BY

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INTRODUCTION

❖ What is hygiene.
❖ What is sanitation.
❖ What is health.
❖ Why its necessary for food.
What is Hygiene

❖ The art & branch of science that deals in preserving good health is hygiene.

❖ It is derived from Greek hygeia (also hygea, hygia, hygeia) meaning “goddess of health”
What is sanitation

❖ The Word Sanitation, Derived From The Latin Word “Sanus” Meaning “Sound & Healthy”

❖ The Knowledge As Well As The Acceptance & Effective Application Of Sanitary Measures Of Good Health.
the creation and maintenance of hygienic and healthful conditions.” It is the application of a science to provide wholesome food processed, prepared, merchandised, and sold in a clean environment by healthy workers.
Health is a state of complete physical, mind & social well-being & not more than absence of disease or infirmity.
Why Should We Care?

Every year food borne illnesses result in an estimated:

76 million cases of food borne illness.
10,25,000 people hospitalized for food borne illness.
25,200 needless deaths each year.
Economic losses between 10-83 billion dollars.
<table>
<thead>
<tr>
<th>Category</th>
<th>Harmful Substances</th>
<th>Health Risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Packaged, tinned &amp; canned</td>
<td>Tin, lead, nickel, preservatives, toxins from plastics</td>
<td>Tin may cause headache, vomiting &amp; photophobia, lead may impair kidneys, and arteries, excess nickel in chocolate can cause skin cancer, phthalates in plastics cause hormonal disorder.</td>
</tr>
<tr>
<td>Meat &amp; meat products</td>
<td>E.coli, mycotoxins, residues of hormones &amp; antibiotics, pathogens, pesticides, heavy metals</td>
<td>Food poisoning, liver damage, hormonal imbalance, cancer and other disorders</td>
</tr>
<tr>
<td>Fruits &amp; Vegetables</td>
<td>Pesticide, heavy metals, carbide gas</td>
<td>Cancer, convulsions, blurred vision &amp; nausea, Cd can cause high BP, cancer &amp; bone marrow disorder</td>
</tr>
<tr>
<td>Edible oil</td>
<td>Argemone seeds, castrol oil, rancid oils</td>
<td>Argemone seeds can cause dropsy, castrol can cause damage to kidneys, rancid oil can cause vitamin deficiency</td>
</tr>
<tr>
<td>Food Category</td>
<td>Harmful Ingredients</td>
<td>Health Risks</td>
</tr>
<tr>
<td>-----------------------</td>
<td>--------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------</td>
</tr>
<tr>
<td>Junk &amp; street foods</td>
<td>All kinds of pathogens, preservatives, tastemakers, excess Na, non-permitted colours</td>
<td>Stomach disorders, cancer, non permitted colours may damage bones, eyes, testicles, ovaries</td>
</tr>
<tr>
<td>Beverages</td>
<td>Pesticides, preservatives, asbestos, tin</td>
<td>Asbestos may cause stomach cancer</td>
</tr>
<tr>
<td>Sweets and honey</td>
<td>Non permitted colours like lead chromate, colour textile dyes like metanil yellow.</td>
<td>Cancer, liver damage, stomach disorders</td>
</tr>
<tr>
<td></td>
<td>Artificial sweeteners, aluminium foils</td>
<td></td>
</tr>
</tbody>
</table>

Sources: NIN, Hyderabad; IRTC, Lucknow, CFTRI & DFRL, Mysore; CERC, Ahmedabad
What are Microorganisms

- Microorganism (microbes) are viruses, bacteria and fungi
- They are too small to be seen with the naked eye, but can be seen with a microscope
- They are single celled organisms
Where Do Microbes Live?

• Microbes live in the water you drink, the food you eat, and the air you breathe.
• Right now, billions of microbes are swimming in your belly and mouth, and crawling on your skin!
Are Microbes Harmful?

- 95% of all microbes are *harmless*
- Some are very beneficial to humans
- Bacteria in people’s intestines help to digest food
- Some harmless microbes protect people by competing with harmful microbes for space.
How do Microbes Multiply?

- They multiply *QUICKLY*!
- Scientists often use scientific notation to express their large numbers.

<table>
<thead>
<tr>
<th>Number</th>
<th>Scientific Notation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1x10^0</td>
</tr>
<tr>
<td>100</td>
<td>1x10^2</td>
</tr>
<tr>
<td>10,000</td>
<td>1x10^4</td>
</tr>
<tr>
<td>1,000,000</td>
<td>1x10^6</td>
</tr>
</tbody>
</table>
Microbes That Cause Food borne Illness

- **Bacteria** – Single-celled organisms that live independently.
- **Viruses** - small particles that live and replicate in a host.
- **Parasites** - intestinal worms or protozoa that live in a host animal or human.
In 1676, Anton Van Leeuwenhoek first observed bacteria through a microscope and called them “animalcules.” In 1838, the German Naturalist Christian Gottfried Ehrenberg called them *bacteria*, from the Greek *baktēria*, meaning "little stick." An apt word, as the first observed bacteria were shaped like rods, although bacteria can also be spiral or spherical in shape.
3 TYPES OF BACTERIA

BACTERIA:

1. Essential
2. Spoilage
3. Pathogenic
<table>
<thead>
<tr>
<th>Name</th>
<th>Where is it found?</th>
<th>Disease/Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salmonella</td>
<td>Raw meats, poultry, dairy products, vegetables and fruits</td>
<td>Nausea, vomiting, diarrhea, fever</td>
</tr>
<tr>
<td>E.Coli 0157:H7</td>
<td>Raw and undercooked ground beef, other red meat, unpasteurized milk, soft cheese, fresh fruit and vegetables</td>
<td>Abdominal pain, cramps, nausea, vomiting, diarrhea, occasional fever</td>
</tr>
</tbody>
</table>
- **Hygiene**
- **Personnel hygiene**
  - (Water temp - 41°C (hand washing), standard of hand washing 20 sec)
- **Protective clothing**
- **Washing**
- **Machine**
- **Pest control sanitizer**
- **Construction and area**
- **Cleaning**
❖ FREEZER TEMP : -18°C (NO GROWTH)
❖ CHILLING TEMP : 1 TO 4°C (GROWTH AWAKE)
❖ TEMP : 20 TO 50°C (MULTIPLE GROWTH)
❖ GROWTH TWICE WITHIN 10 OR 20 MINS
CONTAMINATION

