

UNIT 2 VIRAL DISEASES

HIV/AIDS



Introduction

- HIV stands for Human Immuno-deficiency virus.
- If it is not treated it can lead to acquired immunodeficiency syndrome (AIDS).
- HIV specially attacks the body immune system the CD4 cells (T cells)

The immune system of an HIV-infected person becomes so weakened that it cannot protect itself from serious infections. When this happens, the person clinically has AIDS.

Acquired Immune Deficiency Syndrome

- A “syndrome” is a group of symptoms & signs associated with the same underlying condition
- The variety of opportunistic infections & cancers cause a variety of symptoms & signs
- This group of illnesses with their symptoms & signs makes up the syndrome “AIDS”

Contd..

- AIDS was first identified in USA in 1981 when numbers of gay men started to develop life threatening opportunistic infections like pneumonia, tuberculosis and cancers.
- In 1981 AIDS was first identified among gay men in USA.(WHO)
(Karki S. HIV/AIDS Situation in Nepal: Transition to Women. 2008)
- The disease was detected for the first time in Nepal 1988.

Stages of HIV infection

Stage 1: No AIDS-defining condition

- CD4 count of ≥ 500 cells/ μL or CD4 percentage of total lymphocytes of ≥ 29

Stage 2: No AIDS-defining condition

- CD4 count of 200–499 cells/ μL or CD4 percentage of total lymphocytes of 14–28.

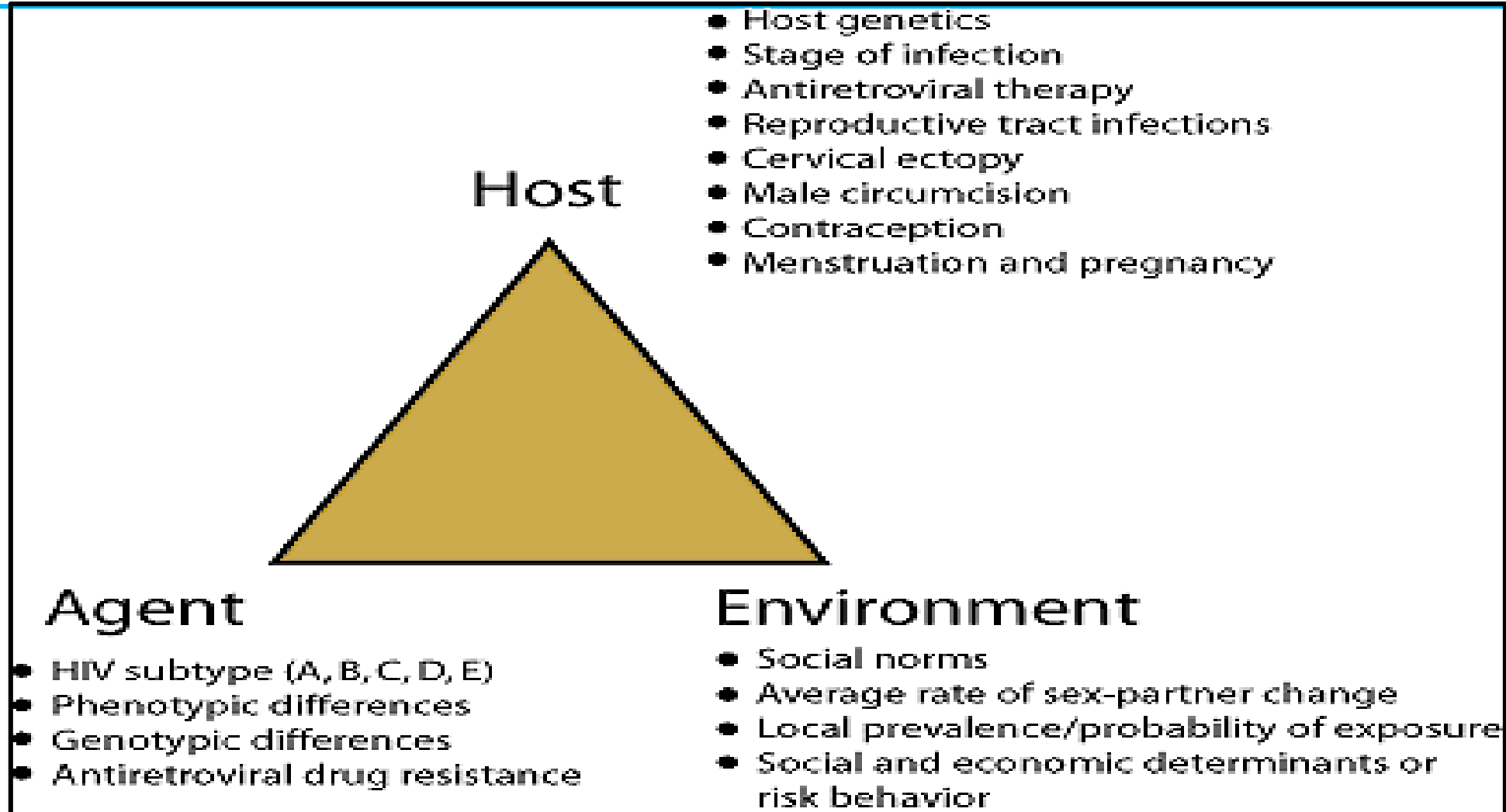
Stage 3 (AIDS): AIDS-defining condition

- CD4 count < 200 cells/ μL or CD4 percentage of total lymphocytes < 14

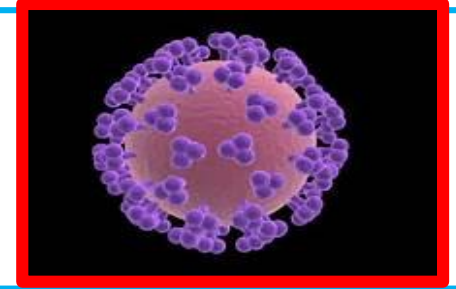
HIV infection, stage unknown:

- No reported information on AIDS-defining conditions and no information available on CD4 count or percentage.
- AIDS (Acquired immune deficiency syndrome) is the final stage of HIV infection, which causes damaged to the immune system.

Epidemiological Triad of HIV/AIDS



Agent



- Human Immunodeficiency virus(HIV) An RNA virus
- Virus destroy human T4 helper cells a subset of human T-lymphocytes.
- Virus can pass through blood –brain barrier and then destroy some brain cell.This may accounts for certain neurological and psychomotor abnormalities.
- Type of HIV: HIV-1 and HIV-2

Host Factors

Higher Risk group:

Age: 20-49yrs

Sex: HIV infects people of any sex

Europe and Australia: 51% homosexual
or bisexual man

Africa: Sex ratio is equal

- Prostitutes(heterosexual)
- Male homosexual and bisexual
- Intravenous drug abuser
- Transfusion recipient of blood and blood product
- Hemophiliacs and clients of
- STD.

Source: K. Park 23rd edition

Environment Factors

- Social norms
- Average rate of sex partner change
- Condom self efficacy
- Local prevalence
- Probability of exposure
- Social and economic determinants

Global Scenario

- HIV remains a major global public health issue, having claimed 40.4 million [32.9–51.3 million] lives so far with ongoing transmission in all countries globally; with some countries reporting increasing trends in new infections when previously on the decline.
- There were an estimated 39.0 million [33.1–45.7 million] people living with HIV at the end of 2022, two thirds of whom (25.6 million) are in the WHO African Region.
- In 2022, 630 000 [480 000–880 000] people died from HIV-related causes and 1.3 million [1.0–1.7 million] people acquired HIV.

<https://www.who.int/news-room/fact-sheets/detail/hiv-aids>

Contd..

- WHO, the Global Fund and UNAIDS all have global HIV strategies that are aligned with the SDG target 3.3 of ending the HIV epidemic by 2030.
- By 2025, 95% of all people living with HIV (PLHIV) should have a diagnosis, 95% of those should be taking lifesaving antiretroviral treatment (ART) and 95% of PLHIV on treatment should achieve a suppressed viral load for the benefit of the person's health and for reducing onward HIV transmission.

<https://www.who.int/news-room/fact-sheets/detail/hiv-aids>

HIV/AIDS Situation in Nepal

- Antiretroviral therapy (ART) services began in February 2004 at Sukraraj Tropical and Infectious Disease Hospital in Kathmandu, Nepal.
- ART is provided free of charge to all People Living with HIV (PLHIV). As of July 2023, there are 85 operational ART sites and 46 ART Dispensing Centers across 76 districts in Nepal.
- Since February 2017, Nepal has adopted the Test and Treat approach, guided by the National HIV Testing and Treatment Guidelines of 2022. CD4 count services are available at 17 sites across 16 districts.

<https://www.ncasc.gov.np/information/93>: 2023

World AIDS Day Factsheet

Contd..

- The HIV epidemic has evolved from a 'low Prevalence' to concentrated epidemic' i.e. a low prevalence of HIV infection in the general population but a higher prevalence in specific sub-population; people who inject drug (PWID), men who have sex with men (MSM), transgender people (TG), male sex workers (MSW), female sex workers (FSW) and male labor migrants (MLM) as well as their spouse.

