly. How can we prevent it?

Thoroughly cook meat, avoid unpasteurized milk, wash hands carefully, washed fruits and vegetables that we eat especially when those that will not be cooked. *Clostridium botulinum* or *Clostridium perfringens*. It is found in improperly canned food, in meats, ham, sausages and some seafood. Symptoms include diarrhea, fever, stomach tenderness or pain, loss of appetite and nausea. Prevention, how can we prevent it?

Ensure that all foods are properly canned. Time temperature guidelines are followed for the canned food. Do not buy dented or damaged cans. Botulism is caused by the botulinum by *Clostridium botulinum*, is a toxin and it is a neurotoxin and can be very fatal.

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Food borne Pathogens (Bacterial)...

Pathogen	Source	Clinical symptoms	Prevention
<i>Salmonella</i> sp.	Raw meats, poultry, milk, other dairy products and raw eggs	<ul style="list-style-type: none"> ➤ Symptoms start 8-12 hours after eating and include abdominal pain, diarrhea, and sometimes nausea and vomiting ➤ usually lasting 12-24 hours in mild cases. 	<ul style="list-style-type: none"> ➤ Cook poultry products to internal temperature of 165° F ➤ Avoid eating raw eggs ➤ Avoid drinking unpasteurized milk
<i>Staphylococcus aureus</i>	Meats, poultry, eggs, raw salads, cream-filled pastries.	<ul style="list-style-type: none"> ➤ Symptom within 30 minutes-8 hrs after eating including diarrhea, vomiting, nausea, abdominal pain, and cramps usually lasting 24 to 48 hours. 	<ul style="list-style-type: none"> ➤ Prepare foods safely. ➤ Wash fruits and vegetables well before eating or cooking. ➤ Store foods safely. ➤ Cook, refrigerate, or freeze meat, poultry, eggs, fish, and ready-to-eat foods within 2 hours. Store food at 4°C or colder.

Salmonella, the common sources are raw meats, poultry, milk, other dairy products and raw eggs. Symptoms include diarrhea, abdominal pain and sometimes nausea and vomiting. Usually lasts for 12 to 24 hours in mild cases. How can we prevent it? Cook poultry products to internal temperature of 165 degrees Fahrenheit. Avoid eating raw eggs, avoid drinking unpasteurized milk.

Staphylococcus aureus, common sources are meat, poultry, eggs, raw salads, cream-filled pastries. Symptoms include again diarrhea vomiting, nausea, abdominal cramps which last usually for 24 to 48 hours. Prepare food safely. Wash fruits and vegetables well before eating or cooking, store food safely. Cook, refrigerate or freeze meat, poultry, fish and ready to eat foods within 2 hours of bringing out from the cold temperature. Store food at 4 degrees or colder.

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Food borne Pathogens (Bacterial)...

Pathogen	Source	Clinical symptoms	Prevention
<i>Listeria monocytogenes</i>	Found in soft cheese, unpasteurized milk, and shell fish	<ul style="list-style-type: none"> ➤ Symptoms are reported 48-72 hours after eating contaminated foods and include fever, headache, nausea and vomiting. ➤ Can cause fetal and infant death. 	<ul style="list-style-type: none"> ➤ Wash hands after using the restroom. ➤ Avoid drinking unpasteurized milk. ➤ Wash vegetables or fruits thoroughly. ➤ Wash hands after handling raw meat, seafood, or poultry. ➤ Meat, poultry and fish products are well cooked.
<i>Shigella</i> sp.	Germ on the hands Eating infected food Swallowing contaminated water	<ul style="list-style-type: none"> ➤ diarrhea (sometimes bloody), fever, and stomach cramps. ➤ Symptoms usually begin 1-2 days after infection and last 7 days. 	<ul style="list-style-type: none"> Wash your hands with soap and water during key activities. Avoid unsafe food and water Do NOT prepare food if you are sick

Listeria, it is found in soft cheese unpasteurized milk and shellfish. Symptoms are reported within 48 to 72 hours after eating the contaminated food and include fever, headache, nausea and vomiting, can cause fetal and infant death. Prevention, wash hands after using the restroom. Avoid drinking unpasteurized milk. Wash vegetables or fruits thoroughly. Wash hands after handling raw meat, seafood or poultry.