THE CHAIN OF INFECTION

BACTERIA → CONTAMINATION → MULTIPLICATION → FOOD POISONING
FOOD CONTAMINATION

THEY ARE THREE TYPES

I. Bacterial contamination
II. Physical contamination
III. Chemical contamination

ROUTES OF CONTAMINATION

I. Direct contamination
II. Cross contamination
III. In direct contamination
SOURCES OF BACTERIA

- Humans
- Raw food
- Poultry
- Meat
- Vegetables
- Fish
- Animals and insect
- Flies
- Mice and rats, Cockroaches
BREAKING OF FOOD POISONING CHAIN

❖ Protect food from contamination
❖ Prevent multiplication
❖ Destroy the bacteria
FOOD IS CONTAMINATED BY

1. BACTERIA
2. CHEMICAL
3. PHYSICAL

❖ RISK GROUP

1. VERY YOUNG
2. ELDERLY
3. WEAK IMMUNITY
4. PREGRENT WOMEN
1. TIME

2. TEMPERATURE (5°C - 63°C) best condition is 37°C.

3. FOOD

4. MOISTURE

5. OXYGEN
The temperature range in which food borne bacteria can grow is known as the danger zone. This is typically considered to be between 40°F (4.4°C) and 140°F (60°C), though often 45°F (7.2°C) is considered the lower temperature of the range. According to the 2005 FDA Food Code, the danger zone is defined as 41°F - 135°F (5°C - 57°C).
Potentially hazardous food should not be stored at temperatures in this range in order to prevent food borne illness, and food that remains in this zone for more than four hours must be discarded.

SPORE: It’s a safety cover of bacteria which they make at the time of very critical situation.
PREVENTATION OF BACTERIA

❖ PLANT CONDITION

❖ DRY STORE

I. Keep Clean
II. Pest Free
III. Ventilate
IV. Rotate Stock, Check Regularly
V. Keep Food Covered
VI. Food Should Be Stored At Floor

6”” Floor To Height
5”” From The Wall
Time & Temperature

Foods Can Stay No More Than 4 Hours

Between 4.4°C and 60°C!

UP TO 4 HOURS SAFE

MORE THAN 4 HOURS UNSAFE!

DANGER ZONE!

-17.8°C

4.4°C

60°C

100°C

Frozen Food

Cold Food

Hot Food

ECOLAB
REFRIGERATION RULES

1. Good ventilation
2. Keep clean
3. Temp 1 to 4°C where 8°C is control point
4. Keep door closed
5. Cover food
6. Rotate stock
7. Sited wall
8. Good construction
FREEZERS

❖ TEMP -5 TO –18°C
❖ KEEP CLEAN
❖ ROTATE STOCK
❖ DO NOT OVERLOAD
❖ WRAP FOOD WALL
METHODS OF PRESERVATION

i. CANNING
ii. DRYING
iii. FREEZING
iv. SMOKING
v. HEAT TREATMENT
vi. VACCUM PACKAGING
vii. PICKLING & SALTING
viii. ADDING SUGAR
PREMISES & EQUIPMENT

❖ CROS CONTAMINATION SHOULD BE ELIMINATE

❖ FLOOR – NON OBSERVED TILES

❖ LIGHTING – 120 LUX IN MIXING AREA
   100 LUX REMAINING AREA.
I. Physical cleaning.
II. Chemical cleaning.
III. Thermal cleaning.
REASONS OF CLEANING

I. PLEASANT AND SAFE ENVIRONMENT

II. REDUCE CONTAMINATION

III. ALLOW DISINFECTION

EFFECTIVE CLEANING

I. WHAT

II. HOW

III. WHO

IV. WHEN

V. HOW MUCH TIME IS ALLOWED FOR CLEANING
<table>
<thead>
<tr>
<th>RISK RANKING</th>
<th>DESCRIPTION</th>
<th>CLEANING</th>
<th>DISINFECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOW</td>
<td>Floor:</td>
<td>Once a week</td>
<td>Once a week with bactericide and once a month with sporicide</td>
</tr>
<tr>
<td></td>
<td>Ceiling:</td>
<td>Twice a year</td>
<td>Once a year with bactericide</td>
</tr>
<tr>
<td></td>
<td>Wall:</td>
<td>Once a year</td>
<td>Once a year with bactericide</td>
</tr>
<tr>
<td></td>
<td>Chair/Table:</td>
<td>Monthly</td>
<td>Monthly disinfection with bactericide</td>
</tr>
<tr>
<td>MEDIUM</td>
<td>Floor:</td>
<td>Every working day</td>
<td>Once a week with bactericide and once a month with sporicide</td>
</tr>
<tr>
<td></td>
<td>Ceiling:</td>
<td>Twice a year</td>
<td>Twice a year with bactericide</td>
</tr>
<tr>
<td></td>
<td>Wall:</td>
<td>Twice a year</td>
<td>Twice a year with bactericide</td>
</tr>
<tr>
<td></td>
<td>Chair/Table:</td>
<td>Weekly</td>
<td>Weekly disinfection with bactericide</td>
</tr>
<tr>
<td>HIGH</td>
<td>Floor:</td>
<td>Every working day</td>
<td>Every working day with bactericide and once a week with sporicide</td>
</tr>
<tr>
<td></td>
<td>Ceiling:</td>
<td>Twice a year</td>
<td>Monthly disinfection with bactericide</td>
</tr>
<tr>
<td></td>
<td>Wall:</td>
<td>Monthly</td>
<td>Monthly disinfection with bactericide</td>
</tr>
<tr>
<td></td>
<td>Chair/Table:</td>
<td>Daily</td>
<td>Daily disinfection with bactericide</td>
</tr>
</tbody>
</table>
USE OF CHEMICALS FOR CLEANING

❖ BACTERICIDE - DESTROYS BACTERIA
❖ DETERGENT - REMOVES GREASE AND DUST
❖ DISINFECTANT - REDUCE MICRO ORGANISM TO A SAFEL EVEL
❖ SANITIZER- CHEMICAL THAT USE BOTH CLEAN AND DISINFECTIONS
❖ STERILIZER- HEAT TREATMENT
REASONS OF CONTROL BACTERIA

❖ PREVENTIVE OF DISEASE
❖ PREVENTATION OF DAMAGE
❖ PREVENTATION OF WASTE FOOD

METHOD OF CONTROL

❖ PHYSICAL CONTROL
❖ CHEMICAL CONTROL
❖ PROOFING
PEOPLE WITH A HIGHER RISK OF FOOD BORNE ILLNESS

Infants

Young children and older adults

Pregnant women

People with weakened immune systems and individuals with certain chronic diseases
SYMPTOMS OF FOOD BORNE ILLNESS

- Diarrhea and/or vomiting, typically lasting 1 to 7 days.
- Abdominal cramps, nausea, fever, joint/back aches, and fatigue.
- “Stomach flu” may actually be a food borne illness caused by a pathogen (i.e., virus, bacteria, or parasite) in contaminated food or drink.
- The incubation period (the time between exposure to the pathogen and onset of symptoms) can range from several hours to 1 week.
Microorganisms can cause foodborne illness either by infection or intoxication.