National HIV Strategic Plan

2021-2026



Government of Nepal
Ministry of Health and Population
National Centre for AIDS and STD Control
Toku, Kathmandu

VISION

- Ending AIDS epidemic in Nepal by 2030

MISSION

- To provide inclusive, equitable and accessible services throughout the HIV care continuum

GOALS

- To prevent new HIV infections
- To improve HIV related health outcomes of PLHIV
- To reduce HIV related inequalities among PLHIV and KPs

TARGETS BY 2026

1. Identify 95 % of the estimated PLHIV
2. Treat 95 % of people diagnosed with HIV
3. Attain viral load suppression for 95 % of PLHIV on ART
4. Reduce 90% of new HIV infections (baseline as of 2010)
5. Eliminate vertical transmission of HIV
6. Achieve case rate of congenital syphilis of ≤ 50 per 100 000 live births

PRIORITIES

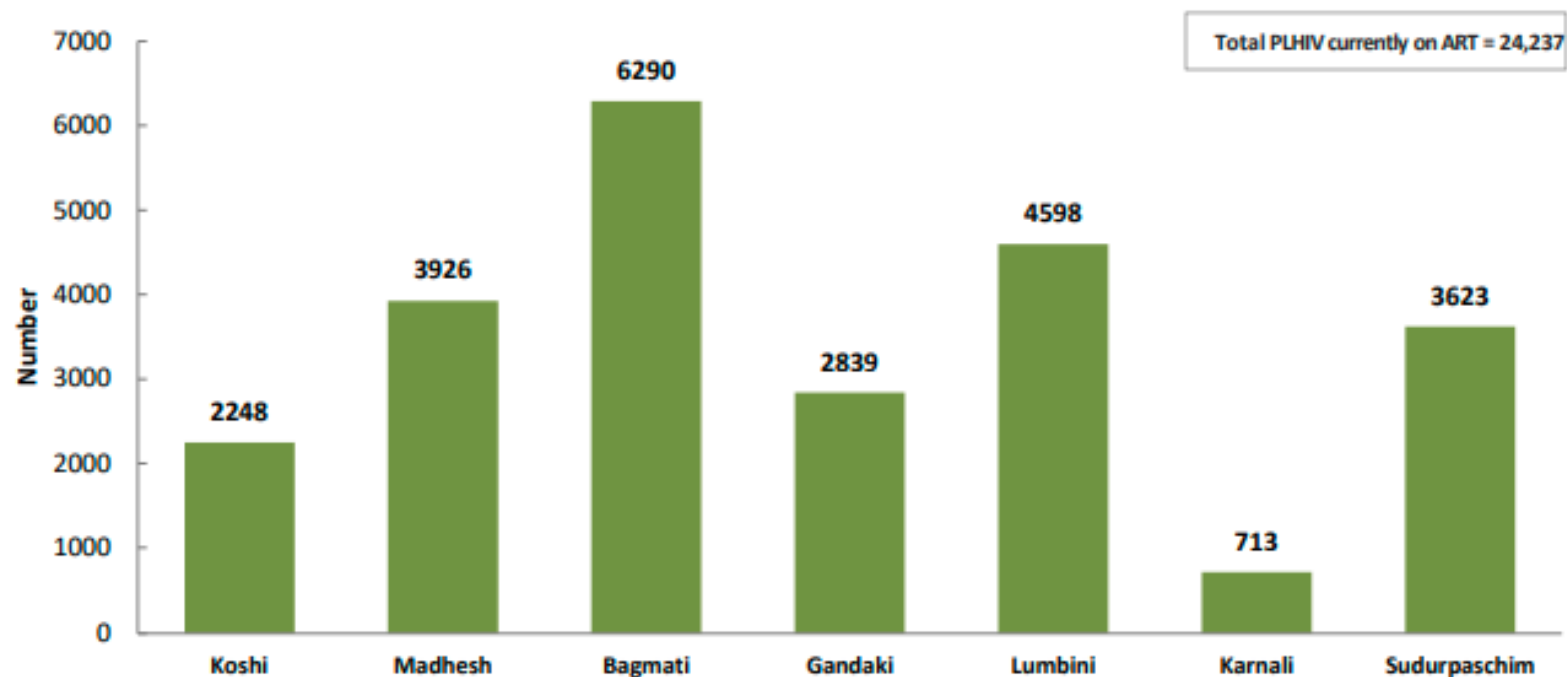
1. Accelerating HIV prevention services among key populations.
2. Expanding innovative and effective testing approaches with universal access to comprehensive treatment, care, support, VL testing and suppression services.
3. Elimination of vertical transmission and syphilis.
4. Scaling up of HIV-sensitive social protection services to key and vulnerable populations.
5. Addressing human rights and gender in HIV response.
6. Strengthening effective, inclusive and accountable HIV governance.

Table 3.1 Facts on ART, FY 2079/80

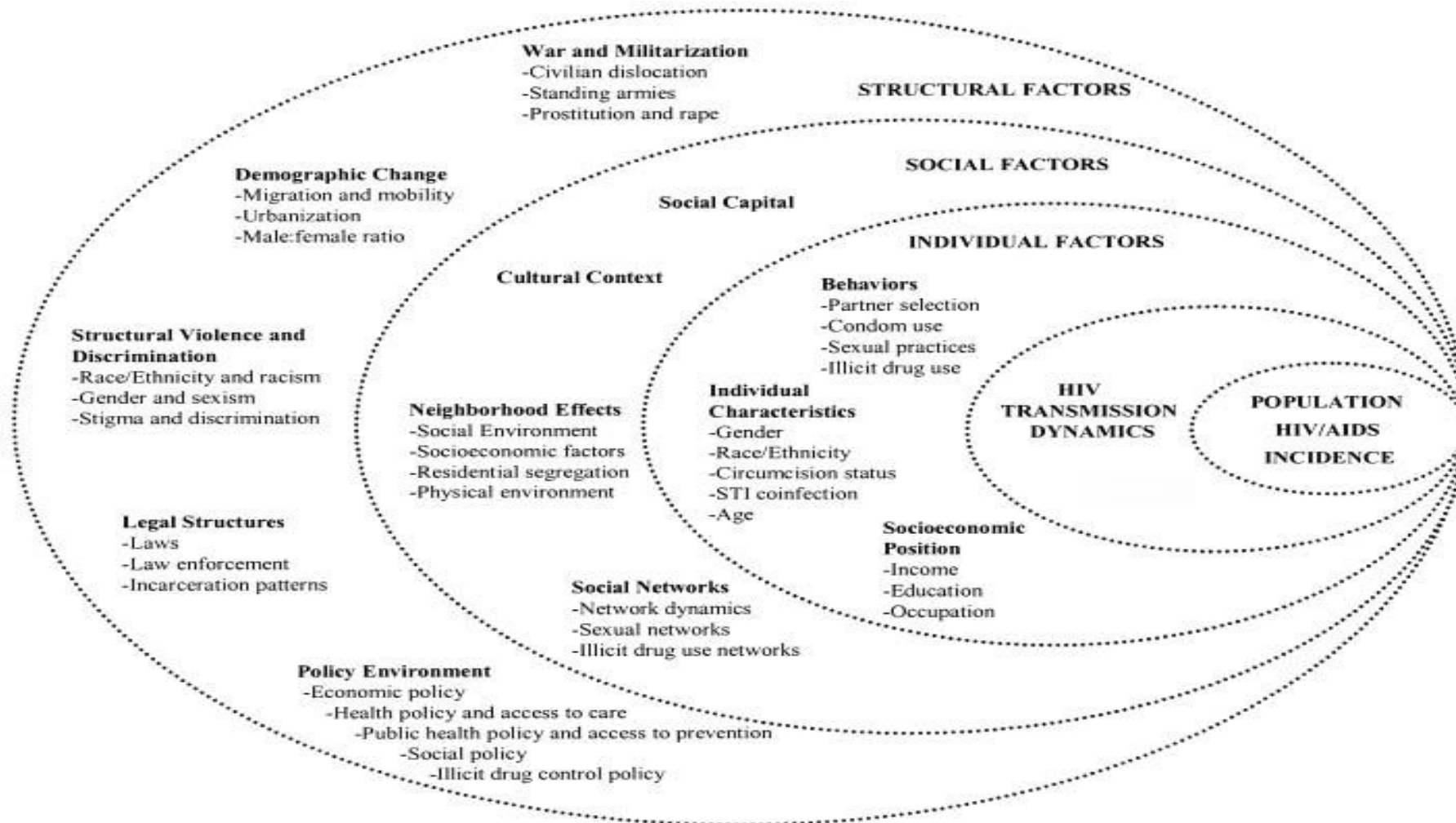
Indicators	Value
Total PLHIV currently on ART	24,237
Adult Male (15+ years) currently on ART	12,038
Adult Female (15+ years) currently on ART	10,757
Transgender (15+ years) currently on ART	439
Child (0-14 years) currently on ART	1,003

Source: IHMIS/DHIS2 Routine program data, FY 2079/80

Figure 3.1 People on ART by Province as of FY 079/80



Epidemiological determinants



Mode of transmission



**Semen and Vaginal
Fluids**



**Sharing Needles
& Syringes**



**Needle Stick
Injury**



**Through Infected
Blood**



**During Pregnancy
or Birth**



Breast Feeding

HIV Is **NOT** Transmitted By



Air or Water



Saliva, Sweat, Tears, or
Closed-Mouth Kissing



Insects or Pets



Sharing Toilets,
Food, or Drinks

Coughing, Sneezing

Touching

Hugging

Sharing water, Food

Public Baths/Pool

Handshakes

Sharing Cup/Glasses or other Utensils

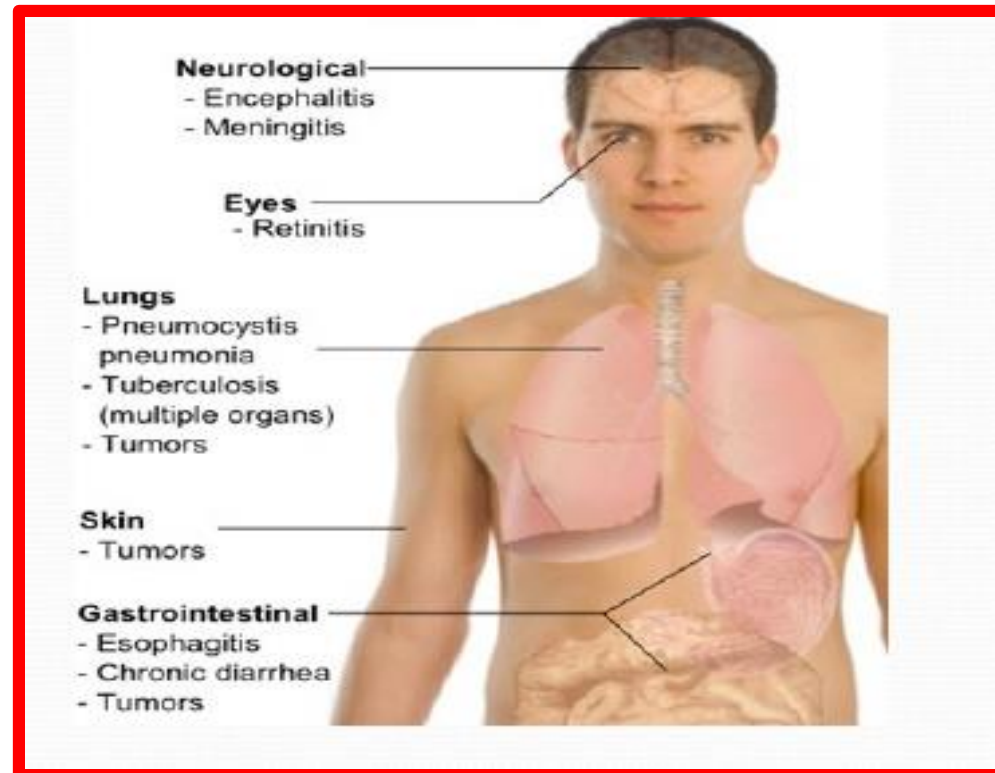
Signs and symptoms

SYMPTOMS MAY START APPEARING 2 TO 6 WEEKS AFTER CONTRACTING THE INFECTION





**White Spots or
Unusual Blemishes
on the Tongue, in
the Mouth, or in the
Throat**



Neurological

- Encephalitis
- Meningitis

Eyes

- Retinitis

Lungs

- Pneumocystis pneumonia
- Tuberculosis (multiple organs)
- Tumors

Skin

- Tumors

Gastrointestinal

- Esophagitis
- Chronic diarrhea
- Tumors

Incubation period

- **Window Period:**

6 weeks to 3 months

- **Incubation Period:**

uncertain(from few month to 10yrs from HIV infection to development of AIDS)

Laboratory Diagnosis

- Screening Test
 1. ELISA (Sensitive test)
 2. Western Blot
(Confirmatory test)
- Virus Isolation



Laboratory Diagnosis: ELISA and Western blot

- ELISA: Enzyme Linked Immunosorbent Assay
- Detects presence of HIV antibodies in a blood
- Positive ELISA test is followed by western blot
- ELISA test is rapid test while WB takes longer time
- Viral isolation can be also performed but its applicability is limited due to complexity of technique

Treatment and management

- ARV chemotherapy have proved to be useful in prolonging the life of severely ill patients.
- ARV suppress the HIV replication.
- Specific prophylaxis treat manifestation of AIDS (E.g. 300 isoniazid daily for 9 month to 1 years against M. tuberculosis)

Prevention and control

Primordial

- Discouraging people to adopt harmful behavior

Primary: Primary HIV prevention refers to activity focused on preventing uninfected people becoming infected.

