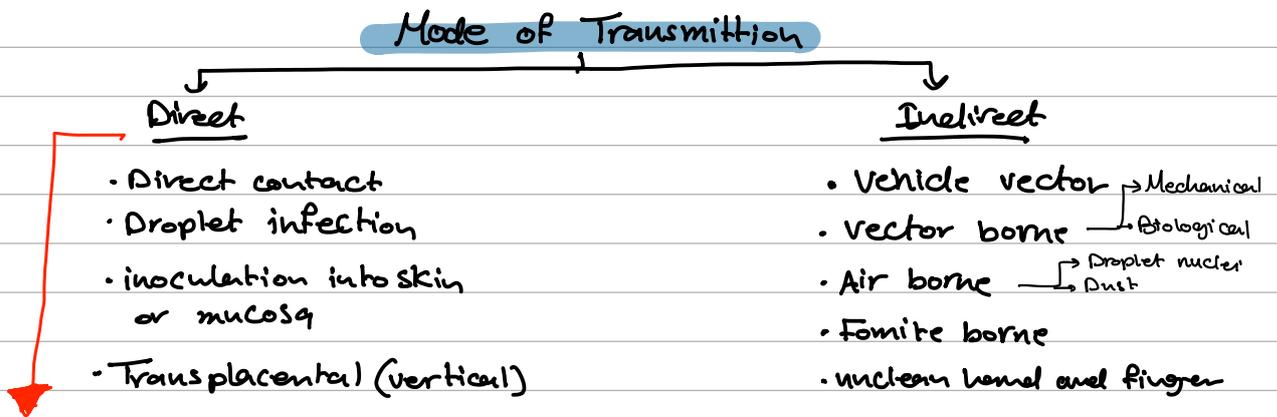


# Epidemiology . 4

\* Mode of transmission depend on :-

1. infectious agent.
2. Portal of entry.
3. local ecological condition

⇒ infectious disease may be transmitted by → one route (typhoid by vehicle transmission)  
↳ several route (AIDS, salmonellosis, HBV, Q Fever, brucellosis)  
multiple transmission route enhance the survival of the infectious agent



## 1. Direct Contact

(touching, kissing, sexual intercourse)

- transmission by direct contact from skin to skin, mucosa to mucosa, mucosa to skin of the same or another person.

- immediate transmission of infectious agent from source or reservoir to susceptible person.

- without an intermediate (3rd object)

→ Direct transmission → reduce the period for which the organism will have to survive outside the host.

↳ ensure a larger dose of infection.

↳ ex: (AIDS, leprosy, skin and eye infection, STI)

## 2. Droplet Infection

- direct projection of droplet (saliva, nasopharyngeal secretions) during coughing, sneezing, spitting speaking and talking into atmosphere

⇒ the droplet may hit directly the conjunctiva, respiratory mucosa or skin of close contact

• Droplet particle → (≥ 10 mm) → filtered off by nose

↳ (≤ 5 mm) → penetrate and reach alveoli

- Droplet spread limited to distance (30-60 cm) between source and host.
- potential of droplet spread increase with:
  - ↳ lack of ventilation.
  - ↳ overcrowding.
  - ↳ Proximity.

ex: common cold - Diphtheria - whooping cough - TB  
meningococcal meningitis

### 3. Inoculation into skin or mucosa

ex: - Rabies virus by dog bites  
- hepatitis

### 4. Transplacental (vertical) transmission

- in-utero passage disease agent transplacentally
- it's a direct transmission
- The disease agent produce malformation of the embryo by disrupting its development.

#### (TORCH)

ex: ① Toxoplasma gondii ② Rubella virus ③ Cytomegalo virus  
④ herpes virus E. varicella virus 6. AIDS  
7 syphilis 8. HBV, HCV

### • Indirect Transmission

- Mechanism of transmission is the traditional 5Fs:  
(Flies - Fingers - Fomites - Food - Fluid)

• The essential requirement for indirect method is:

This depend on:

1. characteristic of the agent

2. inanimate object

3. environmental factor  
(temperature, humidity)

4. if the agent acquired drug resistance (facilitate its spread)

↳ The infectious must be:

① capable of surviving outside the human host in the external environment.

② retaining its basic properties of pathogenesis and virulence till it find a new host

# 1. Vehicle borne

- transmission of the inf. agent through the

(Water, Food, Plasma, blood, Serum, biological Product as tissue and organs)  
↓ (raw vegetable, fruit, milk and its product)

most frequent vehicle of transmission because they used by everyone.

\* the inf. agent: → multiply and develop in the vehicle before being transmitted.

(ex: S. aureus in food)

↳ only passive transmitted in the vehicle (ex: HAV in water)

→ Disease transmitted by water and food mainly cause alimentary tract infection → ex.

1. acute diarrhoeas

2. Typhoid fever    3. Cholera

4. Polio            5. HAV

6. food poisoning    7. Intestinal parasite

→ Disease transmitted by blood → ex:

1. HBV / HCV    2. malaria

3. Syphilis        4. Brucellosis

5. mononucleosis    6. Cytomegalovirus

→ Disease transmitted by organ transplantation.