- **FOOD INFECTION**
  - Bacteria are consumed
  - Body reacts by raising temperature- *fever*
  - Longer incubation

- **FOOD INTOXICATION**
  - Toxin contaminated food is eaten
  - Shorter incubation
FOOD SAFETY FROM FARM TO TABLE

FARM
Use GOOD AGRICULTURAL PRACTICES

TRANSPORTATION
Use Clean Vehicles and Maintain the COLD CHAIN

PROCESSING
Monitor at CRITICAL CONTROL POINTS

RETAIL
Follow the FOOD CODE Guidelines

TABLE
Always Follow the 4 CS OF FOOD SAFETY
Clean
Cook
Combat Cross-Contamination
Chill
FOOD POISONING

❖ An unpleasant illness which usually occurs within 1 to 36 hours.
❖ Symptoms generally lost within 1 – 7 days.
❖ Symptoms of food poisoning.

➢ ABDOMINAL PAIN
➢ DIARRHEA
➢ VOMITING
➢ AUSEA
➢ FEVER
SAFE FOOD HANDLING

❖ Food can provide ideal conditions for bacteria to multiply and to produce toxins.

❖ Disease causing bacteria require these three conditions to thrive
  ❖ Nutrients
  ❖ Moisture
  ❖ Warmth (40oF – 140oF)
BE FOOD SAFER

- **Clean**: Wash hands and surfaces often.
- **Separate**: Don’t cross-contaminate.
- **Cook**: Cook to proper temperatures.
- **Chill**: Refrigerate promptly.
KEEP YOUR HANDS AND SURFACE CLEAN

Wash hands and surfaces often.

Fight BAC!®
WASH YOUR HAND

- Use freshly water
- Wash hand properly at least 15 seconds, not just rinsing them.
- Clean under fingernails
- Wash hand before, after handling raw food
- Hand-washing is the most effective way to prevent spread of food borne illness.
CLEAN DURING FOOD PREPARATION

- Wash
- Cutting boards
- Knives
- Utensils
- Counter tops

Using hot, soapy water after preparing each food and before going on to the next.
KEEP RAW FOOD SEPARATE

Separate

Don’t cross-contaminate.

Fight BAC!®
USE DIFFERENT CUTTING BOARD

- Separate raw, cooked and ready-to-eat foods while shopping, preparing or storing food.

- Use one Cutting Board for raw meat, poultry and seafood.

- Separate another one for fresh produce.
COOK FOOD TO A SAFE TEMPERATURE TO KILL MICROORGANISMS.
SAFE COOKING TIPS

❖ After cooking, food must be held at 140° F or higher.
❖ Use thermometers to test the temperature of cooked food.
❖ Cook thoroughly
❖ Keep Hot food Hot, Cold food Cold
CHILL

Refrigerate Promptly

Fight BAC!®
SAFE CHILLING TIPS

❖ Shop cold food last, keep cold food cold.
❖ Chill (refrigerate) perishable food promptly and defrost properly.
❖ Cooked food must be refrigerated immediately or within 2 hours. 
   (1 hour if room temperature approaches 90oF)
❖ “When in doubt, toss it out.”
RECOMMENDED REFRIGERATOR & FREEZER TEMPERATURES

❖ Set refrigerator at 40°F or below.
❖ Set freezer at 0°F.
FACT OR FICTION

❖ Food is safe once it's cooked, no matter how long you leave it out?

FICTION

❖ Food
❖ raw food and cooked food - may not be safe after sitting out at room temperature for more than two hours. Bacteria grow rapidly in the "danger zone" between 40° F and 140° F.

❖ Advice
❖ Follow the "two hour rule": toss perishable foods left out for more than 2 hours. And if left out in a room or outdoors where the temperature is 90° F or hotter, food should be discarded after just 1 hour.
WHICH FOOD ARE MOST LIKELY TO MAKE PEOPLE SICK?

- Meats and poultry
- Animal Diseases
- Eggs
- Seafood
- Raw Produce
- Honey
- Picnics and Lunch Bags
- Take-out foods and Leftovers
SAFETY TIPS

❖ Read Labels to determine if it is ready-to-eat
❖ Cook to safe temperature.
❖ Consume food by the “used-by” date
❖ Store raw meat, poultry and seafood on the bottom shelf of the refrigerator
❖ Avoid washing raw meat and poultry
  ❖ Increase the danger of cross-contamination, spreading bacteria from raw meat to other foods, cooking surface and utensils.
❖ Remember, when traveling
  ❖ “Boil it, cook it, peel it or forget it.”
PERSONAL HYGIENE
PERSONAL HYGIENE:

❖ Hand washing is the single most important means of avoiding sickness and preventing the spread of disease

❖ Also teach your children how to wash their hands properly
CRITICAL HANDSWASHING STEPS

❖ Wet your hands thoroughly with warm water and add soap
❖ Thoroughly scrub your hands, wrists, fingernails, and in between fingers – for at least:

20 SECONDS
❖ Rinse, then dry hands with a clean cloth towel or use a paper towel
WHEN SHOULD WE WASH OUR HANDS?

❖ Before eating
❖ After coughing or sneezing
WHEN SHOULD WE WASH OUR HANDS???

CONTINUED...

❖ After blowing your nose
❖ After taking out the garbage
❖ After using the bathroom
PET ALERT!!!