- **Health education:**

- avoiding indiscriminate sex
- Using condoms
- Avoid use of shared razor & toothbrush
- Avoid sharing of needles and syringe
- High risk group should avoid pregnancy
- Widely availability of IEC/BCC material and involvement of mass media in P3CE activities.

- **Peer group education:**

- **School Curriculum**

Prevention and control

- **Most at Risk population**
 - Prostitutes(heterosexual)
 - Male homosexual and bisexual
 - Intravenous drug abuser
 - Transfusion recipient of blood and blood product
 - Hemophiliacs and patients of STD.

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- **Behavioral modification** : Blood transfusion , needle sharing, multiple sexual partner, mother to child transmission
- **Specific protection**
 - Prevent cross infection from infected to non –infected patient
 - Safe guard the health care personnel who are at risk of getting infected
 - Avoid infection getting into the society through hospital wastes.
 - Use condoms

Contd..

- **Secondary:** Secondary HIV prevention aimed at enabling people with HIV to stay well (i.e. testing to allow people to know their status: welfare rights advice: lifestyle behavior: anti discriminatory lobbying)
- **VCT**
- **Screening test:** Western blot, elisa
- **Diagnostic test**

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Tertiary:

- Tertiary HIV prevention aims to minimize the effects of ill health experienced by someone who is symptomatic with HIV disease

Rehabilitation:

- **Economic:**

- Social security fund
- Employment creation

- **Social:**

- Convey acceptance, warmth, respect, empathy and confidentiality
- Increased social interaction
- Make a positive contribution they can leave behind when they die
- Policy and programmes development

HEPATITIS

Introduction

- Hepatitis is an inflammation of the liver that is caused by a variety of infectious viruses and noninfectious agents leading to a range of health problems, some of which can be fatal.
- There are five main strains of the hepatitis virus, referred to as types A, B, C, D and E. While they all cause liver disease, they differ in important ways including modes of transmission, severity of the illness, geographical distribution and prevention methods. (WHO)

- Viral hepatitis is a common infection of the liver, resulting in hepatic cell destruction, necrosis, and autolysis.
- In most patients, hepatic cells eventually regenerate with little or no residual damage.
- However, old age and serious underlying disorders make complications more likely.
- Hepatitis D virus is also known as "delta hepatitis" and is considered the most severe form of viral hepatitis (hepatitis caused by a virus) in humans.

Causes

- The five major forms of viral hepatitis result from infection with the causative viruses: A, B, C, D, or E.

Type	Causative agent	Incubation period	Common modes of transmission
Hepatitis A	Enterovirus (picornavirus)	15-45 days	Faecal –oral , sexual
Hepatitis B	Hepadnavirus	45-180 days	Sexual, perinatal, percutaneous
Hepatitis C	Hepacivirus (Flavivirus)	15-60 days	Parenteral
Hepatitis D	Viriods like	30-180 days	Sexual, perinatal, percutaneous
Hepatitis E	Calicivirus (alphavirus like)	15-60 days	Faecal-oral

Sign and Symptoms

Hepatitis A	Hepatitis B	Hepatitis C	Hepatitis D	Hepatitis E
-nausea, vomiting, – stomach pain, anorexia. – mild fever, – dark color urine, jaundice may appear within few days. – The disease is rarely fatal & most people recover in a few weeks without any complications.	-Yellowing of the skin and eyes (jaundice) -Dark urine -Extreme fatigue - nausea and vomiting -Muscle and joint pain -Abdominal pain -Loss of appetite -Rashes -Pain in the right-hand side of the abdomen -Fever	Acute symptoms- fever, fatigue, decreased appetite, nausea, vomiting, joint pain, jaundice etc. – Patient with hepatitis C are susceptible to severe hepatitis if they contract either hepatitis A or B.	Symptoms are similar to those of hepatitis B fever loss of appetite nausea and vomiting abdominal pain (especially in the right upper abdomen) yellow skin and eyes (jaundice) (see image) dark urine and pale faeces muscle and joint pain rash.	HEV in pregnancy: Fulminant form is common in Hepatitis E infection during Pregnancy (up to 20% cases) with a high case fatality rate (up to 80%) HEV in pregnancy: Fulminant form is common in Hepatitis E infection during Pregnancy (up to 20% cases) with a high case fatality rate (up to 80%)

Prevention / Control

Hepatitis A	Hepatitis B	Hepatitis C	Hepatitis D	Hepatitis E
-Control of reservoir & transmission -HAV can be disinfected by formalin, UV rays, boiling 5 minutes or autoclaving	-Hepatitis B vaccine -Hepatitis B immunoglobulins (HBIG)	Combination of antiviral with interferon is the line of hepatitis C treatment.	Practice safer sex – use condoms consistently and correctly. Injecting drug users should never share injecting equipment. If required to handle blood or body fluids, the use of standard precautions will reduce the risk of spreading hepatitis D virus. Infected health care workers must comply with the requirements of their professional boards. Any open sores, cuts or abrasions should be covered with waterproof dressings	Hepatitis "B" Vaccine – Environmental Sanitation Hepatitis "B" Vaccine – Environmental Sanitation

- Hepatitis A can cause epidemic jaundice
- Hepatitis E is fulminant to pregnancy can cause abortion, intrauterine foetal deaths, increase perinatal mortality & morbidity.
- All hepatitis are transmitted through body fluid **except A and E**, they are feco- orally transmitted majorly.
- All of the viral hepatitis are RNA virus except Hep B

Status of Nepal

- Nepal is categorized as low prevalence country for viral hepatitis B and C among general population (HBV 0.9% and 0.38% HCV). However, the prevalence is higher among specific risk populations such as people living with HIV, people who inject drugs and sex-workers.

Table 2: Prevalence of Hepatitis B and C in Nepal

Population	Hepatitis B	Hepatitis C
General population	0.9 %	0.38%
Children under 5	0.3%	NA
Blood donors	0.8%	0.38%
Pregnant women	0.5%	0.38%
PWID	3.5%	27.48%
PLHIV	4.6 %	26.17%

Source: NCASC/WHO regional estimates (2019)

Hepatitis A (Infectious hepatitis, Epidemic hepatitis, Epidemic jaundice, Catarrhal jaundice, Type A hepatitis)

Epidemiological feature:

A. Agent factor

Agent: Hepatitis A virus(HAV), a type of enterovirus of the family picornaviridae. HAV is a non-enveloped RNA virus that multiplies only in the liver cells. In the environment, it is relatively stable for months.

- **Reservoir:** only human

B. Host factor:

- **Age:** Although people of all ages are susceptible to HAV, the prevalence rate is higher in children than adults. In developing countries with poor hygienic conditions, nearly all children are infected with HAV before the age of 9. however, the severity of illness increases with age.
- **Sex:** both sexes are equally affected.
- **Other factor:** travellers to endemic area, IDUs, and MSMs are at increased risk for HAV or its complications.

C. Environmental factor:

- **Temporal pattern:** there is no appreciable seasonal variation in hepatitis A incidence.

Mode of Transmission

- Fecal-oral route
- Food borne
- Fomite borne
- Water borne
- Person to person contact
- Anal-oral sexual contact
- Blood transfusion, rarely

Period of communicability:

Viral shedding persists for 1 to 3 weeks. Infected person are most communicable 1 to 2 weeks before the onset of illness.

Sign and Symptoms

- I.P:28 days, range 15-50 days
- Infants and young children are mostly asymptomatic or may have mild illness with jaundice often being absent, whereas, usually symptomatic and with jaundice in older children and adult.
- In symptomatic cases, clinical course is similar to other acute viral hepatitis and includes sudden onset of fever, malaise, anorexia, nausea, and abdominal discomfort. Few days later, dark urine and jaundice are observed.
- Diagnosis:
 - Blood test
 - PCR
- A blood test indicating IgM anti HAV antibodies confirms recent infection. A blood test indicating IgG antibodies alone are evidence of past infection.

Treatment

- There is no specific treatment for HAV infection.
- Supportive management includes:
 - Adequate rest,
 - Nutritional balance,
 - Replacement of fluids that are lost from vomiting and diarrhoea.

Prevention and control

- Inactivated hepatitis A vaccines are available.
- Good hygiene, i.e. hand washing, use of sanitary latrine etc
- Hygienic food handling
- Not sharing utensils, tooth brushes, towels and face washers with infected persons.
- Nappies of HAV infected infants should be disposed off or thoroughly washed.
- Health education

Hepatitis B (Serum hepatitis, Type B hepatitis, homologous serum jaundice)

A disease caused by a hepatitis B virus that affects the liver.

- **Adults usually recover with hepatitis B.**
- **However most infants infected at birth become chronic carriers i.e. they carry the virus for many years and can spread the infection to others.**

Epidemiological feature

A. Agent factor:

- Agent: Hepatitis B virus (HBV) of the family Hepadnaviridae.
- It is enveloped virus containing a partially double stranded DNA genome. It contains numerous antigenic components, including HBsAg, HBcAg, and HBeAg.
- Reservoir: only human beings

- B. Host factor:
- Age: in endemic countries, most cases of HBV occur perinatally or in early childhood.
- Sex: males are more likely to remain persistently infected than female.

