Class 9 - Science

Why do we fall ill-Study notes

Our body is made up of cells, and cells are made of carbohydrates, proteins and lipids. All the time some complex processes take place in cells. Our organs or tissues also perform specialized functions like heart is beating, lungs breathing and kidney filtering blood and brain thinking. All are interconnected, if any organ went wrong, others are also affected which leads to improper functioning of our body.

We fall ill when:

1. We do not eat nutritious food.
2. We do not exercise.
3. We do not take care of our personal hygiene.
4. We live an environment which is not clean.
5. We eat contaminated food.
   There are many reasons which can make us sick.

What is Health?: Health is a state of being well enough to function well physically, mentally and socially.

Like if we are able to go to market, play do our work we are physically healthy.

If we are able to understand what is being taught to us we are mentally healthy.

Personal and community issues which effect Health:

Community issues:

Physical environment: Physical environment is decided by our social environment.

The health of all organisms will depend on their surroundings. Living conditions depends upon whether we are living in cities or villages. If we live in a place where there is open drainage, garbage not collected, stagnant water around, then the possibility of poor health increases.

Therefore, ***public cleanliness is important for individual health***.

Social Harmony and Equality: We need to be happy and treat each other equally.

Personal issues:

Financial condition: We need food to be healthy, for which we need good job so that we can earn and get nutritious food.

Difference between Healthy and Disease free

Healthy	Disease Free
1. It is a state of physical, mental and social being.	It is a state of absence from diseases.
2. It refers to individual, physical and social environment.	It refers only to individual.
3. The individual has good health.	The individual may have good health or poor health.

What is a disease? In simple words disease means being uncomfortable.

A disease is **any condition which results in the disorder of a structure or function in a living organism that is not due to any external injury. Disease gives rise to symptoms and signs of disease.**

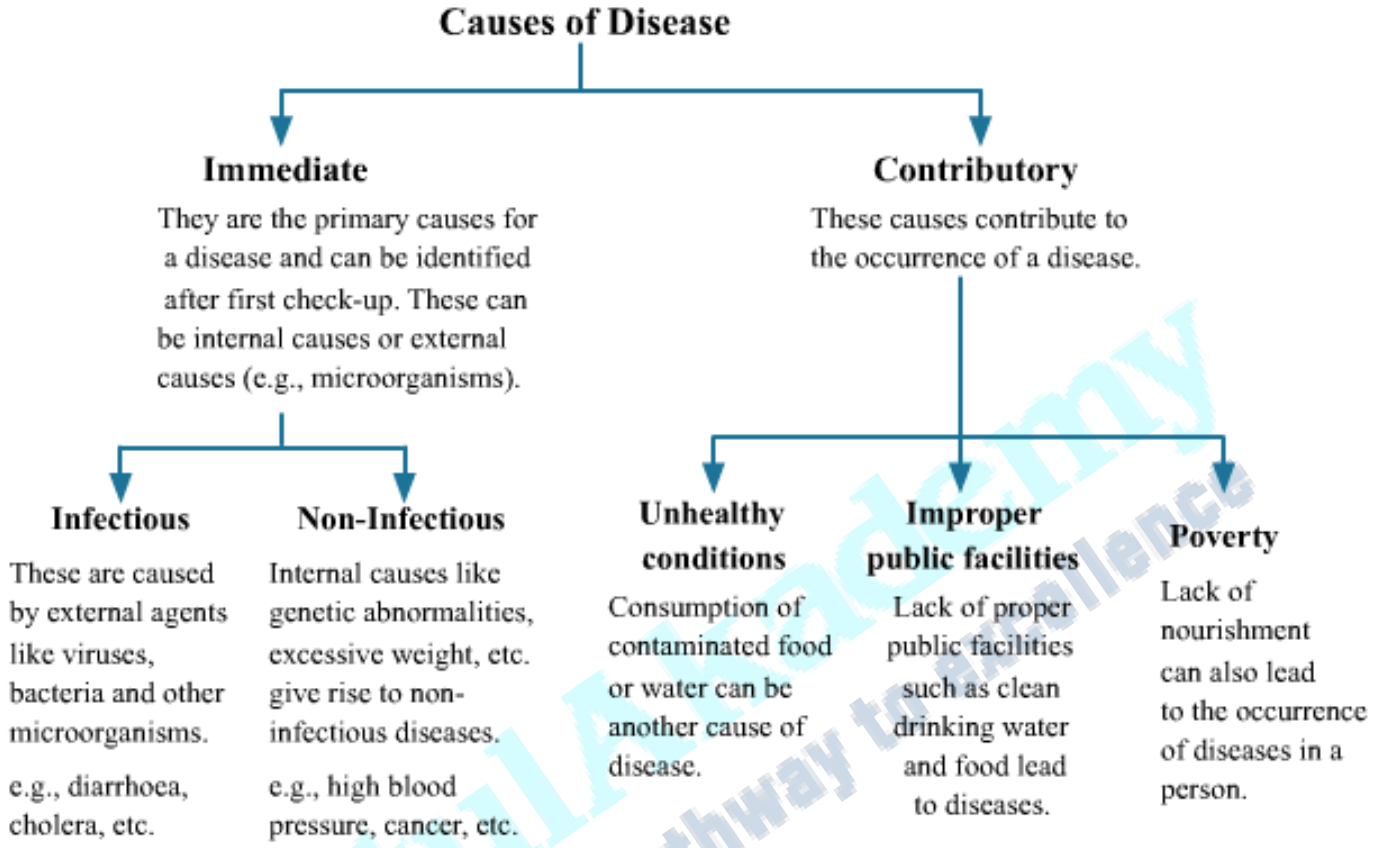
What are symptoms? Symptoms of disease are things we feel as being wrong and indicate the possibility of a disease. Like headache, cough, loose motions wound with pus etc.