❖ Pets, such as dogs, cats, turtles, snakes, birds and lizards

❖ Soil
ANIMALS

- County fairs
- Petting zoos
- Barns
- Home/daycare
CUTS AND ABRASIONS

❖ Clean the wound
❖ Wash your hands
❖ Cover with a clean dry bandage
❖ Use gloves if necessary
COMMON FOODBORNE DISEASES SPREAD BY POOR HYGIENE:

- Hepatitis A
- E. coli O157:H7
- Salmonella typhi
- Shigella
- Staphylococcus aureus
- Norwalk virus
HEPATITIS A (HAV)

❖ What is it?
❖ How is it spread
❖ Prevention
Hepatitis means inflammation of the liver. Hepatitis A is a serious contagious liver disease caused by the hepatitis A virus (HAV). The disease can last anywhere from three weeks to several months. It is transmitted from person-to-person by putting something in the mouth that has been contaminated with the stool of an infected person. The virus is easily spread (transmitted) in places with poor sanitation or where people do not wash their hands. The virus lives in the environment for a long time so it can be transmitted by:
Swallowing contaminated water or ice.
Eating raw or undercooked shellfish harvested from sewage water.
Eating raw fruits, vegetables, or other foods that were contaminated during growing, harvesting, processing or handling or;
By eating cooked foods that were contaminated after cooking.

Prevention:

1. Hepatitis A vaccination is recommended for:
   - All children (check with your doctor concerning the age);
   - Travelers to certain countries and;
   - High risk populations as discussed earlier in the course.”

3. Good personal hygiene as well as proper sanitation practices are necessary to prevent person-to-person spread
ECOLI O157:H7

❖ What is it?
❖ How is it spread?
ECOLI O157:H7 CONTINUED...

- Diagnosis
- Treatment
E. coli, are bacteria that naturally live in the intestines of humans and animals. There are many different strains of E. coli but most of them are harmless. One particularly nasty strain of E. coli, is E. coli O157 H:7. This strain can cause very serious illness in people.

**Symptoms:**
- Bloody diarrhea
- Painful stomach cramps
- Fever

Symptoms can appear from 1 – 10 days after exposure, usually 2-4 days.

E. coli 0157 H:7 can cause hemolytic uremic syndrome, or HUS, which can seriously damage the kidneys, especially in high risk groups.
How it is spread:

- E coli O157 H:7 lives in the intestines of cattle and can spread to humans who eat raw or undercooked meat or other foods that have come in contact with raw beef products or water contaminated by sewage or animal manure.
- Drinking unpasteurized milk
- Contaminated water
- Contact with animals in petting zoos or farms if proper hand washing is not observed.

E coli O157 H:7 can spread easily from one person to another, when a person who has not washed their hands well after a bowel movement contaminates food, water, or surfaces that other people touch.
SALMONELLA

❖ What is it?
❖ How is it spread?
SALMONELLA

❖ Symptoms

❖ Long term consequences
Salmonella.

Symptoms include: fever, diarrhea, abdominal cramps and nausea. The illness can last several days. In high risk populations it can cause life threatening infections.

Some high risk populations can experience long term consequences:

Can take a while for bowel habits to become normal.
Pains in the joints
Irritation of the eyes
Painful urination that can last for months or years and can lead to chronic arthritis that is difficult to treat.
SHIGELLA

❖ What is it?
❖ Symptoms
❖ How is it spread
**Shigella:** Shigella is a disease caused by a family of bacteria called *shigella*.

**Symptoms:**
Diarrhea (often bloody)
Fever
Stomach cramps

The symptoms occur within a day or two of exposure and last for 5 to 7 days. A rare and severe form of shigella can occur including high fever and seizures in children less than 2 years of age. Still, others may have no symptoms at all but can still pass the bacteria to others.
How is it spread:
The shigella bacteria passes from one infected person to another. Most infections occur when the bacteria passes from:

- Stools or soiled fingers of one person to the mouth of another person.
- Poor personal hygiene and hand washing habits.
- Toddlers who are not fully toilet trained.
- Certain types of sexual activity.

Source: www.cdc.gov/nczved/dfbmd/disease_listing/shigellosis_gi.html
What is staphylococcus aureus?
How is it spread?
Staphylococcus aureus.

Staphylococcus aureus is often called “staph”. It is a bacteria commonly found on the skin and in the nose of healthy people. It can be found in the nostrils of at least 30% of the population.

How it is spread-poor personal hygiene

It is usually spread from person-to-person from contact with secretions from infected skin lesions, nasal discharge, or spread by infected hands. Occasionally staph can get into the body and cause infections. The infection can be minor such as boils, pimples and other skin conditions. However, it can produce serious infections such as blood infections or pneumonia.
Foods associated with Staphylococcus aureus:

• Meat and meat products, poultry and egg products. Salads including—egg, chicken, tuna, potato and macaroni.
• Bakery products such as—cream pies, cream filled pastries and chocolate eclairs.
• Sandwich fillings and milk and dairy products
NOROVIRUSES

❖ Or Norwalk like virus
The Norwalk viruses are a group of viruses that cause “gastroenteritis” more commonly referred to as the ”stomach flu.” This “stomach flu is not related to the flu (or influenza). It is an extremely common and contagious virus and spreads easily from one person to the next. Noroviruses are rarely diagnosed due to the often, unavailability of the laboratory test. It got its name from Norwalk, Ohio, where the first outbreak occurred. Noroviruses are found in the vomit or feces of an infected person. In recent years, some ocean liners have been infected with the Norwalk virus and were forced to dock early due to passenger illness.
Symptoms:

- Nausea
- Vomiting
- Diarrhea
- And some stomach cramping.

These symptoms are sometimes accompanied with headache, fever, chills, tiredness and muscle aches. There is no vaccine.
Cause:
food or drink infected with the virus surfaces; utensils and other objects infected with the virus and placed in the mouth; direct contact with another infected person.

Prevention: frequent hand washing; wash fruits and vegetables for at least 30 seconds with potable water, carefully clean and disinfect surfaces, flush, clean and get rid of feces and vomit and clean well around the toilet area. Be careful in child care facilities and nursing homes when caring for infected persons; wash your hands frequently.
Campylobacter
The pathogens of greatest concern today and the most commonly recognized foodborne infections are—campylobacter, salmonella, E-coli O157:H7, and a virus group called calicivirus which is also known as Norwalk and Norwalk like viruses.

What is campylobactor?

Campylobactor is a family of bacteria and are the second most commonly reported cause of foodborne illness in the United States. Campylobactor can be found almost everywhere, such as the gut of some humans, rodents, cats, dogs, poultry, swine and untreated water. Campylobactor bacteria flow through the body and into the environment. If food and water come in contact with the stool of infected animals or humans, it becomes contaminated.
**Cause:** Drinking untreated water, unpasteurized milk, raw or undercooked poultry and meat.

**Symptoms:** Abdominal cramps, fever, often bloody diarrhea. This illness can last about a week. Complications can include urinary tract infections, reactive arthritis (most always rare and short lived) and even more rare Guillain-Barre syndrome an uncommon kind of paralysis.
WHEN SHOULD I CONSULT A DOCTOR?

