

Directorate of Public Health and Preventive Medicine

Health Advisory during Flood and Post Flood Period

1. Medical Care

- 1.1. People can seek health advice in the health facilities / medical camps / mobile medical and public health units visiting the areas.
- 1.2. For injured persons, Tetanus Toxoid Injection is administered in all the health facilities including camps.
- 1.3. In addition to the medical care, bleaching powder for decontamination of the sumps / overhead tanks are also given in the medical camps / mobile medical and public health units.
- 1.4. Further, all Government Health facilities are functioning with necessary facilities and drugs. These facilities may be availed by the public.

2. Infectious Diseases Prevention and Control

- 2.1. Government is taking all efforts to prevent the occurrence of water borne and vector borne communicable diseases like diarrhoea and fever.
- 2.2. The public are advised to follow the following precautions:
 - a. Only safe drinking water to be used.
 - b. Boiled water is preferable.
 - c. Frequent hand washing with soap and water is a must to prevent infections.
 - d. Food materials soaked in flood water should not be used.
- 2.3. If anyone develops fever or diarrhoea, they should immediately seek health care in Government health facilities including medical camps.
- 2.4. If any clustering of cases noticed (i.e. more than 3 cases in the same street), they should inform the nearby health facility / mobile team and public health control room.

- 2.5. People are requested to ignore rumours. People may take notice of the fact that there is not even a single outbreak of infectious diseases during this flood.
- 2.6. If people notice any private tanker lorry collecting water in open pools / open wells, it should be immediately informed to the public health control room since flood contaminated water is not safe.

3. Protected and Safe Drinking Water

- 3.1. Water with proper level of chlorine should be used for drinking.
- 3.2. The chlorine level should be 2 PPM in overhead tanks (OHT) and 0.5 PPM in the street tap / household tap.
- 3.3. Follow the following steps for chlorination of water in the water tank / sump in the household:
 - a. For every thousand litres of water to be chlorinated 4gms of 33% bleaching powder should be taken in a bucket and made as a paste.
 - b. Add water up to 3/4th of the bucket slowly and mix thoroughly.
 - c. Wait for 10 to 15 minutes for the lime and other sediments to settle down.
 - d. Transfer the supernatant chlorine water to another bucket and mix the chlorine water in the overhead tank / sump.
 - e. One hour after the above process of Chlorination the water may be used.
- 3.4. Broken pipe lines should be repaired and checked for any leakages.

4. Procedure for Cleaning of Sumps / Overhead Tanks after Flood

- 4.1. Submerged bore-wells, sumps, open wells should be used for collecting drinking water only after thorough cleaning. The step by step procedure is given below:
 - a. The water logged in the sumps / overhead tanks should be drained out completely.

- b. Scrub and wash the sump / overhead tank with bleaching powder.
 - c. After thorough scrubbing, the sump / overhead tank can be filled with water.
 - d. The water should be chlorinated as described above.
 - e. Allow the water to flow for at least five minutes in all taps to flush out the impurities.
- 4.2. Similarly, wells and bore-wells also should be chlorinated.

5. Hygiene Measures in Temporary Shelters

- 5.1. People staying in temporary shelter should drink only the water provided in the camp.
- 5.2. People should use toilet facilities. If not available for any reason, they may request the camp in-charge to provide the temporary toilet facilities.
- 5.3. Disinfection of temporary shelter areas with bleaching powder and lime (Ratio of 1:4) frequently.

6. Fly Control Activities

- 6.1. Flies multiply in garbage and decaying materials. So, the garbage and decaying materials should be removed at the earliest through the Local Bodies.
- 6.2. These areas should be disinfected with bleaching powder and lime

7. Mosquito Control

- 7.1. Tyres, broken earthen pots, coconut shells, waste plastic containers and Water stagnation in construction site etc. are the potential breeding sources for mosquitoes
- 7.2. So unused containers should be removed frequently and continuously

8. Safe Disposal of Dead Animals or Birds

- 8.1. Dead animals or birds if noticed should be brought to the notice of the Municipalities and Local Bodies and removed by deep burial and spraying of the bleaching power.

9. For further information and help on health issues, people are advised to contact the 24 hours health helpline number – '104'.



Water Chlorination of Over Head Tanks/ Ground Level Reservoirs (Sump)/Wells



1. Find out the volume of the water in a circular well or tank

- a. Measure the depth of the water column (h) in metre
- b. Measure the diameter (d) in metre
- c. Calculate the volume (in litres) =
$$\frac{3.14 \times d^2 \times h \times 1000}{4}$$

Note:

1. In case of square/rectangular shaped well or tanks, use the formula given below;
Volume (in litres) = Length × Breadth × Depth (height of water column) × 1000
2. One cubic meter = 1000 litres of water

2. Amount of bleaching powder required for disinfection

33% Bleaching powder	4 gms	1000 litres
5-6% Sodium Hypochlorite Solution (Liquid Chlorine)	20 ml	1000 litres
5-6% Chlorine tablet	0.5 gm	20 litres

3. Method of chlorination

- Bleaching powder @ 5 grams per 1000 litres of water should be taken in a bucket and made into a paste
- Add water up to 3/4th of the bucket slowly and mix thoroughly.
- Wait for 10 to 15 minutes for the lime and other sediments to settle down.
- Transfer the supernatant chlorine water to another bucket and mix the chlorine water in the Overhead tank / sump
- One hour after the above process of chlorination the water may be used.

Note:

1. **Liquid chlorine 5-6%:** Add directly @ 20ml/1000litres of drinking water and mix well. After 1 hour water can be used for drinking.
2. **Chlorine tablet (0.5 mg):** Crush the tablet and apply to 20 litres pot and wait for one hour before use

4. Method of Chlorine testing

- Take the sample water to 3/4th level in a clean test tube
- Add 2-3 drops of Orthotolidine solution
- Close the mouth of the test tube with thumb and tilt upside down twice
- Observe the colour change in the test tube by comparing with the 'Residual Chlorine Measurement Chart' and infer the Chlorine level in PPM.

5. Recommended Chlorine levels in drinking water

Head works	2 ppm
In Over Head Tanks/Ground Level Reservoirs (sumps)	2 ppm
In Tanker lorries	2 ppm
In street fountains	0.2 to 0.5 ppm

During Floods/Disasters

Head works	3-4 ppm
In Over Head Tanks/Ground Level Reservoirs (sumps)	2 ppm
In Tanker lorries	2 ppm
In street fountains	0.5 to 1 ppm

Directorate of Public & Health and Preventive Medicine

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Kerala Floods

Health Advisory for Care of Health Care Professionals and Relief Workers

Introduction

Disasters like flood, cyclone, earthquake and tsunami in states like Tamil Nadu, Kerala, AP, Maharashtra, Gujarat and super cyclone in Odisha had not shown any risk to health care staff and people involved in relief activities including workers. However, some precautions may be taken.