Meat, poultry and fish products should be well cooked. *Shigella* species, it is found on hands, contaminated hands, eating infected food, swallowing contaminated water. The symptoms include diarrhea sometimes bloody or dysentery, fever and stomach abdominal cramp. Symptoms usually begin in 1 to 2 days after infection and lasts for 7 days. How can we prevent it? Wash our hands with soap and water during key activities. Avoid unsafe water and food. Do not prepare food if you are sick.

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Food borne Pathogens (Viral)...

Pathogen	Source	Clinical symptoms	Prevention
<i>Hepatitis A</i>	Oral fecal contact – when hands are not washed thoroughly after using the restroom, contaminated food.	<ul style="list-style-type: none"> ➤ Symptoms begin with appetite loss, nausea, vomiting and fever. ➤ After 3-10 days patients can develop jaundice and can lead to liver damage. 	<ul style="list-style-type: none"> ➤ Thoroughly wash your hands often. ➤ Wash after using the toilet, before preparing food or eating, and after changing a child's diaper. ➤ The hepatitis A vaccine can prevent infection with the virus.
<i>Rotavirus</i>	Touch, including contaminated food, toys and utensils.	<ul style="list-style-type: none"> ➤ Fever, abdominal pain and vomiting, followed by 3-7 days of watery diarrhea 	<ul style="list-style-type: none"> ➤ Wash hands thoroughly and often — especially after you use the toilet. ➤ Vaccines
<i>Norovirus</i>	Direct contact with an infected person Contaminated food or water Through contaminated surfaces	<ul style="list-style-type: none"> ➤ Diarrhea ➤ Vomiting ➤ Nausea ➤ Stomach pain 	<ul style="list-style-type: none"> ➤ Wash your hands often ➤ Rinse fruits and vegetables ➤ Stay home when sick ➤ Avoid preparing food when sick

Coming to the viral pathogens involved in foodborne illnesses, hepatitis A. Common sources are oral fecal contact when hands are not washed thoroughly after using the restroom and contaminated food. Symptoms include loss of appetite, nausea, vomiting and fever. After 3 to 10 days of the infection, the patients can develop jaundice and can lead to liver damage. Prevention, thoroughly wash your hands often.

Wash after using the toilet, before preparing food or eating and after changing a child's diaper. The hepatitis A vaccine can prevent infection with the virus. Rotavirus, again it infects through touch including contaminated food, toys and utensils. The common clinical symptoms are fever, abdominal pain and vomiting, followed by 3 to 7 days of watery diarrhea. Again, prevention can be done by washing the hands thoroughly and often, especially after use of the toilets.

There are vaccines for prevention of rotavirus. Norovirus, the sources are direct contact with an infected person, contaminated food or water through contaminated surfaces. And clinical symptoms include diarrhea, vomiting, nausea and stomach pain. Again, we can prevent infection with norovirus by washing our hands thoroughly and often. Rinse fruits and vegetables. Stay home when you are sick. Avoid preparing the food when there are symptoms of diarrhea.

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Food borne illnesses (Parasitic)...

Pathogen	Source	Clinical symptoms	Prevention
<i>Cryptosporidium parvum</i>	<ul style="list-style-type: none"> ➤ Contaminated water (e.g., drinking or recreational water). ➤ Occasionally food sources, such as salads, may serve as vehicles for transmission. 	<ul style="list-style-type: none"> ➤ Watery diarrhea ➤ Stomach cramps or pain ➤ Dehydration ➤ Nausea ➤ Vomiting ➤ Fever ➤ Weight loss 	<ul style="list-style-type: none"> ➤ Practice Good Hygiene ➤ Avoid drinking contaminated water ➤ Thoroughly wash your hands often. ➤ Minimize contact with the animals stool, especially young animals
<i>Giardia lamblia</i>	<ul style="list-style-type: none"> ➤ Person to person or through contaminated water, food, surfaces, or objects. ➤ Contaminated drinking water or recreational water 	<ul style="list-style-type: none"> ➤ Diarrhea ➤ Gas ➤ Foul-smelling, greasy stools ➤ Stomach cramps ➤ Nausea ➤ Vomiting & Dehydration 	

The parasitic pathogens which are involved in foodborne illnesses, *Cryptosporidium Parvum*. It against spreads through contaminated water which are used for drinking or recreational water like the swimming pools. Occasionally food sources such as salads may serve as vehicles for transmission. Clinical symptoms include watery diarrhea, stomach cramps, dehydration, nausea, vomiting, fever and weight loss.