Mode of Transmission

- The virus is carried with contact the blood
- Un-safe injection or needle stick.
- Un-sterilized needles or syringes
 - can transfer from patient or a needle user.
- By mothers to their babies during the birth process
- children during social contact through cuts, scrapes, bites, and scratches.
- During sexual intercourse

Signs and symptoms

- The incubation period averages 6 weeks – 6 months
- Young children is asymptomatic but chronic carriers .
- People without symptoms may feel weak and stomach upsets and other flu-like symptoms.
- Very dark urine or very pale stools.
- Jaundice is common (yellow skin or a yellow colour in the whites of the eyes).
- last several weeks or months.
- A laboratory blood test is required for confirmation.
- Adults with acute infection recover completely

Complications of Hepatitis B

- Severe and lead to death
- chronic hepatitis
- Cirrhosis
- liver failure
- liver cancer
- chronic infection.

Treatment for hepatitis B

- There is no treatment for the acute condition
- Supportive treatment is indicated
- Chronic infection can sometimes be reduced

How is Hepatitis B prevented?

- All infants receive three doses of hepatitis B vaccine during the first year of life.
- A combined vaccine for diphtheria, tetanus, pertussis, hepatitis B (HepB), and *Haemophilus influenzae* type b (Hib) available.
- Easiest if the three doses of hepatitis B vaccine are given at the same time as the three doses of DTP.
- Some countries also recommend immunizing adolescents, health workers and other risk groups.

How do we control Hepatitis B

The disease can be controlled basically by three measures:

- Preventive measures
- Case management
- Epidemic measures

Preventive measures:

- The transfusion of blood only after proper screening
- Rejecting the blood from the persons having the history of hepatitis or drug addiction
- Conducting the surveillance of all post transfusion hepatitis and maintaining of list of the donors who donated the blood.
- Sterilization of all essential syringes, needles and tools for inoculation or penetration.
- Provide vaccine to all infants who have missed the vaccine
- Improve immunization coverage

Case management:

- Isolation of the patients and proper care to the hospitalized cases

Epidemic measure:

- Intensify the search for detection of the cases when two or more cases are found
- Search may be in debt among the drug addicts
- Contact all cases of recently blood recipients and test for the disease.

Hepatitis C

- A. Agent factor:
 - Agent: Hepatitis C virus(HCV). It is small, enveloped, single stranded RNA virus, classified into genus Hepaci virus within the Flaviviridae famaily.
 - Reservoir: only human
- B. Host factor:
 - Sex: no sexual predisposition.
 - Other risk factor: unsafe behavior involving the use of contaminated needles for injecting drugs, acupuncture, piercing or tattooing, transfusion of blood not screened for HCV; exposure to infected blood, and unprotected sex with multiple partners.
- C. Environmental factor:
 - Temporal pattern: no seasonal distribution

Mode of Transmission

- By parental routes
- Vertical transmission
- Sexual transmission, rarely

Period of communicability:

- From one or more weeks before onset of the first symptoms and may persist indefinitely in the chronic carrier stage.

Signs/Symptoms

- I.P: 2 weeks to 6 month.
- Most infection with HCV are asymptomatic.
- In symptomatic cases, fever, fatigue, loss of appetite, nausea, vomiting, abdominal pain, dark urine, grey coloured stools, joint pain, and jaundice. HCV infections are silent in nature because they cause severe damage to liver without causing any symptoms.

Complications:

- Chronic HCV infection
- Chronic carrier-75-85 % infected persons
- Hepatocellular carcinoma (HCC), liver failure, cirrhosis and death

Diagnosis:

- Serological tests

Treatment:

- Combination of antiviral therapy with interferon and ribavirin.
- Two new therapeutic agents, telaprevir and boceprevir, have recently been licensed.

Prevention and control

- There is no vaccine, immune globulin (IG) or prophylaxis products available to prevent HCV infection.
- Only means of prevention are universal precautions and safe injection practices.
- Primary prevention includes: screening and testing of blood and blood products, organ and use of single use of equipment, sterile equipment for tattooing, piercing and acupuncture.

Hepatitis D (Delta hepatitis)

A. Agent factor:

- Agent: Hepatitis delta virus (HDV), single stranded RNA virus.
- Reservoir: Human

B. Host factor:

- Age: all age groups
- Other risk factor: chronic HBV carriers are at risk for infection with HDV. Other includes: IDUs using HDV contaminated needles, infection during pregnancy, homosexual behaviors and blood transfusion without screening with HDV.

MOT

- Percutaneous route and similar to HBV infection.
- S/S
- I.P: 3-7 weeks
- HDV infection in the absence of HBV will not cause any illness.
- Infection with HDV and HBV (super infection) is associated with more severe liver disease than HBV infection alone.
- Co-infection of HBV and HDV are usually acute and self limiting. The co-infection may lead to chronic form of hepatitis D in less than 5 % of co-infected persons.
- The general clinical feature are similar to other viral hepatitis.

Complication:

- Severe chronic active hepatitis
- Liver cirrhosis
- Hepatocellular carcinoma

Diagnosis

- Serological tests
- PCR

- **Treatment:**

- Currently there is no specific treatment for hepatitis D.
- Improve with administration of a low dose of interferon.
- For severe acute and end stage chronic hepatitis D, liver transplantation may be effective.

Prevention and control

- Since HDV is dependent on HBV for replication, thus preventive measures should be aimed at preventing HBV that will ultimately prevent the transmission of hepatitis D.
- Hence, although there is no vaccine for HDV; HBV vaccination or post exposure prophylaxis to HBV is recommended for non-chronic HBV carriers, to avoid HBV-HDV co-infection.
- Other preventive measures of HBV infection.

Hepatitis E

A. Agent factor:

- Agent: Hepatitis E virus, non-enveloped, single stranded RNA virus of the genus Hepevirus.
- Reservoir: Natural reservoir is human but animal species may also act as reservoir

B. Host factor:

- Age: Commonly occur among older adolescents and young adults (aged 15-44 years). In developed countries, common in more than 45 years of person.
- Sex: although affect both gender, pregnant women are at high risk of severe illness including death.
- Other risk factors: poor sanitation, poor personal hygiene, open defecation, crowded living condition and tropical climates.
- C. Environmental factor:
- Temporal pattern: Cases of HEV peaks with rainy seasons and floods which favors transmission of water borne disease.

MOT:

- Fecal-oral route
- Contamination drinking water is most common source of infection
- Contamination of food
- Transfusion of infected blood
- Vertical transmission

Period of communicability: not clearly understood but virus excretion in stool has been demonstrated up to 14 days after the jaundice.

- I.P: 40 days, range 15-60 days
- HEV is a self limiting disease with clinical characteristics similar to that of hepatitis A.
- It usually result in an acute infection and does not lead to a chronic infection.
- The disease is mostly asymptomatic or causes a very mild illness without jaundice in children that goes undiagnosed.
- Symptomatic infection is most common in young adults aged 15-40 years.

Complication

- Rarely, acute liver failure, and death during pregnancy.
- Chronic hepatitis E infection in immune compromised people.
- **Diagnosis**
- Same as in HAV
- Epidemiological investigation

Treatment

- There is no specific treatment.
- The disease is usually self limiting and treatment is only supportive.
- Maintenance of hydration, adequate rest, and nutrition and avoidance of alcohol.
- Hospitalization incase of pregnant women

Prevention and control

- There is no vaccine for HEV.
- Good personal hygiene and availability of clean drinking water.
- Boiling and chlorination of water.
- Maintaining hygienic practices

Poliomyelitis

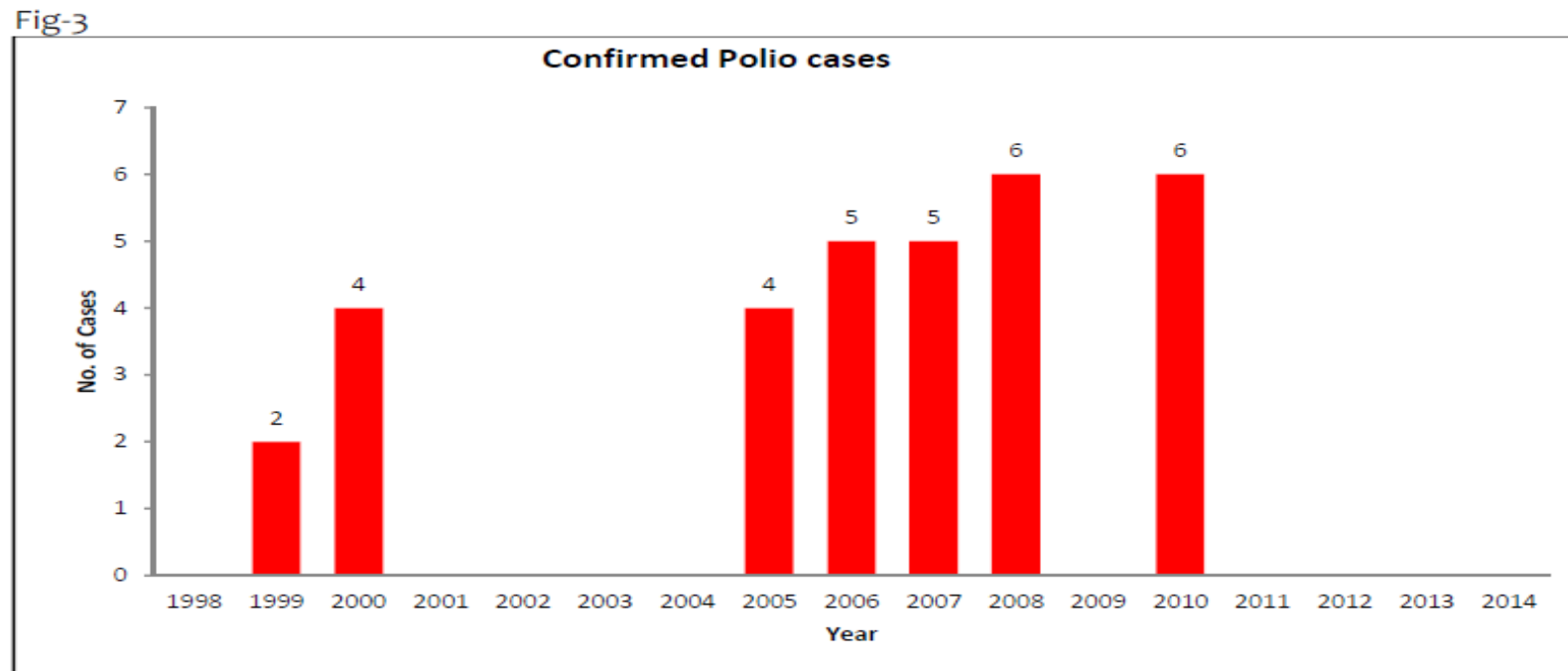
Poliomyelitis

- Poliomyelitis is an acute viral infection caused by polio virus.
- It is a disabling and life-threatening disease spreads from person to person and can infect a person's spinal cord, causing paralysis (can't move parts of the body).