Health Care Staff

1. As usual in normal settings, Universal Precautions should be followed.
2. In between change of duty at least once in every 12 hours may be ensured.
3. Camp Settings:
 - If Chicken pox cases occur, staff who had chicken pox earlier can be deployed, since they will not develop chicken pox when exposed.
4. Pregnant and feeding mothers should not be sent to field work and duty in infection prone areas. They may be engaged in hospital settings.

Relief Workers

- Inj.TT One dose
- Cap. Doxycycline 100mg BD for one week for those working in stagnant water
- Heavy duty gloves, gum boots, masks, Whitfield ointment, povidone iodine ointments should be given.
- Tools appropriate to the work to be arranged.

General

1. In addition to the women, children and aged, all relief workers should be given due care for essential needs like water, food and other basic minimum daily living needs wherever possible, so that they can function enthusiastically.

2. Relief workers from outside Kerala from plains are not adapted to the terrain. Only young and fit staff to be deployed in works involving uphill tasks.
3. All should be careful about snakes- they often rest on places where water and land meets. They may also be resting on cub-boards, lofts etc.
4. While climbing on water tanks, care should be taken for the presence of wasps, honey bees etc underneath the tank.
5. Hungry and angry dogs may bite the relief workers and children. Care must be taken to move around with local volunteers. Dogs may also be given the balance food items to make them calm.
6. Care should be taken about loose wires.
7. Truck and vehicle drivers from plain areas should be careful while driving and parking.

Note:

- Please remember everyone is working in an area where there is no risk of any infectious diseases. But for the disruption due to flood, from public health point of view everyone is operating in the same environment.
- Except doctors and nurses and workers engaged in disinfection with chemicals like bleaching powder, others need not wear masks. It will send a wrong message that there is threat of infectious diseases.

Public Health Guidelines for reopening of Schools / Colleges after floods.**1. Water Supply**

- Cleaning of sumps/OHT / Wells/ Bore wells etc.. with Bleaching Powder.
- Water with minimum 0.5 PPM residual chlorine only to be given for drinking.

2. Garbage Removal

- School or College should be cleared of garbage and all the unwanted waste materials are to be removed.
- This is done for prevention of fly breeding and Mosquito breeding.

3. Disinfection

- School or College Campus should be thoroughly disinfected with bleaching powder and Lime (1:4 Ratio)
- Classrooms should be disinfected with Phenyle.

4. Safety

- 4.1** Power Supply System should be checked for safety
- 4.2** Water logging if any in nearby areas / within school premises
 - To be Barricaded
 - Children should not be allowed to go nearby
- 4.3** If any classroom is damaged and is in doubt for stability such Class rooms should not be used.
- 4.4** During floods Centipedes, Insects, Reptiles etc may be hiding in classrooms. Each classroom has to be checked.

Only after HM / Principal and class teachers are satisfied, the students should be permitted to enter into the classrooms.

Post Flood Measles Vaccination Special Campaign Guidelines for Outreach Sessions

- Worldwide experience shows that in post disaster situations measles outbreak is common. Therefore it is important to immunize vulnerable children.

- **Target beneficiaries**

All children in the age group of 9 months to 15 yrs residing in flood affected areas irrespective of previous immunization status

- **Camps site selection & location**

- Each team consists of 2 VHN / UHN and 2 social mobilizers
- Social mobilisers should be from ICDS /Self help group/Health worker /Volunteer
- Camp site should be located at ICDS Centre /School / Urban Health Centre / Others
- Accessible & acceptable to the local community with adequate space
- Sites should have tables, chairs, proper ventilation & lighting
- Timing – 9 am to 4 pm

- **Logistics requirement**

- Two vaccine carriers with conditioned ice packs
- Adequate stock of vaccines (200 doses per session per day)
- Each team to vaccinate 100 children per day
- Sufficient stock of 0.5 ml AD syringes, 5 ml of reconstitution syringes
- Availability of hub cutter, red & black bags for waste disposal
- Other logistics like paracetamol syrup / tablet, antibiotics, ORS, zinc tablets, Vit-A solution, etc.,
- Forms: Tally sheet

- **Conducting sessions**

- One vial to be reconstituted at a time
- Vaccine & diluents should be from the same manufacturer as supplied
- Date & Time should be written on each vial
- Check VVM status & expiry date of all vials before reconstitution
- Separate 5ml syringe should be used for reconstituting each vial
- Reconstituted vaccine to be used within four hours
- Vaccine should not be exposed to the sunlight
- Dose - 0.5ml
- Route of administration – subcutaneous (s.c.)
- Site of injection - Right upper arm
- Vaccination should not be given to sick children.
- All vaccinated children should be observed for at least 30 minutes for any serious AEFI occurrence
- Inform MO / BMO immediately for any serious AEFI occurrence
- Block AEFI team will immediately respond and manage reported serious AEFI cases
- Prominent display of flood camp banners at vaccination sites
- The team should not carry reconstituted measles vaccine from one site to another site
- Parents should accompany all school children for vaccination

- **Key Messages**

1. It prevents measles
2. This is an additional dose irrespective of previous measles vaccination status or measles like illness
3. Inform about common adverse events
4. Routine immunization schedule to be followed subsequently

All children (9 months to 15 yrs) should receive measles vaccination campaign dose irrespective of previous immunization status

Steps for disposal of spoiled drugs, biologicals, vaccines and other medical and surgical items

Step 1: Identification of spoiled items due to flood and consequent impacts like power failure or any other reason related to the disaster.

Step 2: Immediately store the items in a separate secure room so that access to the items for use is prevented.

Step 3: A committee comprising of a Doctor, Nurse and Pharmacist should certify each item and quantify to this effect.

Step 4 (Disposal):

1. If recall option is available for the item it may be returned to the manufacturer. Often this is impracticable (Para 27 of Part I of *Schedule M of drugs and cosmetic rules 1945*).
2. Otherwise it should be treated as waste and it should be disposed as follows. (Para 1.4 of Part I of *Schedule M Section of Drug and Cosmetic Rules 1945*)
 - a. The disposal of sewage and effluents (Solid, Liquid and Gas) from the manufactory shall be in conformity with the requirements of Environment Pollution Control Board.
 - b. All bio – medical waste shall be destroyed as per the provisions of the Bio-Medical Waste (Management and Handling) Rules, 1996.
 - c. Additional precautions shall be taken for the storage and disposal of rejected drugs. Records shall be maintained for all disposal of waste.
 - d. Provisions shall be made for the proper and safe storage of waste materials awaiting disposal. Hazardous, toxic substances and flammable materials shall be stored in a suitably designed and segregated, enclosed areas in conformity with Central and State Legislations.