What are signs of Diseases? Signs of diseases are what physicians will look for on the basis of the symptoms.

Diseases are confirmed only after lab tests. (Blood test, urine test etc.)

Difference between Acute and Chronic Diseases

1. Last for very short period.	Last for very long time.
2. Do not cause any major effect on our health.	Have a very bad effect on our general health.
3. Person suffering from Acute disease recovers completely.	Person suffering from Chronic disease does not recover completely.
4. No long-lasting effects so do not lead to weight loss or fatigue.	Long term effects and hence lead to weight loss or fatigue.
5. Example Common cold, Flu	Example Asthma, Elephantiasis, Tuberculosis



Differentiate between Infectious Diseases and Non-infectious diseases.

Infectious Diseases	Non-Infectious Diseases
Infectious diseases are also called communicable diseases or transmissible diseases as they can spread from infected person to healthy person(s).	Non-infectious diseases are also called non-communicable diseases as they do not pass on from one person to another.
Caused by pathogens (viruses, bacteria, fungi, protozoans, worms).	Caused by factors such as genetics, environment, and lifestyle
Infection is transmitted through direct contact or through medium	Infection is not transmitted through direct contact or medium
Examples of infectious diseases are colds, influenza, chicken pox, herpes and measles.	Examples of non-infectious diseases are Down syndrome, hemophilia, skin cancer, cardiovascular disease etc

Infectious Diseases: Diseases which are caused by microbes like bacteria, viruses, fungi, protozoa. Some are also caused by multicellular organisms like worms.

Agents	Diseases	Acute/Chronic
Bacteria	Acne(**Staphylococci**)	Chronic
	Typhoid fever(**Salmonella typhi**)	Acute
	Anthrax (**Bacillus anthracis**)	Acute
	Cholera (**Vibrio cholerae**)	Acute
	Tuberculosis (Mycobacterium)	Acute
Virus	Common cold (rhinoviruses)	Acute
	Influenza flu (Type A, Type B)	Acute
	Dengue fever(dengue virus)	Acute
	AIDS (HIV Human immunodeficiency virus)	Chronic
	Severe acute respiratory syndrome (SARS)	Acute
Protozoa	Kala-azar (**Leishmania**)	Chronic
	Sleeping sickness (**Trypanosoma**)	Chronic
	Malaria (plasmodium)	Acute
Fungi	Skin infections like Athlete's Foot Fungal Meningitis Ringworm	Acute and reoccurring
Worms	Ascariasis (roundworm)	Acute
	Elephantiasis (**filarial worm**)	Chronic

Why do we need to categorize diseases based on the infectious agents?

These categories are more important factors in deciding what kind of treatment to use for a particular disease. Members of these groups have different biological characteristics like

- Viruses live inside a host body, but bacteria rarely do.
- Viruses, bacteria and fungi multiply very fast but worms multiply slowly.
- Most of the bacteria belonging to one group are closely related to each other and have similar life processes.
- Drug/medicine/antibiotic that will block that life process in one member of the group will be effective for whole group. But will not be affective for other microbes or other groups.
  So, to know which drug will be effective in the treatment of a particular disease caused by a particular agent we need to categorize.

Why antibiotics are affective in bacterial infections not viral infections?

Antibiotics block biochemical pathways important for bacteria. Many bacteria make a cell wall to protect themselves. Antibiotic penicillin blocks the processes that build cell wall in bacteria. As a result, growing bacteria dies as it not able to make a cell wall.

Human cells do not make a cell wall so penicillin will have no effect on us.

Many antibiotics will work against many species of bacteria. But viruses do not use these pathways (building cell walls) so antibiotics do not work against viral infections.