- Since 1998, WHO has been providing continued technical assistance to the Government of Nepal on polio surveillance. In 2014, Nepal was declared polio-free by WHO after maintaining polio-free status for three consecutive years.

Polio status in Nepal

- Nepal reported 32 confirmed cases of polio since 1998. The table below shows the number of confirmed WPV cases by year, serotype and district from 1998-2014.



Polio Cases in Nepal, 1998-2014

- The last indigenous case in the country was reported in 2000 (4 cases), and Nepal remained polio free for the ensuing four years from 2001 to 2005.
- However, 4-6 cases of polio imported from neighboring country were detected yearly in 2006-2010 with the exception of 2009. Nepal and India have an open boarder with strong socioeconomic relationship and high mobility for employment.

Environmental factors/ mode of transmission

- More likely to occur during the rainy season
- The environmental sources
 - Contaminated water, food and flies
 - Overcrowding and poor sanitation

Mode of transmission

- Faecal - oral route –
 - directly through contaminated fingers
 - directly through contaminated water, food, flies
- Droplet infection - may occur in acute phase

Clinical features

Four types of poliovirus infection

- **In apparent (sub clinical) infections**
 - About 95% cases of poliovirus infection are asymptomatic
 - Mild, transient, and influenza like illness
- **Abortive polio**
 - Minor illnesses
 - Occur in 4 - 8% cases of infections
- **Non - paralytic polio**
 - Occurs in about 1% of cases
 - Symptoms include headache, neck stiffness and back pain
 - The disease lasts within 10 days

- **Paralytic polio**

- Occurs in about 1% of all infection
- Virus invades central nervous system and cause flaccid paralysis
- Other symptoms - malaise, anorexia, nausea, vomiting, headache, sore throat, constipation and abdominal pain
- The symptoms of paralysis start at the hip and move to the distal parts
- These symptoms develop within 3-21 days

Signs and Symptoms

- About 1 out of 4 people (or 25 out of 100) with poliovirus infection will have flu-like symptoms that can include:
 - Sore throat
 - Fever
 - Tiredness
 - Nausea
 - Headache
 - Stomach pain
 - These symptoms usually last 2 to 5 days, then go away on their own.

- A smaller proportion of people with poliovirus infection will develop other more serious symptoms that **affect the brain and spinal cord.**
- Meningitis (infection of the covering of the spinal cord and/or brain) occurs in about 1–5 out of 100 people with poliovirus infection, depending on virus type.
- Paralysis (can't move parts of the body) or weakness in the arms, legs, or both occurs in about 1 out of 200 people to 1 in 2000 people, depending on virus type.;

- Paralysis is the most severe symptoms associated with poliovirus because it can lead to permanent disability and death.
- Even children who seem to fully recover can develop new muscle pain, weakness, or paralysis as adults, 15 to 40 years later. This is called post-polio syndrome.

Prevention and control

Active immunization

- **Inactivated polio vaccine (salk) (IPV)**
 - Salk introduced in 1956
 - Vaccine contains all three serotypes of poliovirus
 - Virus are grown in monkey kidney cells and inactivated by formaldehyde
 - Three injections are given simultaneously with DPT with intervals of 6-8 weeks between first and second, 4-6 months between second and third dose
- **Live attenuated polio vaccine (sabin) (OPV)**
 - In 1962, Sabin replaced IPV
 - Contains live attenuated strains of poliovirus type 1, 2 and 3
 - Administered orally
 - Given for infants from 2 months of age

- It is also very important to practice good hand hygiene and wash hands often with soap and water. Note that alcohol-based hand sanitizers do not kill poliovirus.

4. NATIONAL IMMUNIZATION SCHEDULE

Table 4.1.1. National Immunization Schedule

SN	Type of Vaccine	Number of Doses	Schedule
1	BCG	1	At birth or on first contact with health institution
2	bOPV	3	6, 10 and 14 weeks of age
3	DPT-Hep B-Hib	3	6, 10 and 14 weeks of age
4	Rotavirus Vaccine	2	6 and 10 weeks of age
5	fIPV	2	14 weeks and 9 months of age (new schedule implemented in FY 2079/80)
6	PCV	3	6, 10 weeks and 9 months of age
7	Measles-Rubella	2	First dose at 9 months and second dose at 15 months of age
8	JE	1	12 months of age
9	TCV	1	15 months of age
10	Td	2	Pregnant women: 2 doses of Td one month apart in first pregnancy, and 1 dose in each subsequent pregnancy

Strategies for Polio Eradication

1. Routine immunization
 - Health facilities (Fixed session)
 - Outreach services (Session)
 - Mobile teams
 - Private and NGOs , INGO clinic
 - Private sector

2. Supplementary Immunization Activities (SIA):

National Immunization Days (NIDs) have targeted children less than five years and have been conducted two days throughout the country. Winter season is usually chosen because this is typically a time of low transmission of polio. However, climate dictates that campaigns in certain Himal Districts must be held in another season (usually spring). While the second round of a campaign is ideally held 4-6 weeks after the first, some adjustments to this schedule have been necessary in Nepal due to unavailability of vaccines, political problems, lack of funding and the desire to synchronize the polio campaign with the measles/rubella campaign. SIA does not replace routine immunization. Female community health volunteers are the key vaccinators for polio in the campaigns. The first day, polio is given in the assigned booths while on second day, vaccination teams make house-to house visit to administer polio to the left out children.

3. Mop –up Campaign

There are some important distinctions in the way mop-up campaigns are carried out as compared to SIAs. They are summarized as follows:

- Vaccination is done house to house. Booths are not used.
- Mop-up may require at least three rounds of immunization while SIAs are normally done in two.
- Campaign planning and scheduling are based on the number of houses to be targeted. The entire district in which the case was identified has been included in the mop-up, and all adjoining districts have generally been included

4. Surveillance of Acute Flaccid paralysis:

Case study of surveillance set-up -In June 1998, one of the 4 Surveillance Medical Officers (SMOs) was posted in the East Development Region (Biratnagar) to look after 16 districts. He went there and made frequent visits to the RHD, DHOs and development partners to set-up the office and strategic surveillance sites AFP and others. The UNICEF provided the office place with necessary equipment (computer, phone, etc). A single person managed the office set-up, established surveillance sites and communication systems, conducted training to the government officials and made regular frequent visits to RHD, DHOs and surveillance sites by public buses/ vehicles in the beginning. As a result, the second positive AFP case from Saptari was detected in 1999.

Diarrhoea



Introduction

- Diarrhoea is defined as passage of unusually loose or watery stools usually at least three times in a 24 hours period. (WHO)
- Diarrhoea is excessive loss of fluid and electrolyte in stool, increase in liquidity.
- **Frequent passage of normal stool is no diarrhoea.**

Epidemiology

- Diarrhoeal disease is the second leading cause of death in children under five years old. It is both preventable and treatable.
- Each year diarrhoea kills around 525 000 children under five.
- A significant proportion of diarrhoeal disease can be prevented through safe drinking-water and adequate sanitation and hygiene.
- Globally, there are nearly 1.7 billion cases of childhood diarrhoeal disease every year.
- Diarrhoea is a leading cause of malnutrition in children under five years old.

4.2.7 Key achievement for Management of 2-59 months children Incidence & Case Fatality of Diarrhoea among Under 5 years children

Table 4.2.3: Incidence and case fatality of Diarrhea among children under 5 years of age by Province

Indicators	Year	Koshi	Madhesh	Bagmati	Gandaki	Lumbini	Karnali	Sudur pas-chim	National
Estimated <5 years population prone to Diarrhoea	2076/77	496934	629490	647368	252307	511668	182278	293876	3013891
	2077/78	497208	634058	652626	251327	514162	183481	295726	3028588
	2078/79	449567	679890	446927	207346	474473	184033	262950	2705186
Incidence of Diarrhoea/1000 U5 Population	2076/77	329	355	220	249	350	656	553	350
	2077/78	298	339	213	235	357	653	547	339
	2078/79	309.8	325.5	310.8	262.8	346.6	595.2	601	364.8
Diarrhoeal Deaths	2076/77	50	10	5	3	1	5	0	74
	2077/78	14	3	28	0	3	1	1	50
	2078/79	9	3	10	4	0	2	6	34
Diarrhoea Case Fatality Rate per 1000 (HF+ORC)	2076/77	0.16	0.12	0.14	0.16	0.01	0.08	0	0.15
	2077/78	0.38	0.04	0.81	0	0.05	0.02	0.02	0.16
	2078/79	0.27	0.04	0.33	0.27	0	0.05	0.14	0.12

Source: HMIS

Signs and symptoms:

- Fever
- Severe pain
- Vomiting
- Blood or mucus in stool
- Weight loss
- Bloating

Integrated Management of Neonatal and Childhood Illnesses (IMNCI)

- In Nepal, child survival intervention began when the Control of Diarrhoeal Disease (CDD) Program was initiated in 1983.
- CBIMCI mainly focused on five major childhood diseases like pneumonia, **diarrhoea**, malaria, measles, and malnutrition.

Goals, targets, objectives, strategies, interventions and activities of IMNCI & New-born Care program

- Goal: Improve New-born child survival and ensure healthy growth and development.
- Targets: Target for reduction of NMR, U-5MR & Stillbirths by NHSS, NENAP, SDGs

Targets: Target for reduction of NMR, U-5MR & Stillbirths by NHSS, NENAP, SDGs

Indicators (Per 1000 live births)	Nepal Health Sector Strategy (2015-2020)	NENAP, By 2035	v
Neonatal Mortality Rate	17.5	11	At least as low as 12
Stillbirths		13	
Under-five Mortality Rate	28	21	At least as low as 20*

Contd..