Note:

- Step 1 and 2 are to be done immediately in the interest of patient safety.
- Step 3 and 4 can be done after the acute phase of disaster is over.

Audio jingle content**Important Health advice to public during flood period for preventing communicable diseases**

1. Use water treated with chlorine for drinking
2. Use boiled water for drinking after cooled down
3. Wash hands frequently with soap to prevent diarrhoea.
4. Don't consume food items soaked with flood water.
5. Household general waste should be disposed in dustbins.
6. Small water loggings containers like broken coconut shell, Tyres, Broken Vessels, leaves etc must be discarded properly to prevent breeding of Aedes Mosquitoes to prevent Dengue.
7. Overhead tanks filled with rain water should be emptied and washed with Bleaching Powder before filling with fresh water.
8. In order to disinfect overhead and well water, add 1 gm bleaching powder per 1000 Litres and use after 30 minutes
9. In case of fever, Diarrhoea or any other symptoms people should seek medical attention
10. In case of any queries related to health people can use Toll Free Number '104'.
11. In case of 3 or more cases of fever or diarrhoea from same street, people must inform local Health department

Leptospirosis

- After massive floods there is no immediate threat of leptospirosis
- It will take at least another two weeks for the rats and bandicoots to regroup and infect water and food. Other domestic animals also do not pose any threat
- There is no need for mass chemoprophylaxis with doxycycline.

However the following precautions should be taken.

1. No need for any special protection in running water or large water body or other words rain water. We can handle normally including walking or swimming
2. Those who work in stagnant water may wear gum boots if available or take Cap. Doxycycline one in the morning and one in the evening for one week.
3. Areas with poor sanitation should be disinfected with lime and bleaching powder as given in the health advisory.

This is our experience in Orissa super cyclone, TN floods 2015, Vardah cyclone, Ockhi cyclone and Nagapattinam floods. Anyhow as a matter of caution Doctors should keep a watch over all kinds of fevers. Leptospirosis can be easily treated with Doxycycline or Erythromycin.

Strategies for controlling leptospirosis in flood affected areas:

A. Hospital level (including major private hospitals)

1. Doctors to be oriented to assume all high grade fever cases as leptospirosis and initiate immediate antibiotic therapy with doxy for adults and erythromycin for children and pregnant.
2. Take blood samples before starting antibiotics for malaria, typhoid, leptospirosis, scrub typhus and dengue. If testing facilities not available samples may be sent to places where facilities available.

Testing at least few samples from each locality from where cases are reported.

3. A dedicated team in each major hospital should keep calling the area PHC and local bodies to respond.

B.PHC Medical and Public Health Team

1. Medical camp and rapid house to house visit to identify more cases
2. Prophylaxis for contacts
3. Further lab samples for confirmation of the cause of fever
4. Improving environmental hygiene with the active role of local bodies and public

C. Environmental measures

1. Disinfection of the area with bleaching powder and lime in 1:4 ratio.
2. Water chlorination
3. Drinking water well chlorination
4. Food hygiene-only boiled, steamed and fried food items to be used.
Food storage places to be examined for rat infestation, rat urine/excreta.
5. Hand washing
6. Draining the stagnant water
7. House to house distribution of two half kg bleaching powder in ziplog bags.

D. Animal Husbandry

In areas where repeated cases or large number noticed veterinarians are to be involved. Cattle also need to be attended to control source.

Weakness of enemy Leptospirosis

1. It is a fragile organism.
2. It can be easily destroyed in the environment by drying, boiling and disinfection with bleaching powder and or lime.
3. Rapidly destroyed in human body by antibiotics

4. Alert doctor can easily pickup a case of leptospirosis clinically by transient redness of eyes, high grade fever and myalgia.

Strength of enemy leptospirosis

1. If untreated it may cause jaundice or kidney failure.
2. If environmental hygiene is poor it can rapidly spread.

Garbage Removal

- Garbage will keep coming in batches at least for two weeks depending on the pace with which people return to normalcy
- Garbage lying on visibly on main roads or visible place is often given priority. Of course, it will build public confidence
- Garbage lying more than 5 days is public health priority in order to prevent fly breeding
- At garbage disposal point or temporary storing point Dichlorovas can be sprayed
- Entomologist and health officers are well versed with it.

Care of Drugs

1. Expiry
Since drugs are sent from so many places expiry to be monitored.
2. Composition and strength to be monitored.
3. Damage
Colour change, labels missing, leaking items: anything of these kind noticed it should be discarded.

Surgicals and syringes

Same procedures to be followed.

Storing of bleaching powder, lime powder, liquid, chlorine tablets

- These items should not be stored along with drugs, surgical and syringes. Chlorine emanating from the above will damage these items.
- Storing of insecticides like technical Malathion, Pyrethrum, and Dichlorovas etc should be stored separately.
- Not only storing but also transporting should be done separately and safely.

Diesel/ Petrol Availability

- Diesel supply to generators and relief vehicles may be an issue.
- Oil corporations may be requested to nominate modal officers to monitor petrol, diesel and cooking gas supply.

Diesel/ Petrol Availability

- Relief vehicles and other vehicles coming to Kerala from Tamil Nadu and other states may be informed to fill their vehicles in Petrol bunks before entering into Kerala.
- Adjoining district administrations can put up boards on approach roads. Check posts and toll plazas may inform the drivers on this.

Emergencies**1. Water**

- Water in most parts of Kerala is chemically and physically fit for drinking. What we need to ensure is only biological quality.
- Simple water chlorination or roll boiling is adequate. Most people particularly in camp setting may be given either of this.

2. Cooking gas

- Next issue we may encounter is shortage of cooking gas since the existing balance in home settings will be over in another 10 days time. Uninterrupted supply to be planned from now onwards.

3. Medical gases

- In addition to oxygen cylinders, we have to look into nitrous oxide position also.

Felt Need and Public health need

Felt needs of people

- Health camp, day today living needs and restoration to normalcy.

Public Health Needs which is not felt by people

1. Water Hygiene
2. Personal hygiene
3. Fly control
4. Aedes mosquito control

Hand Hygiene

- People who are returning homes will be engaged in cleaning mud, dirt, contaminated surfaces, washing retrievable items particularly valuables, kitchen vessels, plastic unbroken items.
- In the process hands and fingers may get contaminated.
- Hand wash messages are critical to prevent the sporadic cases of dysentery, typhoid etc.

Handling Psychological Issues

Root cause to be addressed.

1. Reassurance to children and students
Certificates and books will be given. Studies in no way will be affected.
2. Documents
All documents like family card, insurance, driving licenses, land documents will be reissued.
3. No epidemics
4. Safety and security ensured.
5. Motivating news, and speeches in media and encouraging press releases.
6. Channelling youth energy and people's energy in reconstruction of own and public infrastructure.

