Immunity is the ability of an organism to resist infection. Takes two forms:

Passive immunity: produced by the introduction of antibodies into individuals from an outside source/ immunity required immediately/ no direct contact with the pathogen or its antigen/ no lasting immunity.

Active immunity: produced by stimulating the production of antibodies by the individuals own immune system/ direct contact with pathogen and its antigen is necessary/ generally long lasting and is of 2 types:

- **Natural active immunity:** results from an individual becoming infected with a disease under normal circumstances/ body produces its own antibodies and will continue to do so.
- **Artificial active immunity:** forms the basis of vaccination

Vaccination is the introduction of the appropriate disease antigens into the body, either by injection or mouth. **The intention is to stimulate an immune response against a particular disease. The material introduced is called vaccine and in whatever form, contains one or more types of antigen from the pathogen.**

The response is slight because only a small amount of antigen has been introduced. The **crucial factor is that memory cells are produced = these remain in the blood and allow a greater, more immediate response to a future infection with the pathogen.**

Features of successful vaccination programme:

A suitable vaccine must be economically available in sufficient quantities to immunise most of the vulnerable population.

There must be few side effects, if any from vaccination = helps stop discouragement for vaccine.

Means of producing, storing and transporting vaccine must be available.

Means of administering the vaccine at the appropriate time.

Must be possible to create herd immunity.

Herd Immunity:

Arises when a sufficiently large proportion of the population has been vaccinated to make it difficult for a pathogen to spread within population. Important because its never possible to vaccinate everybody in population (for example babies and children – immune system isn't fully developed yet / people who are already ill).

Vaccination

Why vaccination might not eliminate disease:

Vaccination fails to induce immunity in certain individuals (defective immune systems)

Pathogen may mutate frequently = antigens change suddenly rather than gradually = vaccines become ineffective.

There may be so many varieties of a particular pathogen that its almost impossible to develop a vaccine for them all.

Individuals may have objections to vaccination for religious/ ethical or medical reasons.

Vaccine Ethics:

Production of existing vaccines/ developing new ones uses animal testing.

Vaccines have side effects that may cause long-term harm.

How should trials be carried out/ who should they be tested on.

Should the vaccination become compulsory = stronger herd immunity.