Giardia lamblia, person to person or through contaminated water, food, surfaces or objects are the source of contamination. Contaminated drinking water or recreational water. Symptoms again include diarrhea, gas, foul smelling greasy stool, stomach cramps, nausea, vomiting and dehydration. Prevention, again the common modes of prevention are maintaining good hygiene. Avoid drinking contaminated water. Thoroughly washing hands often and minimize contact with animal stools, especially for young animals.

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Key principles of food hygiene

According to WHO:

- ✔ Prevent pathogens from spreading from people, pets, and pests from contaminating food.
- ✔ Separate raw and cooked foods to avoid cross-contamination.
- ✔ To kill pathogens, cook foods for the appropriate amount of time and at the appropriate temperature.
- ✔ Food should be stored at the proper temperature.
- ✔ Use only safe water and raw materials

The key principles of food hygiene as per WHO includes prevent pathogens spreading from people, pets and pests from contaminating the food. Separate raw and cooked foods to avoid cross-contamination. To kill pathogens, cook food for an appropriate amount of time and at the appropriate temperature. Food should be stored at proper temperature. Use only safe water and raw materials for preparing food.

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Food safety & One Health approach

- ✔ In the current scenario, it is well recognized that human health is closely connected to animal and our surrounding environment.
- ✔ Rapid globalization, increase in population and environmental degradation has increased the complexity of threat to public health system.
- ✔ Inappropriate use of antibiotics in livestock industry largely contributed to AMR and rapid emergence of zoonotic diseases is anticipated to the encroachment into wildlife habitat.
- ✔ COVID-19 pandemic, 2020 revealed no public health problem is a local problem and needs a global strategy
- ✔ Emerging health risks must be addressed using a multisectoral approach engaging experts from human health, veterinary medicine, environment, Infectious disease expert, epidemiologist, agriculture, wildlife, plant health, policy makers etc. (Amuasi et al., 2020)

Then coming to the One Health approach which is one of the one of the most important components to maintain the food safety and food hygiene, in the current scenario it is well recognized that human health is closely connected to animal and our surrounding environment.

Rapid globalization, increase in population and environmental degradation has increased the complexity of threat to public health system.

Inappropriate use of antibiotics, in livestock industries contributed largely to the antimicrobial resistance which has become a global public health emergency and rapid emergence of zoonotic diseases is anticipated to the encroachment into the wildlife habitat. The recent outbreak or the recent pandemic of COVID-19, which started in early 2020 in the country revealed that no public health problem is a local problem and it needs a global strategy made to contain it or to manage it.

Emerging health risks must be addressed using a multisectoral approach, engaging experts from human health, veterinary medicine, environment, infectious disease expert, epidemiologist, agriculture, wildlife, plant health and policymakers.

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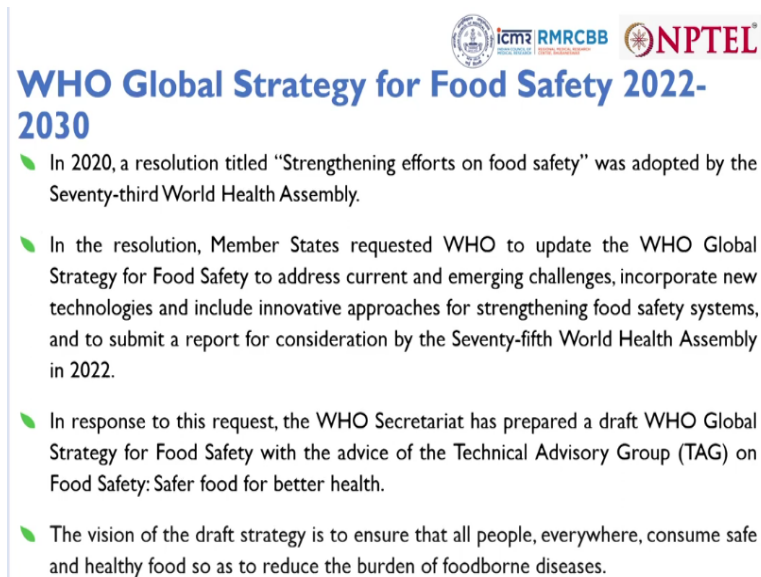
Food safety & OneHealth approach