Objectives

- To reduce neonatal morbidity and mortality by promoting essential New-born care services & managing major causes of illness
- To reduce morbidity and mortality by managing major causes of illness among under 5 years children

Strategies

- Quality of care through system strengthening and referral services for specialized care
- Ensure universal access to health care services for New-born and young infant
- Capacity building of health service providers and FCHVs
- Increase service utilization through demand generation activities
- Promote decentralized and evidence-based planning and programming

Dehydration Management

Sick young infant upto 2 months

Two of the Following signs	Classification	Treatment
• Movement only when stimulated or no movement at all • Sunken eyes • Skin pinch goes back very slowly	Severe Dehydration	- if no other severe classification give fluid as per plan C - If infant has another severe classification, refer urgently with mother giving frequent sips of ORS on the way - Advise mother to continue breastfeeding

Sick young infant upto 2 months

Two of the Following signs	Classification	Treatment
• Restless and irritable • Sunken eyes • Skin pinch goes back slowly	Some Dehydration	-Give fluid and breast milk as per plan B - if infant has any severe classification, refer urgently with mother giving frequent sips of ORS on the way -Advise mother to continue breastfeeding -Advise mother when to return - follow-up in 2 days if not improving

Sick young infant upto 2 months

Signs	Classification	Treatment
• Not enough signs to classify as some or severe dehydration	No Dehydration	- Give fluids to treat diarrhea at home and continue breastfeeding as plan A - Advise mother when to return immediately - Follow up in 2 days if not improving

Sick child 2 months upto 5 years

Signs	Classification	Treatment
• Lethargic or unconscious • Not able to drink or drinking poorly • Sunken eyes • Skin pinch goes back very slowly	Severe Dehydration	- If no other severe classification give fluid as per plan C -if child has another severe classification, refer urgently with mother giving frequent sips of ORS on the way -Advise mother to continue breastfeeding

Sick child 2 months upto 5 years

Signs	Classification	Treatment
• Restless, irritable • Drinking eagerly, thirsty • Sunken eyes • Skin pinch goes back slowly	Some Dehydration	-Give fluid, zinc supplements and food as per Plan B -if child has any severe classification, refer urgently with mother giving frequent sips of ORS on the way -Advise mother to continue breastfeeding -Advise mother when to return -Follow-up in 5 days if not improving

Sick child 2 months upto 5 years

Signs	Classification	Treatment
Not enough signs to classify as some or severe dehydration	NO Dehydration	- Give fluid, zinc supplements and food to treat diarrhea at home as per Plan A - Advise mother when to return immediately Follow up in 5 days if not improving

If diarrhoea present for 14 days or more

Signs	Classification	Treatment
Dehydration Present	Severe Persistent Diarrhoea	- Treat dehydration before referral unless the child has another severe classification - Refer to Hospital
No Dehydration	Persistent Diarrhoea	- Advise the mother on feeding a child who has persistent diarrhoea - Give multi-vitamins and minerals including Zinc for 14 days - Follow-up in 5 days
Blood in stools	Dysentery	- Give ciprofloxacin for 3 days - Follow up in 3 days

No Dehydration: Plan A Treat Diarrhoea at Home

4 Rules of Home Treatment

- Give extra fluid
- Give Zinc (2 months up to 5 years)
- Continue feeding
- When to return

Extra fluid

Age	Extra fluid to be given
Up to 2 years	50 to 100 ml after each loose stool
2 year or more	100 to 200 ml after each loose stool

Zinc supplementation (2 months to 5years)

Age	Extra fluid to be given
2 month-6 month	½ tablet daily for 14 days (10 mg)
6 month or more	1 tablet daily for 14 days (20 mg)

Some dehydration: Plan B-Treat with ORS

Amount of ORS to be given during first 4 hrs				
Weight	<6 kg	6-<10 kg	10-<12 kg	12-19 kg
Age	Up to 4 months	4 to 12 months	12 months up to 2 years	2 to 5 years
In ml	200-450	450-800	800-960	960-1600

Severe dehydration: Plan C-Intravenous fluid

Give 100 ml/kg Ringer lactate divided as follows

Age	First give 30 ml/kg	Then give 70 ml/kg
Infants (Under 12 months)	1 hr	5 hr
Children (12 months up to 5 years)	30 min	2 ½ hrs

➤ **Plan C: Treat Severe Dehydration Quickly**

➤ **FOLLOW THE ARROWS. IF ANSWER IS "YES", GO ACROSS. IF "NO", GO DOWN.**

START HERE

Can you give intravenous (IV) fluid immediately?

YES

Start IV fluid immediately. If the child can drink, give ORS by mouth while the drip is set up. Give 100 ml/kg Ringer's Lactate Solution (or, if not available, normal saline), divided as follows:

AGE	First give 30 ml/kg in:	Then give 70 ml/kg in:
Infants (under 12 months)	1 hour*	5 hours
Children (12 months up to 5 years)	30 minutes*	2 1/2 hours

* Repeat once if radial pulse is still very weak or not detectable.

- Reassess the child every 1-2 hours. If hydration status is not improving, give the IV drip more rapidly.
- Also give ORS (about 5 ml/kg/hour) as soon as the child can drink: usually after 3-4 hours (infants) or 1-2 hours (children).
- Reassess an infant after 6 hours and a child after 3 hours. Classify dehydration. Then choose the appropriate plan (A, B, or C) to continue

NO

Is IV treatment available nearby (within 30 minutes)?

YES

- Refer URGENTLY to hospital for IV treatment.
- If the child can drink, provide the mother with ORS solution and show her how to give frequent sips during the trip.

NO

Key measures to prevent diarrhoea include

- Access to safe drinking-water
- Use of improved sanitation
- Hand washing with soap
- Exclusive breastfeeding for the first six months of life
- Good personal and food hygiene
- Health education about how infections spread; and
- Rotavirus vaccination.

Rabies

National Guideline Rabies Prophylaxis in Nepal (2019)



Department of Health Services
Epidemiology and Disease Control Division
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What is Zoonosis

ZOO = ANIMALS

NOSES = DISEASES

The World Health Organization defines Zoonoses (Zoonosis, sing.) as "Those diseases and infections which are naturally transmitted between vertebrate animals and man".

Rabies

- Rabies is an acute, highly fatal viral disease of the central nervous system.
- Rabies is a disease with the highest documented case-fatality rate, close to 100%.
- Rabies is a dead-end infection in man
- Water is most effective natural barriers to rabies. Hydrophobia is a clinical sign characteristic of human rabies.

- World Rabies day- 28th September.



*Figure 1. A dog bite case reported from
Sukraraj Tropical and Infectious
Disease Hospital*



*Figure 2. A dog bite case visiting
Sukraraj Tropical and Infectious Disease
Hospital for Rabies PEP*

Epidemiology

- Rabies is a vaccine-preventable viral disease which occurs in more than 150 countries and territories.
- It causes tens of thousands of deaths every year, mainly in Asia and Africa, 40% of whom are children under 15 years of age.
- Dogs are the main source of human rabies deaths, contributing up to 99% of all rabies transmissions to humans. Rabies can be prevented through vaccination of dogs and prevention of dog bites.
- After exposure of people to a potentially rabid animal, they should seek post-exposure prophylaxis (PEP), which consists of immediate, thorough wound washing.

Nepal

- In Nepal, it is estimated that the annual incidence of human rabies is around one hundred.
- In the fiscal year 2073/74 (2016-17), 39744 animal bite cases were reported in the national annual report, out of which 37226 (94%) were dog bite cases. In the fiscal year 2074/75 (2017/18), 28514 animal bite cases, including 26312 dog bite cases (92%), were reported

Mode of transmission:

- Animal bites (dogs, cats, monkeys, cow, goats, sheep, buffalo, horses except rat bite and human bite)\
- Licks (on abraded skin or abraded unabraded mucosa)
- Aerosols (Rabies infected bats)
- Person to persons rare but possible
- Corneal and organ transplantation

Incubation Period

- 3-8 weeks, is lower when the bite site is on lower extremities and 14 days to many years

Agent

Causative agent - lassavirus Type -1

Diagnostic feature

- **Prodromal stage:** Fever, headache, malaise, tingling sensation at bite site.
- **Excitation stage:** Hydrophobia, Aerophobia, Photophobia etc.
- **Paralytic stage:** Convulsions, coma, respiratory paralysis (cause of death)
- **Fatality** - 100% Deaths almost results within two to ten days of first symptom.

Treatment

- Local wound treatment (first requisite), Cleansing, Observe animal for 10 days
- Suturing not recommended, if necessary, do 24 - 48 hours later.
- It is only disease which is 100 % fatal.

Prevention and Control

Immunization

- Post exposure Prophylaxis - 0,3,7 days
- Pre exposure prophylaxis – 0 & 7 days
- Sample vaccine is Nervous tissue vaccine (Anterior abdominal wall)
- Human diploid cell vaccine is safest vaccine
- Purpose of post exposure prophylaxis is neutralization of inoculated virus before it can enter CNS

Post exposure Prophylaxis

Dose	Route	Duration	No of Injection Sites Per Clinic Visit	Sites
0.1ml Each site	Intradermal	1 week • Day 0 • Day 3 • Day 7	2-2-2-0-0	• Deltoid - OR • Lateral thigh