❖ “High fever (over 101.5 F)
❖ Blood in stools
❖ Prolonged vomiting
❖ Diarrhea lasting more than 3 days
❖ Dehydration
  ❖ Decrease in urination
  ❖ Dry mouth and throat
  ❖ Dizzy upon standing
FOOD HYGIENE
Understanding Food Hygiene

Food hygiene is more than cleanliness ......

1. Protecting food from risk of contamination, including harmful bacteria, poison and other foreign bodies.

2. Preventing any bacteria present multiplying to an extent which would result in the illness of consumers or the early spoilage of the food.

3. Destroying any harmful bacteria in the food by thorough cooking or processing.

4. Discarding unfit or contaminated food.
The cost of poor food hygiene

1. Food poisoning outbreaks and sometimes death
2. Food contamination, customer complaints and brand image
3. Pest infestations
4. Waste food due to spoilage
5. The closure of food premises
6. Fines and costs of legal action taken because of contraventions in hygiene legislation, or because of the sale of unfit or unsatisfactory food.
7. Civil action taken by food poisoning suffers
8. Loss of production and food which has to be destroyed
9. Decontamination cleaning and replacement of damaged equipment.
The benefits of good food hygiene

1. Satisfied customers, a good reputation, increased business and brand protection

2. Compliance with food safety legislation

3. Less food wastage

4. Good working conditions, higher staff morale and lower staff turnover, which promote increased productivity
Bacteria

Bacteria are microscopic organisms, often referred to as germs, which are found everywhere, including on and in man, on food, in water, soil and air.

Most Bacteria are harmless and some essential.
Requirements for bacterial growth

Warmth

37°C - Best temperature for the growth of most poisoning bacteria (body temperature)

20°C - 50°C  - Bacteria growth quit quickly

5°C - 63°C - Danger Zone

1°C - 4°C  - Sleepy

-18°C – No growth

Food and moisture

Time
High risk foods are **ready-to-eat foods**, which support the multiplication of harmful bacteria and are intended for consumption without treatment, such as cooking, which would destroy such organisms. These foods are usually **proteins**. Require **refrigerated storage**.

They must be kept separate from raw foods.

**Example**....

1. Cooked meat and cooked poultry.
2. Cooked meat product including paste, gravy, stews.
3. Milk, cream, artificial cream, custards, and dairy produce.
4. Eggs and products made from raw eggs.
5. Shellfish and other sea foods including oysters, prawns, and crabs.
Ready – to – eat **raw food**

Raw foods such as *lettuce* or *fruit* may be contaminated with low dose pathogens and must always be double washed in running water before eating.
Food Poisoning

Food poisoning is an acute illness, which usually occurs within 1 to 36 hours of eating contaminated or poisonous food.

Symptoms normally last from 1 to 7 days and include one or more of the following:

- Abdominal pain
- Diarrhea
- Vomiting
- Fever
- Collapse
Food poisoning may be caused by:

01. Bacteria or their toxins
02. Moulds (mycotoxins)
03. Chemicals such as insecticides, cleaning agents and weed killers.
04. Metals such as lead, copper and mercury
05. Poisonous plants such as deadly nightshade and toadstools
06. Poisonous fish or shellfish
The Prevention of food poisoning

Food poisoning rarely occurs of a single isolated mistake. Food poisoning results from management failing to identify hazards and/or failing to control these hazards.

The food poisoning chain consists of 3 major hazards.

1. The contamination high-risk food
2. The multiplication of bacteria within the food
3. The survival of bacteria within the food

Controlling these hazards breaks the chain and prevents food poisoning.
How to destroy bacteria within food

01. Through Cooking

02. Heat processing - Pasteurization, Sterilization or Canning
Food spoilage and preservation

Food spoilage

Spoilage commences in food as soon as it is harvested, taken from the sea or slaughtered.

Spoilage results from the action of

- Bacteria
- Moulds
- Yeasts

Poor Hygiene Practices
Poor temperature control
Unsuitable packing
Rough handling
result in damage and accelerates spoilage
Signs of spoilage

1. Off odors
2. Discoloration
3. Slime / Stickiness
4. Mould growth (whiskers)
5. Changes in texture – e.g. dry or spongy
6. Unusual taste
7. The production of gas
8. Blown cans or packs
Preservation is the treatment of food prevent or delay spoilage and destroy or inhibit the growth of pathogenic organism.

Main ways to preserving foods

1. High temperature, pasteurization, ultra-heat treatment, sterilization, cooking, canning and bottling
2. Low temperatures, refrigeration and freezing
3. Dehydration (the removal of moisture) - e.g. Soup, Vegetables and Meet
4. Chemicals – e.g. salt, sugar, and Sulphur dioxide

contd./
5. Vacuum packing - e.g. Fish & Meet

6. Irradiation - e.g. Spices

7. Smoking fish and meet

Packaging is very important to extend the life of preserved foods.

   e.g. – cans, tetra packs, bottles, and pouches
Personal Hygiene

Hands and Skins

(Food handlers must wash their hands especially)

1. After visiting the toilet
2. On entering the food room, after a break and before handling any food.
3. After putting on or changing a dressing
4. After dealing with an ill customer or a baby’s nappy
5. After handling raw food including eggs, and before handling ready-to-eat food.
6. After cleaning up animal faces or handling boxes contaminated by bird dropping.
7. After combing or touching the hair, face, nose, mouth or ears.
8. After handling waste food.
9. After cleaning, or handling dirty cloths, crockery, etc.
10. After handling external packaging, flowers or money.
The nose, mouth and ears

Cuts, boils, whitlows and septic spots.

Jewellery and perfume

The hair

Smoking

Protective clothing

Hygiene training
WHAT ARE SOME EXAMPLES OF POOR HYGIENE?
EXAMPLES OF POOR HYGIENE

• Touching your Face or Hair
• Wearing Soiled Uniforms
• Not Wearing Hair Restraints
• Chewing Gum
• Eating in Food Preparation and Storage Areas – Drinks not Covered or Stored Properly
• Not Bathing
• Smoking
GLOVES

- When you Wear Gloves, Wear Gloves the Right Way!
- Bare Hand Contact is NOT ALLOWED on Ready-to-Eat and Cooked Foods.