- ✔ Multistakeholders coordination, cooperation and information sharing can greatly contribute to the improvement in food safety and public health.
- ✔ Authentic data on occurrence and disease burden from foodborne hazards through a systematic surveillance network combined with knowledge of source attribution will be crucial in assessing costs and benefits of current intervention strategies.
- ✔ Adopting an One Health approach in ensuring food safety and food hygiene will allow all countries to detect and combat the emerging diseases at the human-animal-environment interface and address food related public health emergencies.

Multistakeholder's coordination, cooperation and information sharing can greatly contribute to the improvement in food safety and public health. Authentic data on occurrence and the disease burden from foodborne hazards through a systematic surveillance network combined with the knowledge of source attribution will be crucial in assessing cost and benefit of current intervention strategies.

Adopting an One Health approach where we bring in all the stakeholders under one umbrella in ensuring food safety and food hygiene will allow all countries to detect and combat the emerging disease at the human, animal and environment interface and address food related public health emergencies in a better way.

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The slide features logos for icmr, RMRCBB, and NPTEL at the top right. The title "WHO Global Strategy for Food Safety 2022-2030" is in blue. Below it, four green bullet points provide a summary of the WHO resolution and the draft strategy's vision.

WHO Global Strategy for Food Safety 2022-2030

- ✓ In 2020, a resolution titled "Strengthening efforts on food safety" was adopted by the Seventy-third World Health Assembly.
- ✓ In the resolution, Member States requested WHO to update the WHO Global Strategy for Food Safety to address current and emerging challenges, incorporate new technologies and include innovative approaches for strengthening food safety systems, and to submit a report for consideration by the Seventy-fifth World Health Assembly in 2022.
- ✓ In response to this request, the WHO Secretariat has prepared a draft WHO Global Strategy for Food Safety with the advice of the Technical Advisory Group (TAG) on Food Safety: Safer food for better health.
- ✓ The vision of the draft strategy is to ensure that all people, everywhere, consume safe and healthy food so as to reduce the burden of foodborne diseases.

The WHO global strategy for food safety 2022-2030: In 2020, a resolution titled strengthening efforts on food safety was adopted by the 73rd World Health Assembly. In the resolution, member states requested WHO to update the WHO global strategy for food safety to address current and emerging challenges, incorporate new technologies and include innovative approaches for strengthening food safety systems and to submit a report for consideration by the 75th World Health Assembly in 2022.

In response to this request, the WHO Secretariat has prepared a draft WHO Global strategy for food safety with the advice of the technical advisory group on the food safety, safer food for better health. The vision of the draft strategy is to ensure that all people, everywhere, consume safe and healthy food so as to reduce the burden of foodborne diseases.

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Resources

- ✓ Havelaar AH, Kirk MD, Torgerson PR, Gibb HJ, Hald T, Lake RJ, et al. World Health Organization global estimates and regional comparisons of the burden of foodborne disease in 2010. *PLoS Med* 2015;12:e1001923.
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These are the resources which we have used which can be studied to get further information on foodborne illnesses, foodborne pathogens, food hygiene. In the present scenario of rapid emergence and reemergence of pathogens, we must realize that food safety is a shared responsibility. It depends on all of us to come forward and take necessary actions at our level, at policymaker's level, at administrative level to ensure the food safety is maintained.

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So let's team up for the food safety. For any further query, you may contact me in these email id's. Thank you.