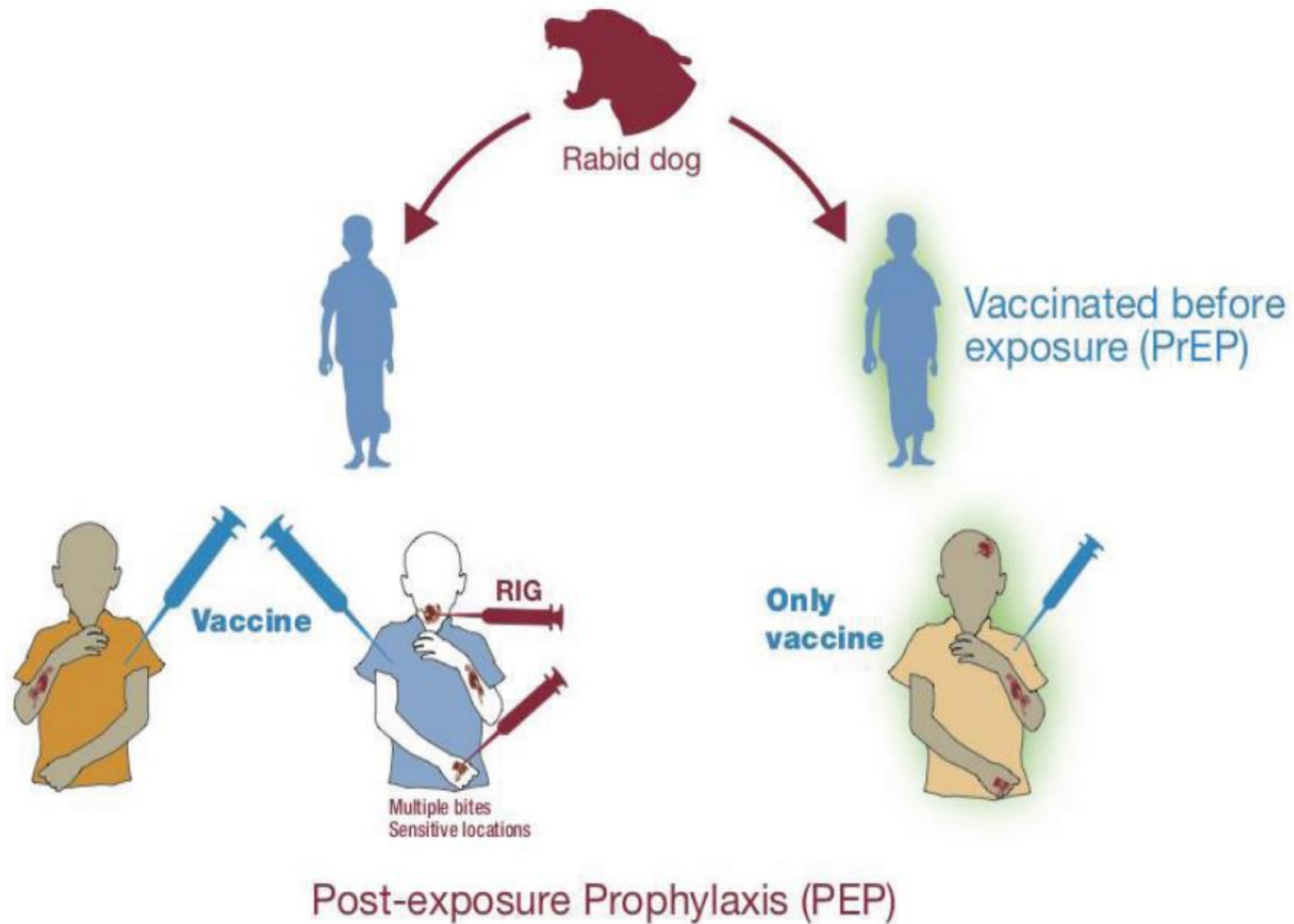




Figure 1 Insertion of needle for ID injection



Figure 2 Formation of bleb (papule) after ID injection



Figure 3 Blanching and 'Peau de Orange' appearance

Pre exposure prophylaxis for Rabies is given on

Recommended vaccine regimen for PrEP

Dose	Route	Duration	No of Injection Sites Per Clinic Visit	Sites
0.1ml Each site	Intradermal	2 visits (1 week) • Day 0 • Day 7	2 sites 2-0-2-0-0	• Deltoid - OR • Lateral thigh

Contd..

- Best prophylaxis is vaccination & immunoglobulin
- For rabies elimination 80% of entire dog population of the area must be immunized.

Influenza (Swine Flu & Bird Flu)



Introduction

- Influenza, commonly known as "the flu"
- Is an contagious respiratory illness
- Caused by a variety of species and strains of Influenza viruses
- Infect the nose, throat, and lungs.

Swine Flu

Introduction

- Swine flu viruses can affect both pigs and human (do not normally infect humans)
- However, sporadic human infections with swine influenza viruses have occurred (observed in people working in close proximity with pigs)
- H1N1, H3N2 and H1N2 have caused human infections.
- Pigs are susceptible to swine influenza viruses and also avian and human influenza virus.
- Genes of swine, avian and human influenza virus mixed
- Created a new virus (antigenic shift)

Epidemiology

- Swine influenza is common in pigs in the midwestern United States, Mexico, Canada, South America, Europe (including the UK, Sweden and Italy), Kenya, China, Taiwan, Japan and other parts of eastern Asia.
- H1N1 influenza is also known as swine flu named because the genes in the virus showed similarity with the influenza viruses occurring in North American pigs (CDCP, 2019). The outbreak of H1N1 came into notice in 2009 and spread across the globe

<https://www.sciencedirect.com/topics/medicine-and-dentistry/swine-influenza>

Mode of transmission: Pig to humans

- Infected pig's cough or sneeze
- Inhalation of droplets or dust with virus
- Touching a surface with virus on it and then touching of mouth or nose
- Not transmitted to people by eating pig meat

Mode of transmission: **Human-to-human transmission**

- Transmission occurs same way that seasonal flu transmits in people.
- Limited transmission, but has occurred

Incubation Period

- Average of 2 days for seasonal influenza (1-7 days)

Agent

- Influenza A (H1N1) Virus

Host

- Nutritional status
- Vulnerability to Infection
- Involved in poultry farming, pig farming
- Age is over 65 or under 5 years
- Pregnancy or postpartum (within 2 weeks after delivery)
- Obesity (i.e., $\text{BMI} \geq 40$)

Health challenges such as asthma, diabetes, heart disease, renal disease, anemia, COPD

Environmental factors

- Crowding
- Cold temperature: viral particles are capable of prolonged persistence in colder environments

Signs and symptoms:

- Acute onset of fever,
- Cough,
- Headache,
- Sore throat,
- Muscle or body aches
- Headaches
- Fatigue
- Vomiting and diarrhea (more common in children, may be severe in children with influenza B)

Prevention and Control

- Good personal health and hygiene habits:
 - not touching your eyes, nose or mouth
 - frequent hand washing
 - covering coughs and sneezes
 - avoiding close contact with sick people, and
 - staying home yourself if you are sick.

Prevention and Control

- Face masks
- Quit smoking
- Wipe frequently touched disinfectant.
- Flu vaccines (but required every year as the influenza virus is constantly changing)

FLU PREVENTION TIPS



Treatment

- Most people recover with rest, drinking plenty of fluids and use of paracetamol for the relief of pain and fever.
- Children and teenagers with flu fever (especially influenza type B) shouldn't take aspirin
 - Can lead to Reye's syndrome, a rare but potentially fatal disease of the liver
- Antibiotics only for secondary infections (bacterial pneumonia)

BIRD FLU(H5N1)

Introduction

- It is also known as highly pathogenic avian influenza. The disease is communicable and transmitted through infected birds and animals. Influenza A(H5N1) and (H7N7) both are highly infectious for human and birds.
- Virus can be easily survive in <60 degree temperature
- In water it can survive up to 4 days.
- In 0 degree temperature it can survive for 1 months.



Wild Birds



Poultry



Humans



Epidemiology

- In 1997 in Hongkong transmit to people through migratory birds, 18 cases and 06 deaths.
- In 1999 and in 2003 (H9N2) and (H5N1) epidemic outbreak in hongkong.
- In 2003 (H7N7) virus outbreak in Holland, 83 cases and 1 death.
- In 2004 Thailand and Vietnam the virus was outbreak, 23 cases and 19 deaths.

Sources: <https://www.cdc.gov/flu/avianflu/avian-flu-summary.htm>

Contd..

- The virus spread in the poultry population across the country and resulted in over 1500 reported human cases and many human deaths from 2013 to 2019.
- No further human cases have been reported to WHO since 2019. Since 2014, sporadic human infections with avian influenza A(H5N6) viruses have been reported almost exclusively from China.
- (Sources:[https://www.who.int/news-room/fact-sheets/detail/influenza-\(avian-and-other-zoonotic\)](https://www.who.int/news-room/fact-sheets/detail/influenza-(avian-and-other-zoonotic)))

Nepal

- H5N1 is a lethal bird flu virus strain that is highly pathogenic. The virus was first detected in birds in 2009 in Nepal
- Nepal had also reported a **human death from the virus in 2019**. A 21-year-old man from **Kavrepalanchok district** who was a driver by profession and used to **drive poultry's truck had died** of a respiratory infection while undergoing treatment.
- Nepal witnessed a massive bird flu outbreak in 2022 that saw outbreaks in 15 districts. Over 600,000 fowls were culled at the time.

<https://kathmandupost.com/national/2023/02/05/four-days-since-bird-flu-detection-authorities-yet-to-jump-into-action>

Mode of transmission:

- Saliva of infected birds.
- Infected pots, soil, air and food grains and migratory birds transfer the virus in to another poultry farms.
- In human the virus was transmitted through infected and death birds.
- Also transfer through meat and eggs.

Incubation Period

- 1-7 days

Agent

- Avian influenza type A virus.

Host

- Migratory and poultry birds and also human body.



Environmental factors

- During the summer and winter season when the migratory birds moves from one place to another

Signs and symptoms:

- Influenza A H5N1 kills birds, stopping in fertilization, swelling head, not eating grain by hens, thirsty and white feces of birds are the symptoms.
- Fever
- Coughing
- Throat pain
- Infected in lungs and severe pneumonia and finally death.

Risk Group

- Poultry farm worker people
- Lab workers
- And meat suppliers

Prevention and Control

- Doubtfulness hens should not be supplied.
- Wash our hands when we touch the doubttness hens.
- In poultry farms well manage through proper grain feeding.
- Well cook meat and egg.
- Health education for awareness of people about bird flu.
- Proper care about personal hygiene.
- If douttness of virus than inform to the health providers.

Prevention and Control

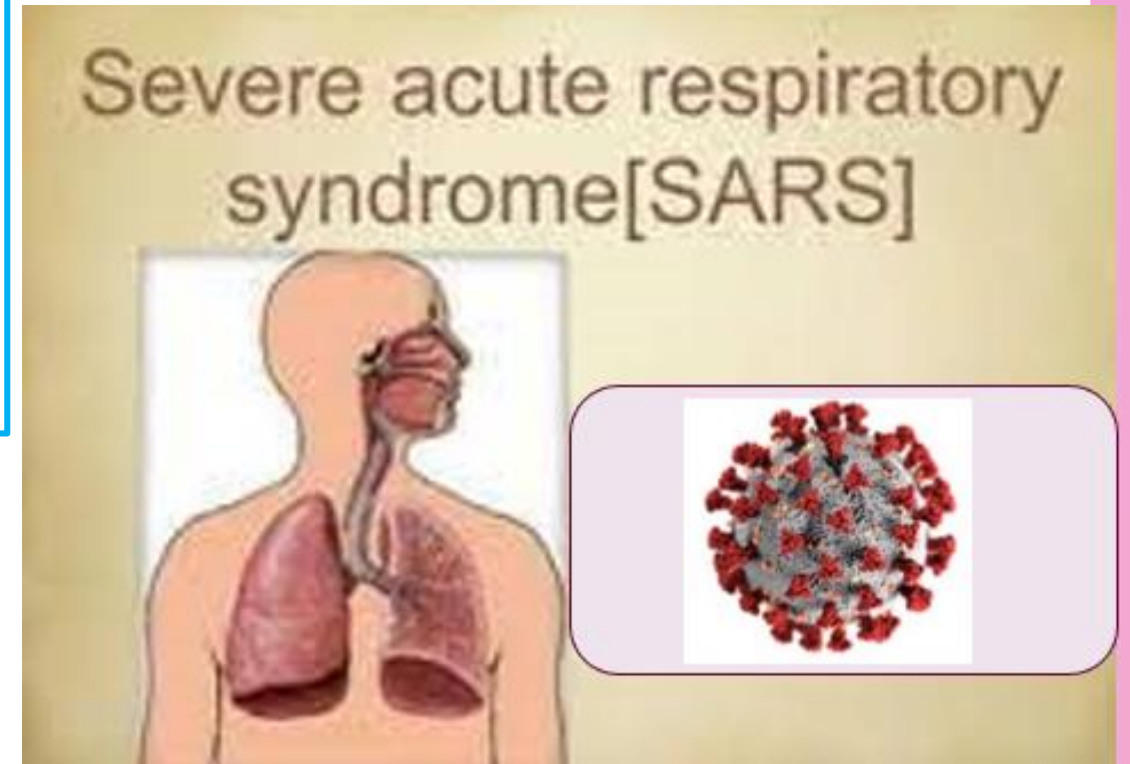
- Diagnosis of disease in birds and animal will be managed by central and national veterinary disease laboratory.
- Government has focused on quarantine of birds and related things, surveillance of disease and monitoring of every program related to birds.
- Infected and death birds should be burn or dump.