India Mark 2 OR Mark 3 Hand Pumps

- Usually, properly erected handpumps are not affected by any kind of disasters including floods and earthquake, except when objects fall directly on them.
- Still across the country, in many places India Mark 2 or 3 handpumps are functioning.
- Many handpumps are lost when they were converted into mini power pumps.
- If anywhere these pumps available, plumbers above 50 years of age can quickly put them back into use.
- They can act as lifeline for drinking water.

Milk

Well-wishers may supply milk in small milk drums. Camp in charge may turn down due to fear of spoilage.

Simple rule

1. Each drum milk to be boiled separately without mix up with milk from other drums or containers. After rolling boiling good milk will be normal. Spoiled milk will show it up. Everyone knows this.
2. While Hot distribute completely for immediate drinking.
3. If any milk remains, it may be used for making curd.

By this simple technique we can safely use milk in situations like this.

Implications of power restoration

1. Tank Operators

- Tank operators will be tempted to start motors to fill tanks. In all likelihood source and supply lines are contaminated. This will lead to waterborne diseases.
- Please remember submersible jet pumps are not damaged during the floods. Tank operators may simply give wire connection and operate.
- Strictly enforce OHT and stumps are washed with bleaching powder. Pipeline repairs are carried out and washed with heavily chlorinated water. People should be informed over mike to let out water for first 5 to 10 minutes.

2. Electric shocks

People may be tempted to use submerged household electric equipment to assess functionality. People should be warned.

Power restoration priority:

1. Water supply systems
2. Relief camps
3. Establishments involved in relief operations
4. Street lights
5. Others

3. Information sharing

Whenever doctors and nurses come across to treat any electric shock the location and circumstances let to the incident should be immediately informed to EB authorities.

Rapid disinfection strategy for covering large open areas quickly

1. Areas which require disinfection

Areas contaminated with human or animal excreta or drainage or decomposing garbage or other organic matter

2. Chemicals

Lime 4 parts and bleaching powder 1 part

Example: 4 bags of lime mixed with one bag of bleaching powder

Bleaching powder as such can also be used. Lime alone can be used.

It is a matter of availability and cost

3. Rapid coverage

A small vehicle like Tata or Bolero pickup truck can be loaded with the disinfectant mixture. Workers wearing heavy duty gloves and gum boots and mask can use spade like tool with a long handle can sprinkle the disinfectants from the vehicle itself. Vehicle can move very slowly at the site of disinfection.

One team comprising of one vehicle and driver and two workers can do marvellous job.

Restoration of Drinking Water Wells

1. Biological safety

Biological safety is the highest priority. It can be achieved by water chlorination. Initially because of high organic content, bleaching powder solution may be higher. We should achieve 2 ppm by repeating the procedure.

2. Chemical quality

It is not changed during floods. If at all it changes, it changes in the positive direction because of huge soft rain water and dilution effect. We need not focus on this.

In any place, if a chemical process unit is flooded only then it should be examined.

3. Physical Quality of water

Except for appearance, it has no significance during floods.

Improving physical quality

1. Water chlorination itself eat up organic matters.
2. Sediments will settle on its own in the bottom
3. Use of water and fresh spring coming from inside will clear the water over the course of time.

Alum is useful for major water treatment plants for improving the physical quality. Using alum for thousands of wells is impracticable, it will divert attention from main thrust on chlorination.

This is our experience during Orissa super cyclone in which 10 districts were submerged and Tamil Nadu floods in Chennai and four other districts. Also, during different floods and cyclones over the last six decades in Tamil Nadu for which we have senior retired people who share their experiences even during cholera times.

Focus

- We need to focus only on Water Chlorination.
- Half kg bleaching powder distributed in zip lock bags with guidelines.
- Form teams with little vehicles and portable Mike sets. Move around and involve people.
- Reaching out to each household in this hour of crisis is easy by involving ASHA, local bodies, Volunteers, Mike and radio announcements.

During super cyclone bleaching powder was widely known as magic powder by people in Orissa, Miracle powder in Tamil Nadu during age-old cholera times and so on.

Water Hygiene = Public Health

Restoring Drinking Water Wells submerged in Flood Water

Introduction

- Flood water submerging the wells does not alter chemical quality. But invariably it alters biological and physical quality.
- Physical quality is nothing but appearance of water.

Restoration Procedure

A. Ensuring biological quality

Step.1.

- Dissolve 2 kg of bleaching powder in a 15-20 litre bucket full of water. Wait for about 10 minutes for the sediments to settle down.

Step.2.

- Add one mug full of the solution into the well and vigorously shake well water with a steel bucket tied with a rope.

Step.3.

- Wait for one hour and measure the residual chlorine level with chlorine test kit.
- If no residual chlorine is present repeat the procedure.
- Due to heavy organic contamination chlorine demand may be more. Chlorine level may be kept up to 2ppm.
- If more than 2ppm also we need not worry. It will evaporate in few hours.
- First three steps will ensure biological quality.

B. Improving physical quality

For drinking water appearance matters.

Step.1: Chlorination itself will improve physical quality since chlorine will eat up organic matters.

Step.2.

- Let out water for washing and other purpose after chlorination.
- Clear water with reasonably satisfactory physical appearance with minimum 1 ppm chlorine can be used for drinking.

C. Lab Testing of water in flood situation

- It is not necessary to test water in all wells during disasters. All the above steps are done on the physical inspection of submerged wells.

Submerging means contamination.

Chlorination and letting out mean decontamination.

- If anywhere any chemical contamination suspected due to flooding of a manufacturing unit involving chemicals, then it is a must to test water in a water testing laboratory.
- In major water supply projects, testing may be done routinely.
- Sumps and OHTs in household should also be cleaned with bleaching powder.
- First few minutes water from taps should be let out to clear out stagnant water in the pipe lines and organic contamination if any.



Rumours

1. Heavy rains, flash floods etc

- Now roads are gradually restored and people start returning homes mischief mongers for obvious reasons may spread rumours like flash floods, heavy rains forecast and so on for stealing valuables and other reasons.

2. Epidemics/ spread of infectious diseases

- People may be tempted to stock medicines unnecessarily.
- Constant reassurance and health media briefing absolutely essential to build confidence.

Logic:

- Every chemical contamination/ microbial contamination washed away.
- Nothing will happen if we take care of water and food hygiene and hand wash.

School reopening

School Uniform

- May be relaxed for two months.
- This may be attended later.

School reopening

- Public Health Advisory for School reopening to be followed.
- Only after thorough inspection of schools for structural safety, clearing poisonous insects, scorpions and snakes, electrical safety, clearing water stagnation, safe drinking water, clearing woodlogs, garbage, other wastes and fogging school and other educational institutions to be reopened.