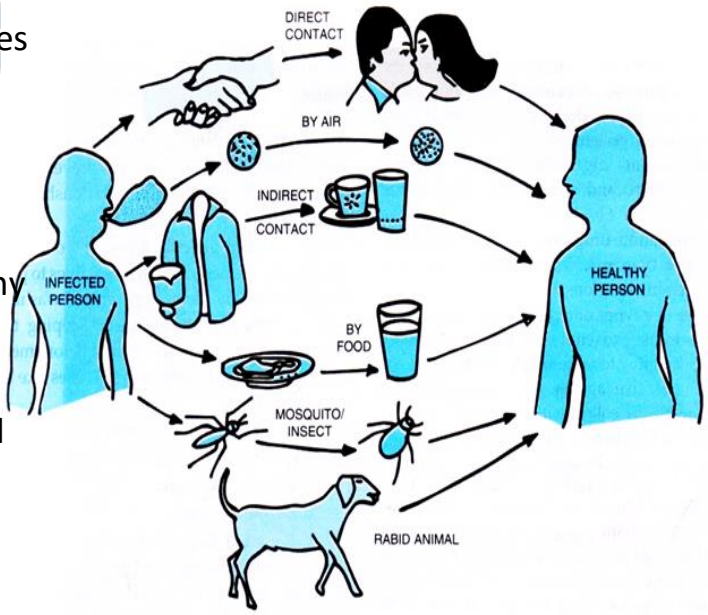
But if we have a bacterial infection together with viral cold, then antibiotics will help as it will work against bacterial infection.

How diseases spread?

Diseases that spread from an infected person to a healthy person are called **communicable diseases**.

Disease spread through:

1. **Air**: when an infected person sneezes or cough, little droplets are thrown out, which infect nearby persons.
2. **Water and Food**: when someone drinks and eat contaminated water and food microbes enter into healthy person.
3. **Physical Contact**: direct contact (sexual act) also result in the spread of virus.
4. **Vectors**: through insect bites, like mosquito and also through infected animal bites



Means of Spread	Diseases
Air borne	Common cold, flu, pneumonia, tuberculosis
Water borne	Cholera, typhoid
STD's (Sexually Transmitted Diseases)	Syphilis, AIDS
Vectors (carriers)	Dengue, Malaria, Rabies

Vectors: Animals that carry the infecting agents from a sick person to another potential host.

Most common vectors are mosquitoes. Female mosquitoes need highly nutritious food in form of blood to lay mature eggs. They feed on warm blooded animals and hence transfer disease from one person to another.

Organ Or Tissue Specific Diseases: When microbes enter our body, they make different part of our body as their home and then effect that specific part.

Disease	Organ effected	Entry	Symptoms
Tuberculosis	Lungs	From air via Nose	Cough, breathlessness
Jaundice	Liver	Mouth	Yellowish skin
Typhoid	Gut lining	Mouth	Stomach pain, high fever, vomiting, loose motions
Malaria	Liver, then red blood cells	Through mosquito bite	Chills, fever
Brain Fever/Japanese encephalitis	Brain	Through mosquito bite	Headaches, vomiting, fits or unconsciousness
AIDS	Lymph nodes	Sexual organs	

Role of our Immune System: An active immune system recruits many cells to the affected tissue or organ to kill off the disease-causing microbes. This recruitment process is called **inflammation**. There might be local effects such as swelling and pain and general effect as fever due to inflammation.

Our immune system is a major factor that determines the number of microbes surviving in our body. If there are less microbes, disease is minor, if the number of microbes is high the disease could be severe enough to be life threatening.

Principals of treatment: There are two ways to treat infectious diseases:

1. To reduce the effect of disease by providing treatment that will reduce symptoms. The symptoms are usually because of inflammation. We can take medicine to bring down fever, reduce pain or loose motion. We can take rest and conserve our energy.

2. To kill the cause of the disease by using medicines that will kill microbes. There are drugs that block the synthesis pathways of the microbes without affecting ours. Like antibiotics for bacteria.

Microbes used to make antibiotics: Bacteria, Fungi.

Streptomycin (Streptomyces), penicillin (Penicillium).

Why it is difficult to make anti-viral medicines? Viruses have few biochemical processes of their own. They enter our cells and use our machinery for their life processes. There are few virus-specific targets to aim at.

There are few anti-viral drugs available. For example, the drug which keep HIV infection under control.

Why do we say "Prevention is better than cure"?

If someone gets an infectious disease than following situations might happen:

1. body functions are damaged and may never recover completely.

2. treatment will take time and person is likely to be bed ridden for some time.

3. person suffering from disease will serve as the source from where disease might spread to other people.

That is why we say that prevention is better than cure.

How can we prevent disease?

There are two ways to prevent disease.

General way: To prevent exposure to disease by maintaining public hygiene.

Air borne diseases	Living conditions should not be overcrowded
Water borne diseases	Drinking clean water
Vector borne diseases	Clean environment

Another basic principle of prevention is taking nutritious food to make immune system strong.

Regular health checkups also help us to prevent diseases.

Specific way of preventing disease is **Immunization.**

What is immunization? It is the process whereby a person is made immune or resistant to an infectious disease by the administration of a vaccine.

Vaccine: A preparation containing usually killed or weakened microbes that is injected to increase protection against a particular disease. Vaccines are available against many diseases like tetanus, diphtheria, whooping cough, measles, polio etc.

Having disease once is a means of preventing subsequent attacks of the same disease. As our immune system first sees the infectious microbe, responds against it and then remembers it. So, if next time that particular microbe or any other related to that enters our body, the immune system responds and eliminates the infection even more quickly.

This is the basic principle of immunization. Weak or dead microbes are injected into the body so that our immune system produce antibodies for that microbe and prevent any subsequent exposure to the infecting microbe.