1. Wear Food Service Gloves, Utensils or Deli Tissues when Handling Ready-to-Eat Foods.

2. Always Wash your Hands BEFORE putting on Gloves. Your Hands Sweat in the Gloves which can Produce Bacteria.

3. Change your Gloves Anytime you would Need to Wash your Hands.

4. Change your Gloves when they are Torn or Soiled.
Wearing Gloves is NO SUBSTITUTE for Clean Hands. Wash your Hands and Change your Gloves Often.
WHEN WOULD YOU HAVE TO WASH YOUR HANDS?

❖ AFTER

❖ Touching your Body, Face, Sneezing and Clothing
❖ Using the Toilet
❖ Eating, Drinking and Smoking
❖ Handling Dirty Equipment or Utensils
❖ Handling Raw Food
❖ Handling Garbage
❖ Any Other Activity that Contaminates your Gloves
WHERE DO WE WASH OUR HANDS?

❖ Where – ONLY at a Hand sink

❖ Sinks Must be Designated for a Specific Task

❖ A Hand sink is for Hand Washing ONLY and is NOT to be used for Any Other Purpose.
HOW SHOULD YOU WASH YOUR HANDS?

❖ Wet your Hands with Warm Running Water.

❖ Lather with Soap and Scrub between Fingers, on the Backs of your Hands and Under Nails.

❖ Wash for at Least 20 Seconds. Sing “Happy Birthday” to yourself Twice.


❖ Use a Paper Towel when you Turn Off the Tap.
❖ Hand Sanitizers are to be Used ONLY in Conjunction with Hand washing.

❖ They are Not a Substitution for Hand Washing.
If Employee’s are Allowed to Drink in Preparation Areas, the Cup MUST have a Cap and Straw or a Cap with an Opening for Hot Beverages.

The Cup should be Stored in a Manner which does not Contaminate Food, Prep and Equipment.
While Preparing Food, Food Employees May Not Wear Jewelry on their Arms and Hands.

Only a Plain Ring such as a Wedding Band May be Worn.
Food Employees Should Keep their Fingernails Trimmed,Filed and Maintained so the Edges and Surfaces are Cleanable and Not Rough.

Fingernail Polish or Artificial Fingernails May Not be Worn Unless Intact Gloves in Good Repair are Worn.
CLOTHING

❖ All Food Employees Shall Wear Clean Outer Clothing to Prevent Contamination of Food, Equipment, Utensils, Linens and Single Service and Single-Use Articles.

❖ Aprons Should be Removed when Going Outside, Entering the Bathroom and when Contaminated.
Employees Shall ONLY Eat in Designated Areas where the Contamination of Exposed Food, Clean Equipment, Utensils, Linens and Unwrapped Single-Service and Single-Use Articles Can Not Result.
Employees with Long Hair should have a Hair Restraint.
DON’T FORGET TO WASH HANDS AND CHANGE GLOVES OFTEN.
HACCP
HACCP - WHAT IS IT?

- HACCP -(HAS-SIP)
- Hazard
- Analysis and
- Critical
- Control
- Points

- HACCP often misused term.
- A systematic method of documenting that food safety hazards have been addressed.
HACCP - What is it?

- HACCP involves only food safety issues.
- Out of control = unsafe food produced.
- Plans unique for each unit and product.
<table>
<thead>
<tr>
<th>Step</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Hazard Analysis</td>
<td>What are the controllable food safety hazards?</td>
</tr>
<tr>
<td>2. Establish Critical Control Points</td>
<td>Where do things go wrong and how can we reliably control it?</td>
</tr>
<tr>
<td>3. Establish Critical Limits</td>
<td>What value indicates the process is in control?</td>
</tr>
<tr>
<td>4. Establish Monitoring Procedures</td>
<td>Who, what, when, where and how will CCP’s be monitored?</td>
</tr>
<tr>
<td>5. Establish Corrective Actions</td>
<td>What happens if we exceed a Critical limit?</td>
</tr>
<tr>
<td>6. Establish a Record Keeping System</td>
<td>If you don’t write it down it doesn’t exit.</td>
</tr>
<tr>
<td>7. Establish Verification Procedures</td>
<td>How do you know the system works?</td>
</tr>
</tbody>
</table>
HOW DOES HACCP WORK?

❖ Processors must take the following steps:

❖ assemble a HACCP team to design their plan

❖ describe the product and its method of production, distribution and intended consumer.

❖ Develop and verify process flow diagrams
How does HACCP Work?

❖ Identify at each step of the production flow chart any hazard to food safety as to:
  ❖ Chemical
  ❖ Physical
  ❖ Bacterial

❖ Support the hazard with a decision making document and scientific data
How does HACCP Work?

❖ If a CCP deviation is found the following must take place:
  ❖ Identify the cause of deviation
  ❖ Describe how the critical limit was restored
  ❖ Describe how the deviation can be prevented from happening again
  ❖ Describe how the adulterated product was reconditioned or what happened to the product
HACCP

❖ HACCP is designed to prevent food safety problems rather than catch them after they occur
❖ It includes seven principles
❖ It was adopted by the FDA in the 1990's
HACCP’S SEVEN PRINCIPLES FOR FOOD SAFETY

1. Analyze Hazards
2. Identify Critical Control Points
3. Establish Critical Limits for each Critical Control Point
4. Establish Monitoring Procedures
5. Establish Corrective Actions
6. Establish Verification Activities
7. Establish Records and Documentation
WASH for INDIA

SOCIAL INNOVATORS FOR WATER, SANITATION, & HYGIENE IN INDIA

INNOVATION CONSULTING
WASH For India (WFI) is a unique social innovation catalyst that seeks to greatly accelerate the pace of WASH innovation in India.
**Research**

Primary & Secondary research as independent deliverables or as Inputs to Strategy creation.

Can include User Research through ethnographic methods.

**Strategy**

Developing Program Strategy, Innovation Strategy, or Investment Strategy as per assignment.

**Design**

Designing different aspects of the Program or Intervention.


**Management**

Assembling teams & implementing program management structures to manage complex WASH programs & projects.

We can also help you set up new entities: for-profit / nonprofit in India.
INDIA’S SANITATION CRISIS

FOUR PILLARS OF SANITATION

GOOD HYGIENE IS DEFINED AS PEOPLE HAVING ACCESS TO AND USING FOUR ESSENTIAL SERVICES.

- **CLEAN WATER**
  - Having access to clean, pathogen & chemical free water for drinking & cooking.
  - Centralized, community level, or household water treatment solutions.