Managing snake menace during/after floods

1. Where do snakes hide?

- Areas where land and water meet. Avoid such areas.
- On cup boards, slabs, table drawers, almirahs, lofts, crevices, broken heavy objects, building rubbish materials, woodlogs, pump rooms etc.
- Clothes, resin may also act as hideout since they may provide warmth. One should be careful in these areas.

2. Attack distance for a 4 to 5 feet length snake

- Snakes can reach only upto knee level or little more. On surface two feet.

3. How to clear things?

- Clear waste materials from at least four feet distance.
- Rakes normally used by municipalities are useful or alternatively curve the heavy steel rods used for concrete into hook with four to five feet length and use for pulling objects.
- While doing so do not encircle a given area from all sides. Clear through ONE direction only so that snakes have escape routes.
- First attempt for any snake is to escape. Only when escape option is not available it attacks.

4. Are there any protection materials?

- People working in snake infested areas can wear gum boots covering above knee with thick jeans offer protection.

5. What precautions one should take before entering an area?

- Keep tapping the ground and objects so that snakes will move away or movement may indicate the presence of it.

6. What is the ideal length of bamboo sticks to use?

- Five feet

7. How to secure camp site?
 - Trench around the camp or sprinkle crystal salt around once in three days. Salt is an irritant to snake skin.
8. When to suspect snakes presence in the vicinity?
 - Presence of snake skin as a biological process
 - Presence of little snake means there are another 6 or 10 similar age group siblings.
 - Presence of rats or frogs will attract snakes. Food remains should be disposed then and there. Food remains attract rats and in turn snakes.
 - On wet soil movement impressions will be seen.
9. Can birds be made useful?
 - Giving the birds some grains to eat, they will cry foul when they see snake movements.
 - Similarly, dogs will indicate by barking at snakes. Cats should not be entertained inside house since they may bring half eaten snakes with heads.
10. Snake catchers can also be engaged if available. Experienced middle aged local farmers are the best option for guidance.
11. Sprinkling disinfectants over suspected areas may also be useful.

If anyone is bitten by a snake, reassure and treat in a hospital where ASV available.

Finally, the ability of rural people to manage snakes will resolve the issue. Awareness to be cautious is important ultimately.

Simple tools for managing snake menace

1. Bamboo stick
 - For tapping on the ground and objects to make vibrations. Vibrations will alert the snakes and move out.
2. Steel rod
 - Five feet long 16 mm steel rod curved at one end is useful to pull out materials, woodlogs from a distance of 4 feet.
3. Steel rake
 - Helps in pulling out heaps of clothes, broken materials etc from a distance of four feet.



All are low cost or no cost locally available materials.

In addition, a little caution about snakes more than sufficient to manage snakes.

Tetanus Toxoid

Kerala is a high immunisation coverage state.

For the past 40 years all children borne and pregnant women have received Tetanus Toxoid vaccine. In addition all kinds of minor injury patients also received TT.

Now only the people sustained one or other kind of injuries alone need TT.

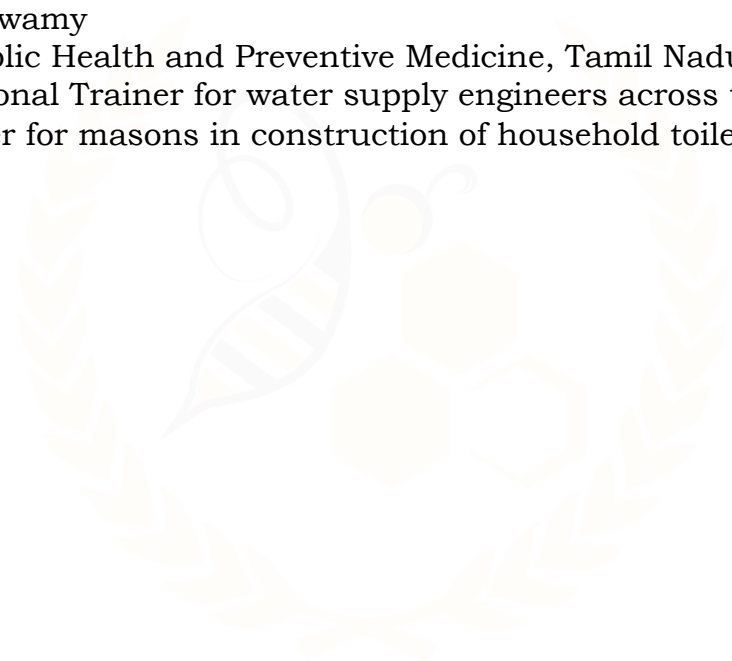
Relief workers engaged in various kinds of relief activities may be given one dose of TT in anticipation of some scratches or pricks.

Tetanus does not spread from person to person. Current level of attention for TT is adequate enough in this situation.

Dr.K.Kolandaswamy

Director of Public Health and Preventive Medicine, Tamil Nadu.

(Formerly National Trainer for water supply engineers across the country for 5 years: Trainer for masons in construction of household toilets for 5 years)

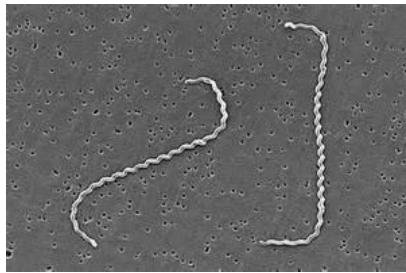


District Action Plan for Post Flood Measures

Activity	Desk review	Analysis plan	Indicators	Action Plan
Surveillance	- Reporting units – Govt & Private, Hospital & Labs - Data flow & Frequency (IP line list, IDSP, Private Hospital, PEID Cell, Lab, Death) - Data for last one week	- Consistency of reporting units - Uniformity in the format - Analysis at the district level - Action taken after analysis (Sharing of findings) - Follow up of findings	% of RUs reporting daily - Number of common variables in all format - Number of Hotspots identified - Sharing of findings (Mode and content) - Action taken reports received % of cases reported among the total admissions (Govt and Private) - Coverage in GP/MU/CO	- Communication of reporting format & Case definition, frequency to all RUs - One DEO & Data Manager fixed responsibility for the same - Nodal officer for each RUs - Cluster definition (DMO & DSO) - Email/WhatsApp / Phone – sharing of data - Action taken reports received - Compliance of RUs
Case Management	- Health advisory - OP - IP - Referral services - Curative services (Dialysis centres)	- Protocol awareness - Method of updating the protocol - Case definition for detection - Treatment of OP & IP cases - Criteria for referral – facility & Level wise - Preparedness of dialysis centres - Drug indenting mechanism - ICU bed strength - Laboratory with testing facility - Staff reallocation - Transportation facilities - Insurance scheme coverage	% of doctors aware of the protocol - Source of protocol for updation % of adherence to case definition % of OPD having the Doxy as Treatment % of IPD treated with CP - Criteria for referral cut-off values/findings - Frequency and place of requesting - Number of beds and cases with complication % of lab test positive among suspected cases % got doxy prophylaxis OPD & IPD - Number of ambulances available - Insurance scheme is any	- Constituting the training teams - Adherence to treatment protocols - Adherence to referral protocols - Intending of drugs to nearest store - Laboratory testing facilities and number of diseases confirmed - Number of beds to treat severe cases and places - Number of dialysis per day and places - Staff reallocation as needed - Cases and deaths reported on same day - Emergency transportation - Insurance scheme to support