\* cytomegalovirus in kidney transplant

## \* Epidemiological feature of vehicle transmission:

1] if the contamination dose high → the outbreak be explosive like in cholera, HAV epidemic.

2] cases initially confined to those who are exposed to the contaminated vehicle.

3] when secondary cases occur the Primary may be obscured (unknown)

4] the distance travelled by inf. agent may be great (ex: outbreak in food poisoning)

5] It's not always possible to isolate the inf. agent in the vehicle (like in: typhoid bacilli in contaminated water)

6] The common source of infection is often traceable (can be detected)

7] when the vehicle is controlled or withdrawn the epidemic subside as in cholera

## 2. Vector borne

• Vector: is an arthropod or any living carrier (snail) that transport an inf. agent to a susceptible person.

→ Divide to → Mechanical.

↳ Biological.

### → Mechanical transmission

- by crawling or flying arthropods.

(contamination) ← - soiling of its feet or proboscis or by passage of the organism through GI tract and passively excreted.

- no development or multiplication of the inf. agent on or within the vector.

### → Biological transmission

- The inf. agent undergo replication or development or both in vector.

• require incubation period before vector can transmit.  
(extrinsic incubation period)

→ Have 3 type:

#### 1 Propagative

: agent merely multiply in vector, but no change in form (no development)

ex: Plague bacilli in rat fleas

#### 2 Cyclo-propagative

: agent change in form and number.

ex: malarial parasite in mosquito.

#### 3 Cyclo-developmental

: agent only develop but no multiplication.

ex: microfilaria in mosquito

#### \* Transovarian transmission

: inf. agent vertically transmitted from the infected female to her progeny (offspring)

in the vector (ex: like in arthropod)

\* Factor influencing the ability of vectors to transmit disease :

- 1] host feeding preference
- 2] infectivity (ability to transmit the disease agent)
- 3] susceptibility: (ability to become infected)
- 4] survival rate of vectors in the environment
- 5] Domesticity (degree of association with man)
- 6] suitable environmental factor

note: seasonal occurrence of some disease (malaria) to intense breeding and greater density of insect vector in certain period of year.

### 3 Air-borne

① **Droplet nuclei** :- are type of particle implicated (related) to spread of air borne infection.

- they are tiny particle (1-10) micron that represent dried residue of droplet

- may remain for long time  $\left\{ \begin{array}{l} \text{some retain infectivity or virulence} \\ \text{some loss} \end{array} \right.$

- keep floating in the air and may disseminate to other site of origin by air current.

- particle (1-5) liable to easily drawn into the alveoli and remain there.

• Disease spread by droplet nuclei :

- ① TB
- ② influenza
- ③ measles
- ④ Q fever
- ⑤ respiratory infections

2. Dust : - larger droplet expelled (by talking, coughing, sneezing) settle down by their weight on the immediate area (floor, clothes, furniture, bedding, carpet, linen) and become part of the dust.

↳ some survive for long period at favourable condition (like tubercle bacilli)

- Airborne dust ↗ inhale  
↳ settle on uncovered food and milk.

\* This type of transmission most common on hospital acquired (nosocomial) infections.

#### 4. Fomite borne (singular - fomes)

- inanimate article other than food and water contaminated by infectious discharge from patient and capable of harbouring and transferring inf. agent to healthy person.

• HAV • **intestinal parasite**  
like: (clothes, towels, cups, spoon, door handle, syringe, books, ...)

↳ play important role in indirect transmission,

\* Disease transmitted by fomites:

- ① Diphtheria
- ② Typhoid
- ③ Bacillary dysentery
- ④ HAV
- ⑤ eye and skin infection.

#### 5. Unclean hand and finger

\* Hand are the most common medium by which pathogenic agent are transferred to food from (skin, bowel, nose, from other food)

• The transmission ↗ Directly (hand to mouth)  
↳ indirectly

↳ Unclean hand and fingers imply lack of personal hygiene which associated with poor sanitation.

ex: ① Staph. and strept. infection    ③ Dysentery    ⑤ intestinal Parasite  
② HAV    ④ Typhoid

## Portal of entry to new host

respiratory tract

GI tract

GU tract

skin and mucous membrane

→ affecting its → then passing to  
layer systemic circulation

\* Piercing skin through inoculation by:

1. insect

2. During blood letting

3. Transplacental

note

some pathogen have one portal of entry and

2 or more portal of exit from reservoir (e.g.) - Salmonella typhi  
- Poliomyelitis virus

incubation period :- time between entrance and start of  
manifestation.

↓  
extrinsic

↓  
intrinsic

- time of contact and entry of agent and onset of  
illness.

Extrinsic incubation Period period between that time when vector gets infected  
and time vector become infected.

Intrinsic incubation Period interval between infection of  
susceptible person or animal and appearance of  
signs and symptoms.

\* Variation in range and duration in incubation period  
depend on:

① resistance of host

② Dosage and virulence of agent.

③ Type of agent with regard of toxin Production

④ Route of infection inside body.