Section 1.1: Causes of Disease - Pathogens

- **Health** – A state of physical and mental well-being, free from disease.
- **Disease** – An abnormal condition of an organism that impairs bodily functions and is associated with specific symptoms.
- **Non-infectious** – Sometimes called disorders and can be caused by a broad range of environmental factors. They cannot be transferred.
- **Infectious** – Caused by pathogens. Can be passed on.
- **Inherited** – due to a mistake or alternation in the genetic make-up e.g. Down's syndrome, cystic fibrosis, Huntington's disease etc.
- **Nutritional deficiency** – caused by inadequate or unbalanced diet or by over-eating E.g. scurvy, obesity, rickets, etc.
- **Psychological disorders** – diseases causing changes in the working of the brain E.g. schizophrenia.
- **Social/self induced** – Influenced by living conditions or personal behaviour e.g. lung cancer, STIs, etc.
- **Degenerate** – wholly/partly caused by aging. Organs and tissue may not work as well due to slower cell renewal and repair.
- **Environmental** – Abnormal bodily reaction caused by the environment e.g. U.V rays.

Note: many diseases can be caused by multiple factors.

Most microbes are harmless.
Pathogen – disease causing microbe.
Infection – process by which a pathogen enters and establishes itself.

- **Communicable disease** – spread via close proximity or contact.
- **Non-Communicable** – disease caused by food/drink or animal vectors e.g. mosquitoes.
- **Interface** – where internal and an external environment meet.
- **Skin** – Difficult to penetrate, thick and water proof. Platelets quickly produce scabs.

Interfaces are adapted for absorption but also make it easier for pathogens to pass through.
Gas exchange – airborne pathogens

Digestive System – Disease in contaminated food or water.

Defences

Gas exchange – thick/sticky mucus traps pathogens. Celia on the surface of epithelial cells work together to remove microbes.

Digestive system – concentrated HCl kills microbes. Protease also kills microbes.

Fungi – Opportunistic pathogens. Fungal toxins are called mycotoxins.

Viruses – Invade body cells in order to reproduce thus preventing the host cell functioning as normal. It kills body cells and rarely produces toxins.

Bacteria reproduction is called binary fusion.

Endemic – a disease that is always present in the population.

Epidemic – when a new disease spreads rapidly through the population.

Pandemic – when an outbreak occurs on a global basic.

Section 1.2: Epidemiology

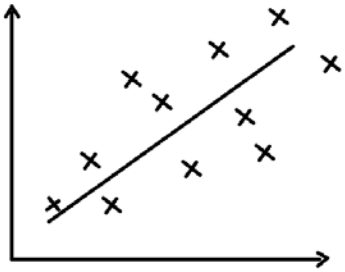
Epidemiology is the study of patterns in diseases and the various factors that affect the spread of disease.

A correlation is different causal link.

Strong, positive correlation

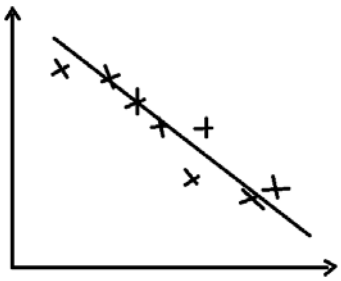
A positive correlation will occur when an increase in one variable, causes an increase in another. In order for the correlation to be "strong", there must be little spread in the data.

Weak correlation



A weak correlation occurs when there is a wide spread of data shown in the graph.

Negative Correlation



A negative correlation will occur when an increase in one variable causes a decrease in another.

How to prove a link

- Wide samples must be used.
- Data must be analysed over long periods of time.
- Variables must be controlled.

Demographic Transition

Explains how the population changes over time e.g. from high birth rate.

Section 1.3: Lifestyle and Health

- Risk – A measure of probability that damage to health will occur as a result of a given hazard.
- We need to look at probability that a hazard will occur as a consequence of the hazardous event.
- If the consequence of the hazard is high and the probability is low, there is little cause for concern.
- A major concern is when both are high.

Measuring risk

- 0% (no harm will occur)
- 100% (will definitely occur)
- A timescale is needed to give the data more weight.
- Risk must be relative.

Cancer

- **Cancer** – Cell division in an uncontrollable fashion. This continues if there are nutrients.
- Cancer cells cease to function normally.
- **Carcinogen** – Cause the DNA to mutate. They are cancer causing agents.
- Most mutated cells are destroyed.
- One mutated cell can cause a mass of mutated cells.
- **Benign –** does not move from the point of origin. Usually harmless, however can cause problems depending on where it grows.
- **Maligment** – grow faster and can spread throughout the body. Can have its own blood supply. The process of moving to another area of the body is called metastasis.
- Older people = more likely.
- Genetics can cause approximately 5% of cancers. Tumour producing genes (oncogenes).
- Lifestyle factors can expose you to more carcinogens.

- More you smoke, higher the risk.

- **Diet** – low fat, high fibre, fruit etc.
- Radiation, UV light and X-rays are carcinogens.
- **Physical activi**ty – exercise reduces the risk.
- **Alcohol** – increases risk.
- **Hormones** – high level of sex hormones can increase risk.

Treatments

- Prevention is better than cure.
- Early diagnosis.
- Surgical removal – Easiest when the tumour is benign.
- Chemotherapy – using drugs to kill cells in the body. Affects all cells that divide rapidly.
- Radiotherapy – ionising radiation that destroys tissue. Healthy cells suffer less so there are little side-effects.

Future treatments

- Hyperthermia may destroy cancer because the immune system is better at detecting cancer cells.
- It may be possible to create drugs which can locate genes which are responsible for mutating and causing each type of cancer.

Smoking

- Heavy smoking over a long period of time will drastically increase the risk of developing lung cancer.
- There is a strong correlation, but not a causal link.

Conclusive evidence

- Tar in cigarettes contains Benzopyrene (carcinogen)
- Cancer cells were looked at and scientist found that mutations occurred in 3 places in the DNA.

- The gene that mutates is called a tumour suppressor gene.
- This is still not a causal link because smoking does not definitely cause cancer, even though it is very likely to be the cause.
- It is only a correlation because it is a multi-factorial disease.

Coronary Heart Disease

- Largest cause of death in the U.K
- Occurs when one of the arteries supplying heart tissue with oxygen is blocked.
- Heart cells respire anaerobically when there is a blood clot.
- Anaerobic respiration does not release enough energy.
- **Heart attack** – myocardial infarction.
- **Blood clot** – thrombus
- Process of a blood clot forming is called thrombosis.
- If this happens to coronary arteries it is called coronary thrombosis.
- Smoking narrows blood vessels thus increase blood pressure.
- High blood pressure increases the rate at which cholesterol is deposited.
- Exercise can lower blood pressure.
- Diets high in saturated fats will increase the risk of developing coronary heart disease.