Field activities	- Medical camps - Water Chlorination - Monitoring chlorination - Vector control measures - IEC on Hand washing	- Medical camps in cluster/death reported places - Water Chlorination protocol - Sensitization and training to LSGD at every district - Monitoring chlorination - Vector control measures - IEC on Hand washing - Stock and Availability of chlorine tablets/ water sterilization powder at the community level - Distribution of chlorine tablets door to door and IEC	% of cluster/death places where camp conducted % of places Contact prophylaxis given % of places where water chlorination done on daily basis % of JHI/JPHN/ASHA having monitoring card/choloroscopes % of places antilarval work conducted % places fogging done % of places IEC issued - Modes of IEC conducted (Media/TV/Papers) - Amount of chlorine powder/liquid/tablet issued & available - Number of houses received chlorine powder & tablets - Number of death due to communicable disease	- Medical team availability - Rapid response team availability - Contact prophylaxis - Water chlorination of all water sources - Vector control measures in fever cluster/death places - IEC in all media/govt. websites to reach public - Local Self Government engagement - NGO/Volunteers engagement
Death audit	- Daily auditing the death case sheets - Identifying the disease/aetiology of deaths	- Deaths cause identifying strategies - Death audit form for verbal autopsy - Suggestion for improving the outbreak management	- Number of death audit team constituted and members % of death audited % of deaths submitted audit report for preventive and corrective actions - Number of suggestions implemented	- Death audit team of Physician/ Pediatrician/ microbiologist/ pathologist/ Forensic - Factor associated with deaths - Preventable factors – admin/clinical/field activities
Control room	- HR and roles assigned - Logistics plan	- Review presentation for daily review meeting - Daily review meeting minutes - Action taken on minutes - Nodal officers and assigned roles	- Number of issues received - Number of issues resolved - Logistics plan for drugs - Contact directory for officials and health staff	- Report generation for officials - Daily review presentation - Minutes of meeting - Review on next day

Leptospirosis



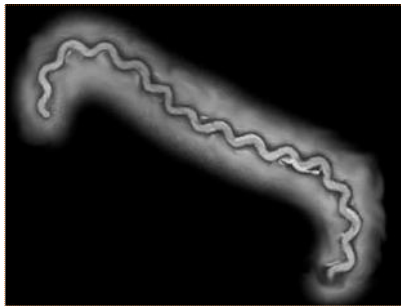
Outline

- Leptospirosis
- History
- Introduction
- Pathogenesis
- Clinical Features
- Complications
- Diagnosis
- Treatment



Leptospirosis (Weil's Disease)

- **Leptospira** - Greek word
 - ❖ Leptos - fine or thin
 - ❖ Spira - coil
- A genus of Spirochaete bacteria



Other Names

- Rice-field fever
- Swamp fever
- Mud fever
- Cane-cutter fever
- Haemorrhagic Jaundice
- Ictero-hemorrhagic fever



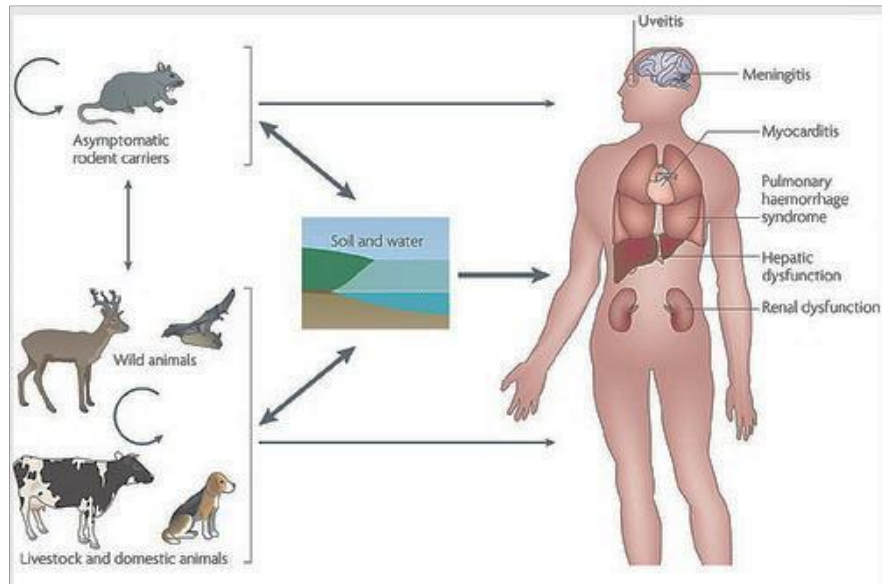
History

- A syndrome of severe multisystem disease
 - presenting as **profound jaundice** and **renal function impairment**
 - described by Weil in Heidelberg in 1886
- First visualized in autopsy specimens
 - thought to be Yellow Fever
- Simultaneously isolated in Japan and Germany

Introduction

- **Zoonosis:** Leptospirosis is a spirochete bacterial disease affecting both humans and animals
- **Emerging Infectious Disease:** Several recent outbreaks in Asia, South America & USA
- During outbreaks more than 100 per 100,000 may be infected.