- **TOILETS**
  - Having access to & consistently using toilets that are well designed, clean, & disabled friendly.
  - Sewage management systems that ensure safe disposal of waste generated.

- **HANDWASHING WITH SOAP**
  - Being aware of the need of and consistently washing hands with soap at critical times - before eating, after defecation, & after handling child feces - to avoid ingesting pathogens.

- **MENSTRUAL HYGIENE**
  - Being aware of the need for and consistently using safe menstrual hygiene practices including appropriate products (low cost pads, cloth, cups) and other local solutions.
DISEASE PATHWAYS

In the absence of adequately functioning toilets, clean water systems, handwashing practices, & menstrual hygiene management practices, pathogens affect humans with severe consequences, often including death.
THE CLEAN WATER CRISIS

Vast sections of the Indian population don’t have access to clean water for drinking and cooking. Water contamination in urban municipal water supply systems is very common especially during monsoons. People in rural areas collect their water from ponds, or borewells that are contaminated by agricultural residue. A shockingly low percentage of the population has adopted water treatment technology.

800 MILLION
INDIANS DON’T TREAT THEIR WATER IN SPITE OF CONTAMINATION

770 MILLION
INDIANS DON’T HAVE ACCESS TO DRINKING WATER NEAR THEIR HOUSES.

73 MILLION
WORKING DAYS LOST ANNUALLY DUE TO WATERBORNE DISEASE.

21%
COMMUNICABLE DISEASES ARE CAUSED BY WATER
## Population of India (2017 and historical)

<table>
<thead>
<tr>
<th>Year</th>
<th>Population</th>
<th>Yearly % Change</th>
<th>Yearly Change</th>
<th>Migrants (net)</th>
<th>Median Age</th>
<th>Fertility Rate</th>
<th>Density (P/Km²)</th>
<th>Urban Pop %</th>
<th>Urban Population</th>
<th>Country’s Share of World Pop</th>
<th>World Population</th>
<th>India Global Rank</th>
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</thead>
<tbody>
<tr>
<td>2017</td>
<td>1,342,512,706</td>
<td>1.18 %</td>
<td>15,711,130</td>
<td>-377,200</td>
<td>26.9</td>
<td>2.45</td>
<td>452</td>
<td>32.8 %</td>
<td>439,801,466</td>
<td>17.86 %</td>
<td>7,515,284,153</td>
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<tr>
<td>2016</td>
<td>1,326,801,576</td>
<td>1.2 %</td>
<td>15,751,049</td>
<td>-377,200</td>
<td>26.9</td>
<td>2.45</td>
<td>446</td>
<td>32.4 %</td>
<td>429,802,441</td>
<td>17.85 %</td>
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<tr>
<td>2015</td>
<td>1,311,050,527</td>
<td>1.27 %</td>
<td>16,013,205</td>
<td>-519,600</td>
<td>27</td>
<td>2.48</td>
<td>441</td>
<td>32 %</td>
<td>419,938,867</td>
<td>17.84 %</td>
<td>7,349,472,099</td>
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<td>2010</td>
<td>1,230,984,504</td>
<td>1.47 %</td>
<td>17,331,642</td>
<td>-565,900</td>
<td>25</td>
<td>2.8</td>
<td>414</td>
<td>30.3 %</td>
<td>372,901,884</td>
<td>17.76 %</td>
<td>6,929,725,043</td>
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<td>2005</td>
<td>1,144,326,293</td>
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<td>18,169,044</td>
<td>-441,300</td>
<td>24</td>
<td>3.14</td>
<td>385</td>
<td>28.8 %</td>
<td>329,516,783</td>
<td>17.55 %</td>
<td>6,519,635,850</td>
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<tr>
<td>2000</td>
<td>1,053,481,072</td>
<td>1.86 %</td>
<td>18,521,218</td>
<td>-143,400</td>
<td>23</td>
<td>3.48</td>
<td>354</td>
<td>27.4 %</td>
<td>288,365,219</td>
<td>17.2 %</td>
<td>6,126,622,121</td>
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<tr>
<td>1995</td>
<td>960,874,982</td>
<td>1.99 %</td>
<td>18,054,641</td>
<td>-135,600</td>
<td>22</td>
<td>3.83</td>
<td>323</td>
<td>26.5 %</td>
<td>254,314,016</td>
<td>16.75 %</td>
<td>5,735,123,084</td>
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<td>1990</td>
<td>870,601,776</td>
<td>2.17 %</td>
<td>17,703,330</td>
<td>9,000</td>
<td>21</td>
<td>4.27</td>
<td>293</td>
<td>25.5 %</td>
<td>221,979,229</td>
<td>16.4 %</td>
<td>5,309,667,699</td>
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<tr>
<td>1985</td>
<td>782,085,127</td>
<td>2.32 %</td>
<td>16,971,076</td>
<td>96,600</td>
<td>21</td>
<td>4.68</td>
<td>263</td>
<td>24.3 %</td>
<td>190,338,784</td>
<td>16.12 %</td>
<td>4,852,540,569</td>
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<tr>
<td>1980</td>
<td>697,229,745</td>
<td>2.32 %</td>
<td>15,105,221</td>
<td>226,400</td>
<td>20</td>
<td>4.97</td>
<td>235</td>
<td>23.2 %</td>
<td>161,445,950</td>
<td>15.7 %</td>
<td>4,439,632,465</td>
<td>2</td>
</tr>
<tr>
<td>1975</td>
<td>621,703,641</td>
<td>2.33 %</td>
<td>13,552,083</td>
<td>423,700</td>
<td>20</td>
<td>5.41</td>
<td>209</td>
<td>21.3 %</td>
<td>132,732,329</td>
<td>15.31 %</td>
<td>4,061,399,228</td>
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<tr>
<td>1970</td>
<td>553,943,226</td>
<td>2.16 %</td>
<td>11,204,591</td>
<td>-49,000</td>
<td>19</td>
<td>5.72</td>
<td>186</td>
<td>19.8 %</td>
<td>109,709,315</td>
<td>15.04 %</td>
<td>3,682,487,691</td>
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<tr>
<td>1965</td>
<td>497,920,270</td>
<td>2.06 %</td>
<td>9,651,679</td>
<td>-21,100</td>
<td>21</td>
<td>5.9</td>
<td>138</td>
<td>18.8 %</td>
<td>93,540,800</td>
<td>14.99 %</td>
<td>3,322,495,121</td>
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</tr>
<tr>
<td>1960</td>
<td>449,661,874</td>
<td>1.9 %</td>
<td>8,076,336</td>
<td>-800</td>
<td>20</td>
<td>5.9</td>
<td>151</td>
<td>17.9 %</td>
<td>80,586,315</td>
<td>14.9 %</td>
<td>3,018,343,828</td>
<td>2</td>
</tr>
<tr>
<td>1955</td>
<td>409,280,196</td>
<td>1.69 %</td>
<td>6,590,998</td>
<td>-21,100</td>
<td>21</td>
<td>5.9</td>
<td>138</td>
<td>17.6 %</td>
<td>71,906,548</td>
<td>14.84 %</td>
<td>2,758,314,525</td>
<td>2</td>
</tr>
</tbody>
</table>
THE TOILET CRISIS

