



Module -3

Sustaining Natural Resources and Environmental Quality

By

Dr. V. Sai Saraswathi., M. Pharma., Ph. D.,

Environmental Science Professor,

School of Advanced Sciences

VIT University, Vellore- 632014

Contents

- Environmental hazards: Biological, Chemical, Nuclear
- Risk and evaluation of hazards
- Types of pollution: Air and water
- Pollution sources, effects and mitigation
- Water quality management and its conservation;
- Water footprint and virtual water
- Solid waste management
- Climate disruption and ozone depletion (Kyoto protocol, Carbon sequestration methods and Montreal Protocol – can be discussed).

Environmental hazards

- Risk assessment is the scientific process of using statistical methods to estimate how much harm a particular hazard can cause to human health or to the environment.

Risk Assessment

Hazard identification

What is the hazard?

Probability of risk

How likely is the event?

Consequences of risk

What is the likely damage?



Risk Management

Comparative risk analysis

How does it compare with other risks?

Risk reduction

How much should it be reduced?

Risk reduction strategy

How will the risk be reduced?

Financial commitment

How much money should be spent?

Every day's risk

- Every day we face some risks
 - Driving or riding a car
 - Eating foods with high cholesterol- risk to heart attack.
 - Drinking alcohol.
 - Smoking
 - Enclosed place with smoker.
 - Tanning – sun's ray.
 - Skin cancer
 - Living in a hurricane –prone area.

Types of hazards

- **Biological Hazards:** more than 1,400 pathogens (bacteria, viruses, parasites, Protozoa, and fungi) can affect humans.
- **Chemical hazards:** harmful chemicals in air, water, soil, and food.
- **Physical hazards:** fire, earth quake, volcanic eruption, floods, storms.
- **Cultural hazards:** unsafe working conditions, unsafe highways.
- **Life style changes:** smoking, , drugs usage etc.

Biological hazards

- Disease can spread by following ways:
 - **Non-transmissible disease**: eg. Cancer, CVS disorders, asthma, emphysema, and malnutrition.
 - **Transmissible Disease**: disease can spread from one to another or by pathogens or parasites etc.