Mode of Transmission



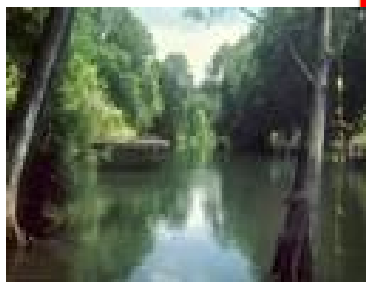
Mode of Transmission



Mode of Transmission



Flooding



Mode of Transmission



Farming



Water logging



Mode of Transmission



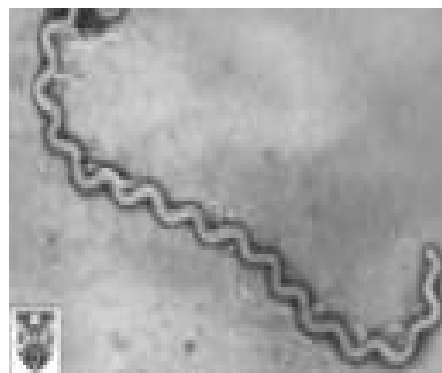
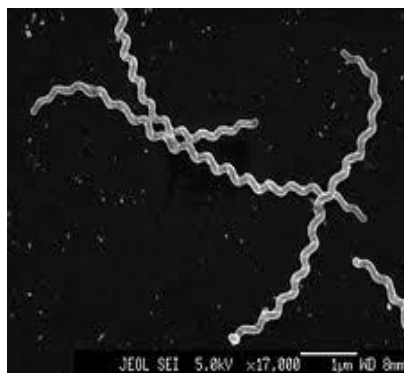
Pathogenesis - Agent

Order	Spirochetales
Family	Leptospiridae
Genus	Leptospira
Species	interrogans (pathogenic) biflexa
Serovars	More than 200
Serogroups	More than 25: (icterohemorrhagica, gryppotyphosa, canicola, pomona, andmanii, etc)

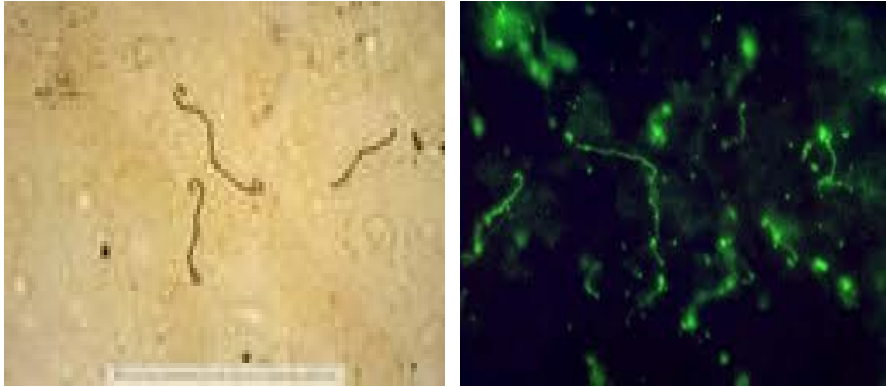
Pathogenesis - Agent

- Coiled, thin, highly motile
- Hooked ends and flagellae
- Stain poorly
- Seen by Dark Ground Illumination (DGI) & Silver impregnation
- Need special media
- Take long for culture

Pathogenesis - Agent



Pathogenesis - Agent



Pathogenesis - Agent

- Can survive outside the body for long
- Organism is excreted in the urine even after clinical infection settles down (symptomatic)
- Leptospirosis is maintained in nature by chronic renal infection of carrier animals



Pathogenesis - Host

- **Animals-** Rodents, dogs, cattle, pigs, horses, etc
- **Humans**
 - Direct contact with urine of infected animals
 - Urine-contaminated surface water, soil and plants



Pathogenesis - Host

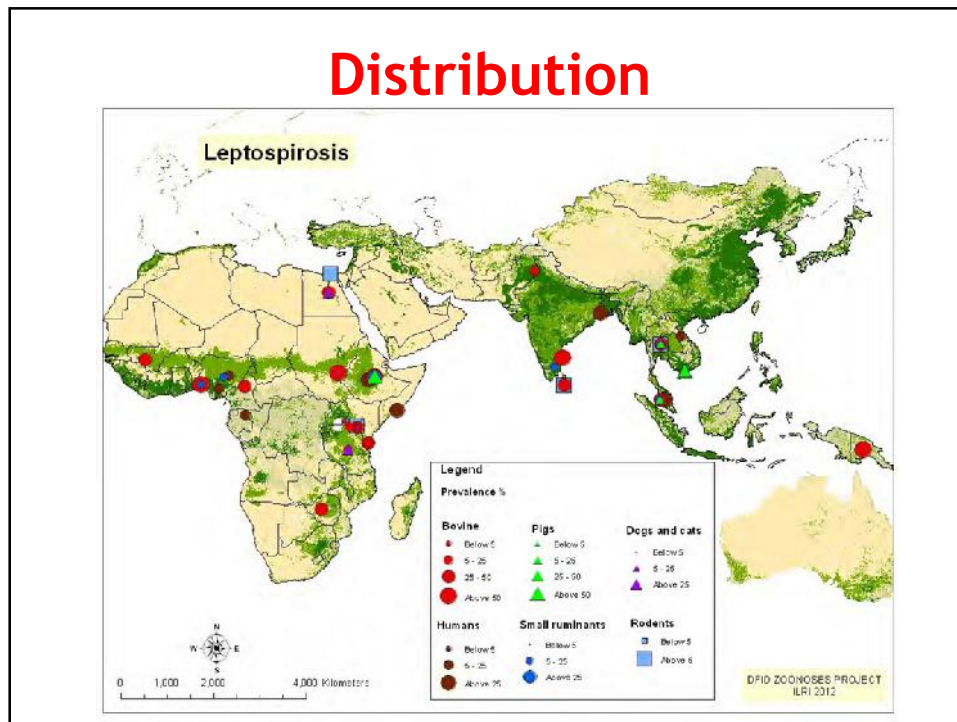
- **Occupation:** people who work outdoors /with animals
 - rice and sugar-cane field workers, farmers
 - sewer workers
 - veterinarians and dairy workers
 - butchers and slaughterhouse workers
 - Military personnel - living in varied locations
 - Persons with forest exposure
- **Recreation:** tourists, Water sports

Pathogenesis - Environment

- Worldwide
- Both rural and urban areas
- Temperate and tropical climates
- Incidence peaks during the **rainy season** and during **flooding**
- Tourism in tropics with adventure water sports



Distribution



Pathogenesis - Entry

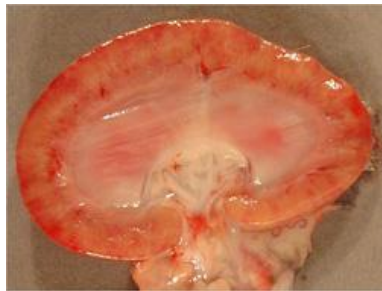
- **Entry:**
 - **Direct contact**
 - through cuts and abrasions in skin & mucous membranes of the eyes, nose and mouth
 - **Indirect Contact**
 - Contact with soil / water contaminated with animal urine
 - Drinking contaminated water
 - Eating contaminated food
 - **Human-to-human transmission -rare**
- **Incubation Period: 5 to 14 days (mean 10 days)**

Pathogenesis - Phases

- **Leptospiremia / Septicaemic phase**
 - Systemic vasculitis
 - Migration of organisms into tissues- inflammation and multi-organ dysfunction from direct cytotoxicity
- **Immune phase/ Leptospiruric Phase**
 - Severe fever and organ involvement through immunological mechanisms
- **Persistence of organisms**
 - Renal tubules, aqueous humor