India faces a toilet crisis of epic proportions. 60% of the Indian population doesn’t have access to a toilet and goes outside to defecate. Billions of dollars have been spent in constructing toilets but India continues to be last in the World Diarrhea Rankings. India will not be reaching the United Nations Millennium Development Goal of Sanitation For All.

626 MILLION INDIANS DON’T HAVE ACCESS TO A TOILET AND DEFECATE IN THE OPEN

54% OF THE VARIATION IN INTERNATIONAL CHILD HEIGHT DUE TO OPEN DEFCATION.

30% WOMEN EXPERIENCE VIOLENT SEXUAL ASSAULT DUE TO LACK OF SANITATION FACILITIES.

44% MOTHERS DISPOSE CHILD FECES IN THE OPEN.

800,000 PEOPLE REMOVE HUMAN FECES MANUALLY FROM LATRINES.

100 MILLION SCHOOL DAYS LOST DUE TO LACK OF A TOILET.
THE HANDWASHING CRISIS

Handwashing with soap is one of the easiest ways to reduce disease and death caused by pathogens. Yet, 70% of Indians don’t use soap to wash their hands at three critical times: before eating food, after defecating, & after handling infant feces.

564 MILLION INDIANS DON’T WASH THEIR HANDS WITH SOAP AFTER DEFECACTION

- 40% REDUCTION IN DIARRHEAL DISEASE DUE TO HANDWASHING.
- 19% REDUCTION IN INFANT MORTALITY DUE TO HANDWASHING BY BIRTH ATTENDANTS.

744 MILLION INDIANS DON’T WASH HANDS WITH SOAP BEFORE EATING.

#1 PROMOTING HYGIENE IS OFTEN THE SINGLE MOST IMPORTANT PUBLIC HEALTH INTERVENTION.
Menstruation and menstrual hygiene are “taboo” topics in India. In the absence of education about this issue, many girls, during their first period, feel they’ve been afflicted by a terrible disease and will die soon. 70% of Indian women don’t have access to appropriate menstrual hygiene products - using sand, ash, rags. This leads to severe health complications.

300 million Indian women & girls don’t have access to menstrual hygiene products.

- 23% girls drop out of school when they start menstruating.
- 60% women change their menstrual cloth only once a day.
- 10% girls think menstruation is a serious illness.
- 20% women don’t use latrines during menstruation due to cultural taboos.

Old rags, husk, dry leaves, ash, sand, newspapers are materials Indian women who lack sanitary products are forced to use during their periods.
CONSEQUENCES

The Toilet, Clean Water, Handwashing, & Menstrual Hygiene Crises, together, form India’s WASH crisis. This is perhaps the largest public health problem in the world.

HEALTH CONSEQUENCES
- 1000 children die every day due to diarrhea caused by the WASH crisis. This is more than HIV, malaria, & TB combined.
- Indian children and adults remain stunted losing up to 3-4 inches in height due to open defecation.
- Women develop severe health complications through using unsafe menstrual hygiene products and through having to “hold it in” till the cover of dark.

HUMAN RIGHTS CONSEQUENCES
- 25% women have reported violent sexual assault when they go to secluded places to relieve themselves.
- 50% report being catcalled or verbally abused.
- The loss of human dignity is immeasurable when people have to defecate publicly exposing themselves to the eyes of others.

EDUCATION CONSEQUENCES
- 25% girls drop out of school when they start menstruating.
- 50 schools days missed by girls every year due to menstruation.
- 100 Million school days missed due to lack of toilets.

ECONOMIC CONSEQUENCES
- USD 53.4 billion is lost by India due to reduced productivity, reduced tourism, & medical costs.
## The Need for Innovation

Activities to improve India’s WASH crisis can be classified into three distinct buckets.

<table>
<thead>
<tr>
<th>What</th>
<th>Advocacy</th>
<th>Infrastructure &amp; Service Delivery</th>
<th>Awareness, Education, &amp; Behavior Change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Specific Goals</strong></td>
<td>Influencing government, media, corporates, &amp; civil society.</td>
<td>Improving access to sanitation (toilet infrastructure + waste management), clean water supply, menstrual hygiene products, &amp; personal hygiene products in urban low income areas &amp; rural India.</td>
<td>Promoting awareness, demand, &amp; adoption of various WASH products, services, &amp; habits.</td>
</tr>
<tr>
<td><strong>Government:</strong> Improved policy, improved budgets, better policy implementation &amp; budget utilization.</td>
<td><strong>Toilets:</strong> An adequate number of household level or community shared toilets run under appropriate business models along with centralized / de-centralized waste capture and treatment processes</td>
<td><strong>Awareness:</strong> Ensuring millions of people are reached and are aware of the need and mechanisms for adopting improved hygiene</td>
<td></td>
</tr>
<tr>
<td><strong>Media:</strong> Enhanced coverage of the WASH crisis in media</td>
<td><strong>Clean Drinking Water:</strong> An adequate supply of easily accessible and affordable clean drinking water to urban slums and rural villages</td>
<td><strong>Education:</strong> Ensuring millions of people are trained in-depth around sanitation and hygiene habits</td>
<td></td>
</tr>
<tr>
<td><strong>Corporates:</strong> Enhanced participation of corporates in the WASH crisis through CSR + business programs</td>
<td><strong>Menstrual Hygiene Management:</strong> Easily accessible supply of affordable menstrual hygiene management products such as sanitary napkins</td>
<td><strong>Behavior Change:</strong> Ensuring adoption of the four key health behaviors - adoption of toilets, handwashing with soap, consuming clean water, &amp; appropriate menstrual hygiene - through a seamless transition from awareness to behavior.</td>
<td></td>
</tr>
<tr>
<td><strong>Civil Society:</strong> Getting large sections of society involved in addressing the WASH crisis.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Thank you