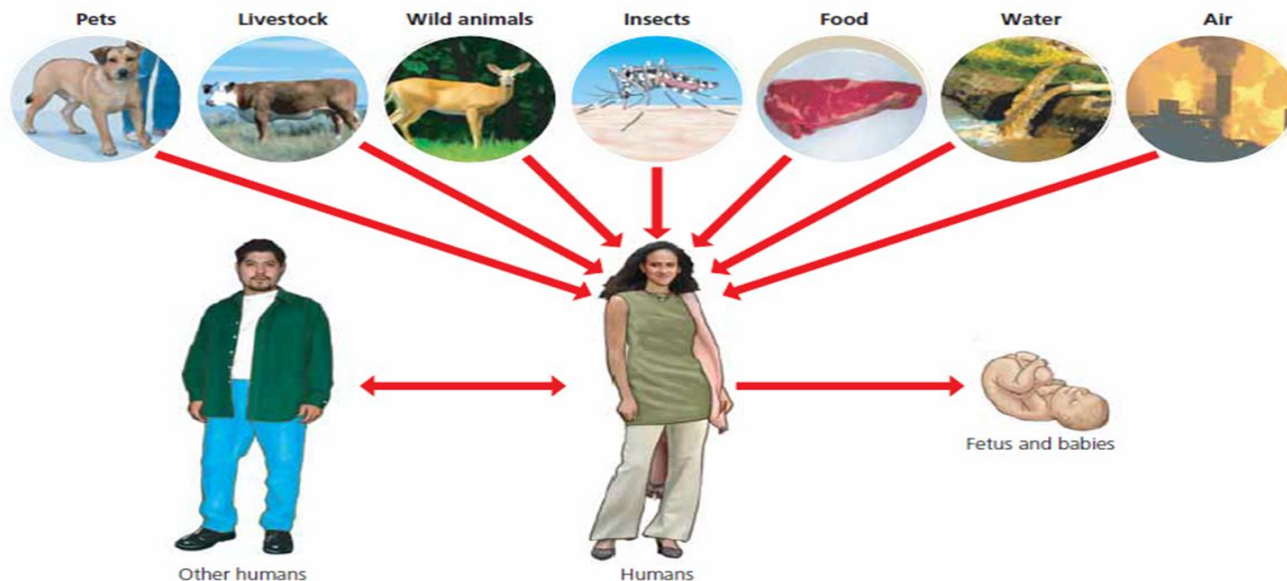
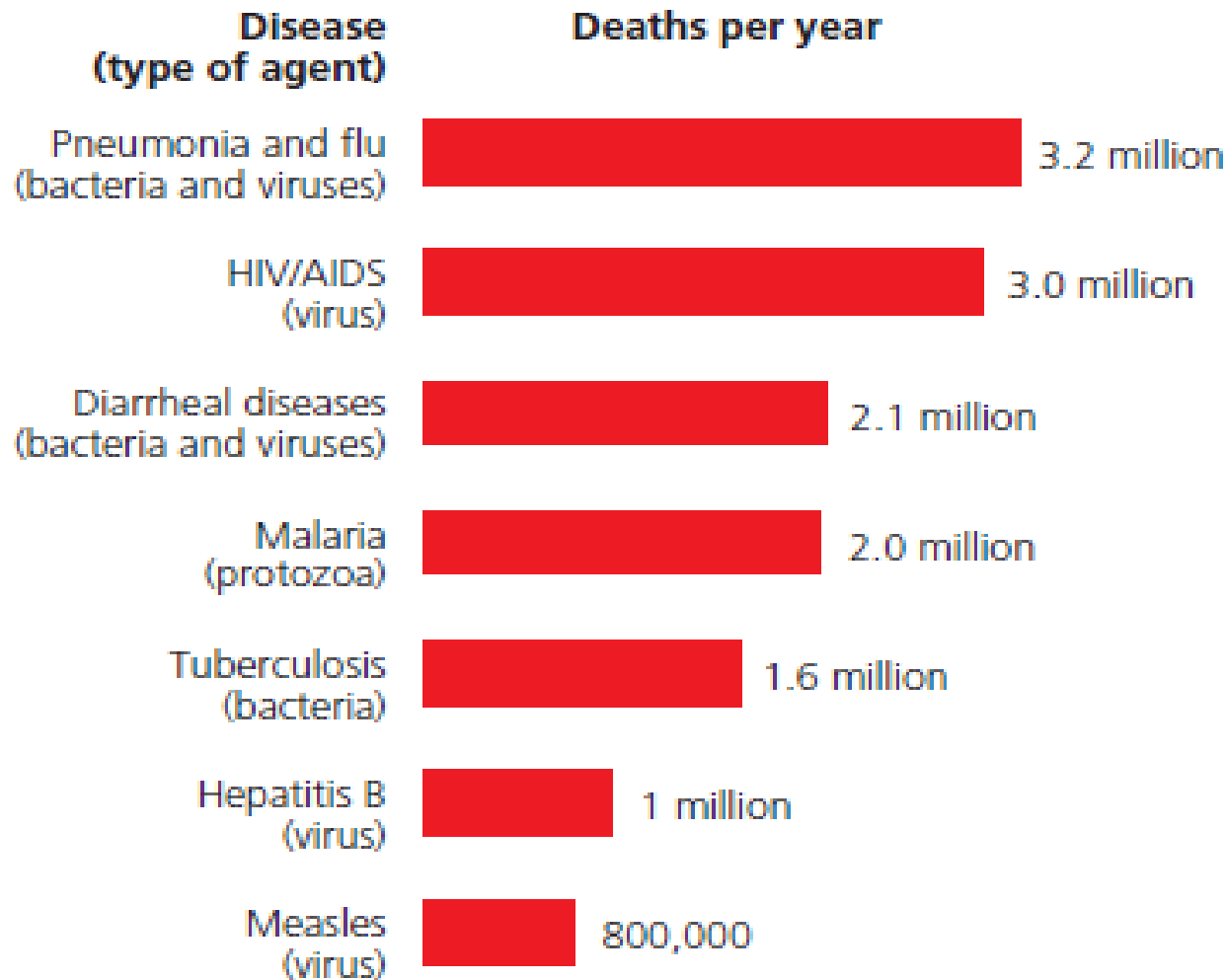


Figure 14-4 Science: pathways for infectious disease in humans. **Question:** Can you think of other pathways not shown here?