Pathogenesis - Renal Failure

- Migrate to interstitium, renal tubules and tubular lumen - interstitial nephritis and tubular necrosis
- Hypovolemia - dehydration and leakage



Pathogenesis - Liver Changes

- Centrilobular necrosis and Kupffer cell hyperplasia
- No hepatocellular necrosis



Pathogenesis - Other Systems

Pulmonary:

- Hemorrhage
- hemoptysis, patchy lung
- infiltrates and ARDS



Muscles:

- Direct cytotoxicity



CNS:

- mild CSF changes
- Meningitis in immune phase

Clinical Features - Early (5-7 days)

- Redness in the eyes & conjunctival injection
- High fever and chills
- Severe headache, eyeball pain, photophobia
- Muscle pain & tenderness (calves and back)
- Sore throat
- Mental confusion

Clinical Features - Early (5-7 days)

- Abdominal pain
- Vomiting and diarrhea
- Jaundice, hepatosplenomegaly
- Hemorrhages in skin and mucous membranes
- Cough, chest pain & hemoptysis

Clinical Features - Late

1. Anicteric Variety (without jaundice)

After 2 to 3 days of seeming recovery

- New fever
- Milder myalgias
- Aseptic meningitis- similar to viral meningitis- **Clue- Neutrophilic leucocytosis**
- Uveitis (Iridocyclitis)
- Choreoretinitis

Clinical Features - Late

2. Icteric Variety (with jaundice)

Severe Leptospirosis (Weil's Disease)

- Jaundice
- Renal Dysfunction
- Hemorrhagic Diathesis

Mortality 5 to 15 %

Transient Red Eyes



Jaundice



To Sum up Clinical Features

- Bacteraemic Leptospirosis
- Aseptic Meningitis
- Icteric Leptospirosis with Renal involvement
- Pulmonary Syndrome

Other Complications

- Rhabdomyolysis - Rapid destruction of skeletal muscles
- Hemolysis
- Myocarditis
- Pericarditis
- Cerebral Hemorrhagic Fever
- Necrotising Pancreatitis
- Multi Organ Failure

Differential Diagnosis

- Acute febrile syndrome
 - Dengue, Chickungunya, Malaria, Influenza, Typhus, Infectious mononucleosis, Enteric fever, Hanta fever)
- Jaundice
 - Viral Hepatitis, Yellow Fever, Complicated Malaria
- Aseptic Meningitis

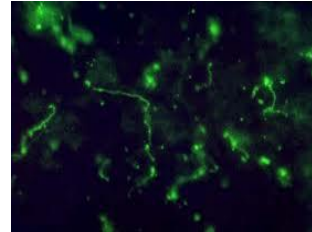
Lab Diagnosis

Tests	Description
Urine Sediments	RBCs, WBCs, Casts & proteinuria
Blood Counts	• PMN - Leucocytosis • ESR elevation • Thrombocytopenia
Biochemistry	• Altered Liver Function Test • Altered Kidney Function Test
Coagulation Profile	Low Vit K dep factors
Creatinine Phospho Kinase (MM)	Elevated
CSF analysis	Abnormalities
X Ray Chest	Patchy alveolar pattern- lower lobes

Lab Diagnosis

Antigen Detection:

- DGI and Silver impregnation staining- urine, CSF
- Culture (EMJH medium)
- PCR



Lab Diagnosis

Antibody Detection (second week)

Ig M & Ig G

- MAT
- ELISA
- Indirect Haemagglutination Test
- Microcapsule Agg test



Treatment

- General and Supportive Care
 - Antipyretics / Antibiotics
 - Rest
 - Hydration
 - In severe cases
 - Ventilator support
 - Liver support
 - Renal support
 - Transfusion support

Drugs of Choice

- Adults:
 - Doxycycline 100 mgs twice a day for 7 days
 - Cap. Amoxycillin 500mg every 6th hourly (for Pregnant and lactating mother)
- Children < 8 years)
 - Amoxycillin 30 - 50 mg/Kg /day should be given in divided doses for 7 days

(Other drugs including Ceftriaxone, Cefotaxime and Erythromycin may also be used)

Prevention

- Rodent and wild plus peri-domestic animal control
- Avoid exposure to urine and tissues of animals
- Avoid wading through water collections
- Environmental Sanitation

Control of Leptospirosis

- Rodent control is most important
- Human should avoid contact with water contaminated with animal urine



Personal Protection

- Avoid walking on stagnant water / Sewage collection
- Avoid contact with waterbodies - for bathing, fishing etc.
- PPE like gloves and boots for sanitary workers
- Proper hand and leg washing with detergent after sanitation activities
- Avoid exposure to forest environment

**Public Health Strategies for
Leptospirosis control in Flood
affected areas**

Public Health Actions at Four levels

1. Hospital level
2. PHC level
3. Environmental measures
4. Animal Husbandry department

Hospital level

- Doctors to be oriented to assume all high-grade fever cases as leptospirosis and initiate immediate antibiotic therapy
- Take blood samples before starting antibiotics for malaria, typhoid, leptospirosis, scrub typhus and dengue.
- If testing facilities not available samples may be sent to places where facilities are available.

Hospital level

- Testing at least few samples from each locality from where cases are reported.
- A dedicated team in each major hospital should keep calling the area PHC and local bodies to respond.

PHC level

- Medical camp and rapid house to house visit to identify more cases
- Prophylaxis for contacts
- Further lab samples for confirmation of the cause of fever
- Improving environmental hygiene with active role of local bodies and public

Environmental Measures

- Proper disposal of food wastes - preventing attractions of rodents
- Food storage places to be examined for rat infestation, rat urine/excreta.
- Locating and closing of rodent burrows
- Handling pipeline leakages and repairing
- Regular cleaning of drainage and removal of obstructions - preventing stagnation and overflowing of drainage waters

Environmental Measures

- Disinfection of the area with bleaching powder and lime in 1:4 ratio.
- Well Water chlorination
- Food hygiene-only boiled, steamed and fried food items to be used.
- Hand washing
- Draining the stagnant water
- House to house distribution of two half kg bleaching powder in zip-lock bags.

Animal Health

- In areas where repeated cases or large number noticed veterinarians are to be involved.
- Cattle also need to be tested and treated so that excretion of the organisms into the environment can be controlled.

Weakness of Leptospira

- It is a fragile organism
- It can be easily destroyed in the environment by drying, boiling and disinfection with bleaching powder and or lime
- Rapidly destroyed in human body by antibiotics
- Alert doctor can easily pick-up a case of leptospirosis clinically by transient redness of eyes, high grade fever and myalgia.

Strength of Leptospira

- If untreated it may cause jaundice or kidney failure
- If environmental hygiene is poor, it can rapidly spread.



Thank You