Disease : death rate

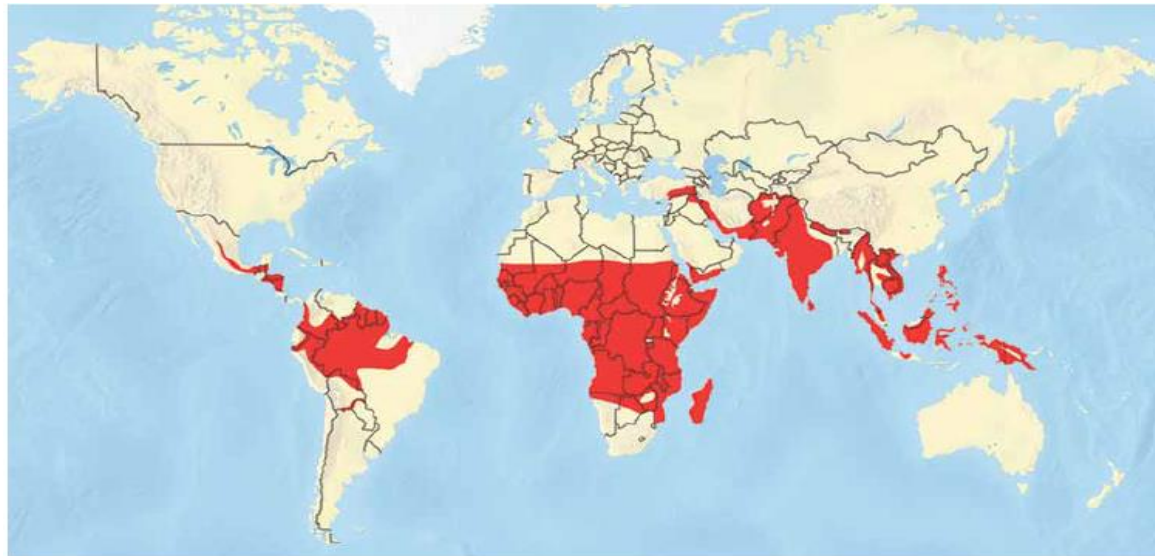


Case study 1- Global threat - TB

- Acc. WHO the highly infectious bacterial disease strikes 9 million people/yr and kills 1.6 million- 85% developing countries.
- WHO estimates 2006 to 2020 that 25 million people will die by TB.
- **Factors:** lack of TB screening and control programs.
- Most strains – TB bacterium develops genetic resistance- antibiotics.
- Population growth, urbanization, air travel, person to person contact.
- **Slow down the disease rate:** identification and treatment of people suffering with TB: chronic cough.
- Drugs should be taken every day for 6-8months.

Case study 2 Malaria – Death by Mosquito

- Acc. 2005 study, 40 % - world's people – in poor african countries are risk from malaria.
- Malaria is caused by parasite- mosquito species.
- **Symptoms:** Infect and destroys RBC, fever, chills, drenching sweats, anaemia, abdominal pain, headaches, vomiting, weakness.



Plasmodium parasite- life cycle

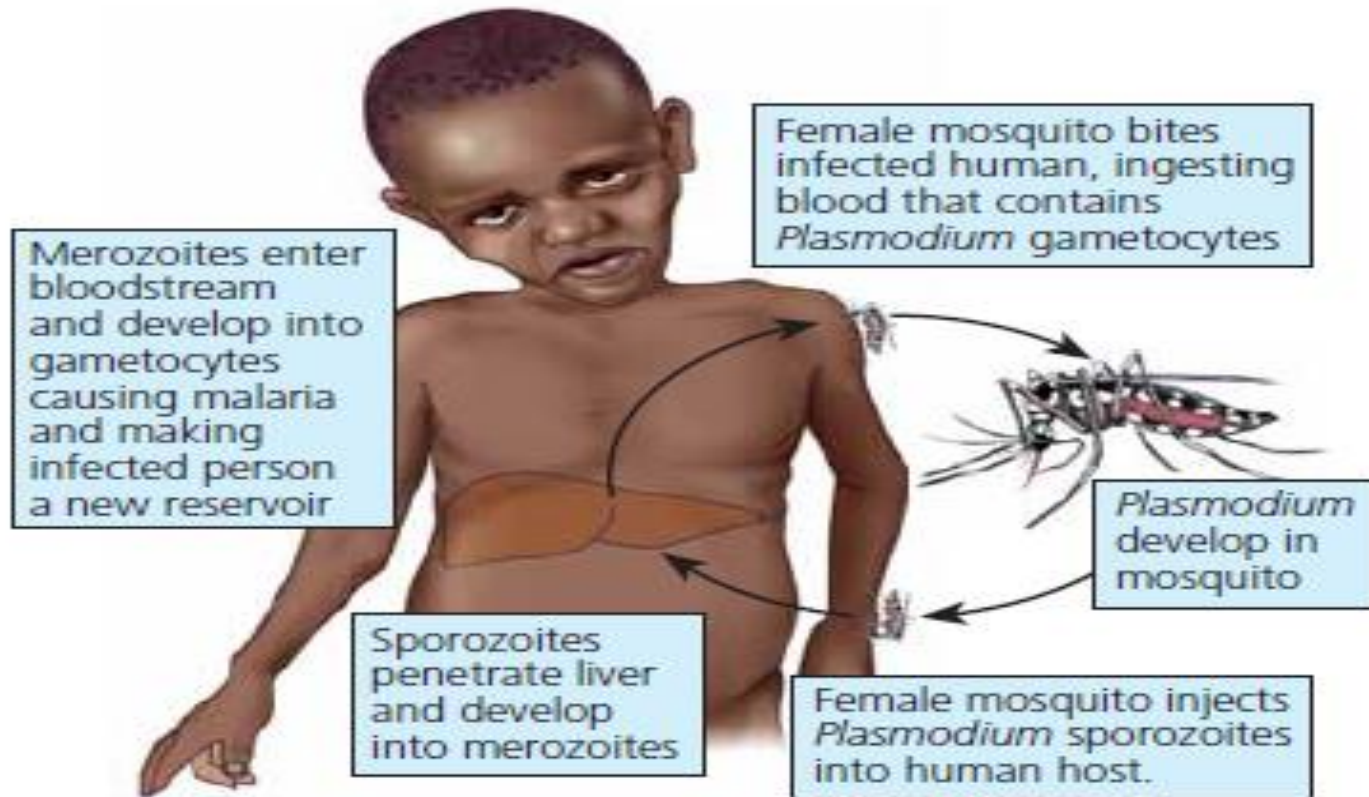


Figure 14-7 The life cycle of malaria. *Plasmodium* parasites circulate from mosquito to human and back to mosquito.

Anti-Malarial drugs

- Researcher develop new anti-malarial drugs: artemisinin, chinese medicine- sweet worm wood plant.
- Vaccines, biological controls for Anopheles mosquitoes.
- Malaria researchers were evaluating the use of fungi- harmless to the environment.

SOLUTIONS

Infectious Diseases

- Increase research on tropical diseases and vaccines
- Reduce poverty
- Decrease malnutrition
- Improve drinking water quality
- Reduce unnecessary use of antibiotics
- Educate people to take all of an antibiotic prescription
- Reduce antibiotic use to promote livestock growth
- Require careful hand washing by all medical personnel
- Immunize children against major viral diseases
- Provide oral rehydration for diarrhea victims
- Conduct global campaign to reduce HIV/AIDS



Thank You