Treatment

- There is no special treatment method in birds and human.
- Infected birds and animals should be killed and their farms also destroyed.
- Isolation for patient and support with proper careing.
- Antiviral drugs.
- In Nepal, this drugs are costly, not available and negative effect can be seen and not usable.

(Source:<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7216858/>)

Severe Acute Respiratory Syndrome (SARS)



Introduction

- The SARS coronavirus, sometimes shortened to SARS-CoV, is the virus that causes severe acute respiratory syndrome (SARS).
- SARS is an airborne virus and can spread through small droplets of saliva in a similar way to the cold and influenza.
- On April 16, 2003, following the outbreak of SARS in Asia and secondary cases elsewhere in the world, WHO declared the coronavirus as the official cause of SARS.

(Source:https://www.who.int/health-topics/severe-acute-respiratory-syndrome#tab=tab_1)

Contd..

- SARS outbreak of 2003, about 9% of patients with confirmed SARS infection died.
- SARS coronavirus is an enveloped positive and single stranded RNA virus.

Epidemiology

- It was the first severe and readily transmissible new disease to emerge in the 21st century and showed a clear capacity to spread along the routes of international air travel.
- Most patients identified with SARS were previously healthy adults aged 25–70 years. A few suspected cases of SARS have been reported among children under 15 years.
- The case fatality among persons with illness meeting the current WHO case definition for probable and suspected cases of SARS is around 3%.

Contd..

- The earliest case was traced to a health care worker in China, in late 2002, with rapid spread to Hong Kong, Singapore, Vietnam, Taiwan and Toronto.
- As of early august 2003, about 8,422 cases were reported to the WHO from 30 countries with 916 fatalities.
- https://www.who.int/health-topics/severe-acute-respiratory-syndrome#tab=tab_1

Mode of transmission:

- Direct or indirect contact of mucus membrane eyes, nose, mouth with respiratory droplets or fomites.
- SARS virus spreads by droplets produced by coughing and sneezing.
- Contamination by faecal matter.



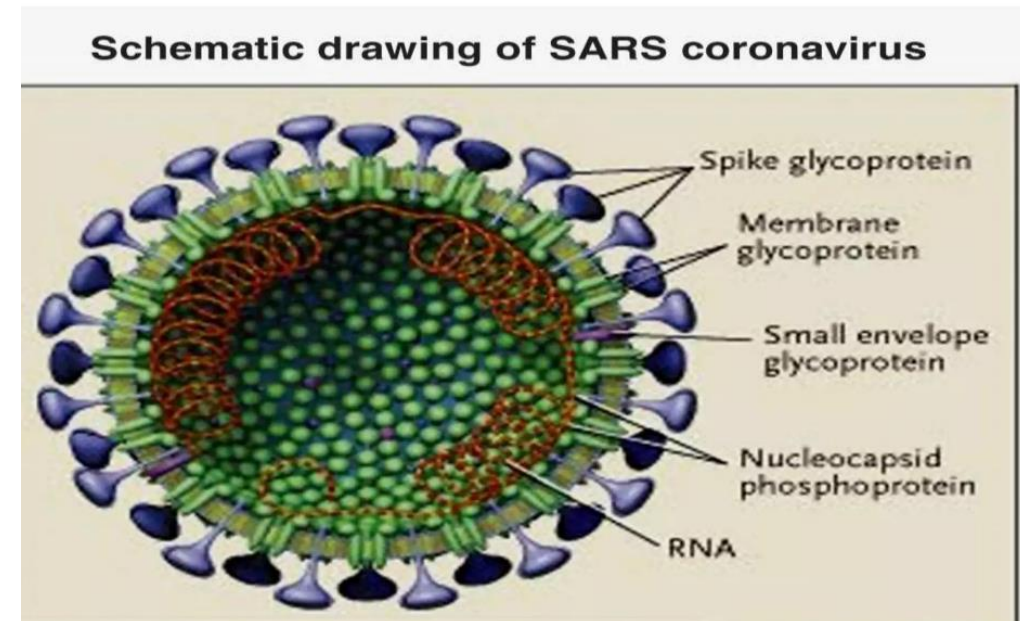
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7286265/>

Incubation Period

- 2-7 days

Agent

■ Corona virus (Urbani SARS)



Host

- Age (older age)
- Risk Group (Cardiovascular, diabetes..etc)
- Immune status

Environmental factors

- Climate change
- Industrial pollution
- Urban lifestyle
- Mobility and transportation

Signs and symptoms:

- Fever of at least 38°C (100.4° F) or higher
- Early symptoms last about 2-7 days and include non-specific flu-like symptoms
 - chills/rigor
 - muscle aches
 - headache
 - diarrhea
 - sore throat
 - runny nose
 - malaise
 - myalgia (muscle pain)

Contd..

- Dry cough
- Shortness of breath (dyspnea)
- Hypoxaemia (low blood oxygen concentration)
- Upper respiratory tract infection
- In severe cases
 - respiratory failure
 - acute respiratory distress syndrome (ARDS)
 - 70-90% of the cases develop lymphopenia (low count of white blood cells)
 - mildly elevated aminotransferase level
- Incubation period -2-10 days, sometimes lasting up to 13 days, with the mean being 5 days.

Complication

- As with any viral pneumonia, pulmonary decompensation is the most feared problem.
- Intensive care include infection with nosocomial pathogens, tension pneumothorax from ventilation at high peak pressures, and non-cardiogenic pulmonary edema.

Laboratory Diagnosis

- PCR
- ELISA
- Immunofluorescent assay (IFA)

Prevention and Control

- Prompt identification of cases
- Close contacts of a probable or suspect case of SARS are at high risk of becoming a case, and should be **isolated** in the community during their potential incubation period
- Travelers from areas with recent local transmission of SARS should be given advice about whom to contact, and what to do if they develop a **fever** within their potential **incubation period**

Contd..



- Wearing N95 mask was one of the main public preventive measures against SARS
- Simple hygienic measures like hand washing after touching patients, use of appropriate and well fitted mask
- Timely and accurate reporting and sharing of information with other authorities and or government.

Prevention and Control

- Health departments should assign staff to undertake **contact tracing** and daily review of contacts in the community. Ideally, this should be in conjunction with a 24-hour SARS hotline
- The recovered patients will be **quarantined** at home for at least **14 days** after discharged from hospital



Treatment

- Severe cases require intensive support
- Ribavirin (400-600 mg/day)
- Lopinavir/ritonavir (400 mg/10 mg)

Chickenpox



Introduction

- Chickenpox is a highly contagious disease caused by the varicella-zoster virus (VZV).
- It can cause an itchy, blister-like rash among other symptoms. The rash first appears on the chest, back, and face, and then spreads over the entire body.
- Chickenpox can be serious, especially during pregnancy, in babies, adolescents, adults, and people with weakened immune systems (lowered ability to fight germs and sickness).



Epidemiology

- Chickenpox is very contagious. If one person has it, up to 90% of the people close to that person who are not immune will also become infected.
- Chickenpox can also be serious, even life-threatening, especially in babies, adolescents, adults, pregnant women and people with weakened immune systems.

Source: <https://www.cdc.gov/chickenpox/index.html>

Contd..

- Varicella outbreaks are frequently reported in countries like India and Nepal where varicella vaccination is not a part of the country's routine immunization schedule.
- Outbreaks are common in young school-going children however they can occur in adults in closed institutional settings like hostels and military barracks.

(Sources: An Outbreak Investigation of Varicella Zoster among Male Military Personnel in a Military Training Centre)

- The global annual chickenpox disease burden includes 4.2 million severe complications leading to hospitalization and 4,200 deaths.
 - Source: K.Park

Mode of transmission:

- Person to person by direct contact
- Droplet or airborne spread of vesicle fluid
- Secretion of the respiratory tract to chickenpox cases
- Vesicle fluid of patients with herpes zoster
- Indirectly through articles freshly soiled by discharges from vesicle and mucous membranes of infected people

Incubation Period

- 10 to 21 days

Agent

- The causative agent of chickenpox, V-Z virus is also called "Human (alpha) herpes virus -3". Primary infection causes chickenpox.
- Chickenpox is highly communicable
- Secondary attack rate in household contact is up to 90%

Host

- Occurs primarily in children under 10 years
- Disease can be severe in adults
- Immunity: generally single attack gives lifelong immunity, secondary attack rate.
- Pregnancy: Infection during pregnancy –risk for fetus and neonate.
- Worst victims: Adult, teenagers, people with weak immunity system

Environmental factors

- Chickenpox shows a seasonal trend in Nepal as well as in India, mostly occur in first 6 months of the year
- In temperate climates there is little evidence of seasonal trends
- Seasonal trend: most common at the end of winter and early spring.
- Overcrowding favours the transmission.

Signs and symptoms:

- Maculopapular rash
- Fever
- Tiredness
- Loss of Appetite
- Headache
- may last for 2-3 days in adult before the rashes comes out.

Complication

- Bacterial infections of the skin and soft tissues in children
- Septicaemia
- Toxic shock syndrome
- Bacterial pneumonia
- Septic arthritis
- Bleeding problems (hemorrhagic complications)
- Dehydration

Prevention and Control

- Usual control methods are- notification, isolation and disinfection
- Isolation of cases for about 6 days after onset of rash
- Disinfection of articles soiled with nose and throat discharge

Prevention and Control

- Live attenuated varicella vaccine is used
- A live attenuated varicella virus vaccine is safe and currently recommended for children between 12-18 months of age who have not had chickenpox.
- Protect high risk individuals from exposure

Contd..

- People with weakened immunity such as those with HIV;AIDS or people on immune-suppressing medications.
- VZIG given within 72 hours of exposure has been recommended for prevention of chicken pox in exposed susceptible individuals particularly immuno-suppressed persons.

Treatment

- Symptomatic treatment & making the patient more comfortable.
- Antiviral medication, Acyclovir
- Symptoms such as headache, fever, fatigue & muscle ache can be treated with acetaminophen (Tylenol) (aspirin should be avoided)
- Calamine lotion (to stop itching and soothing skin)

Measles

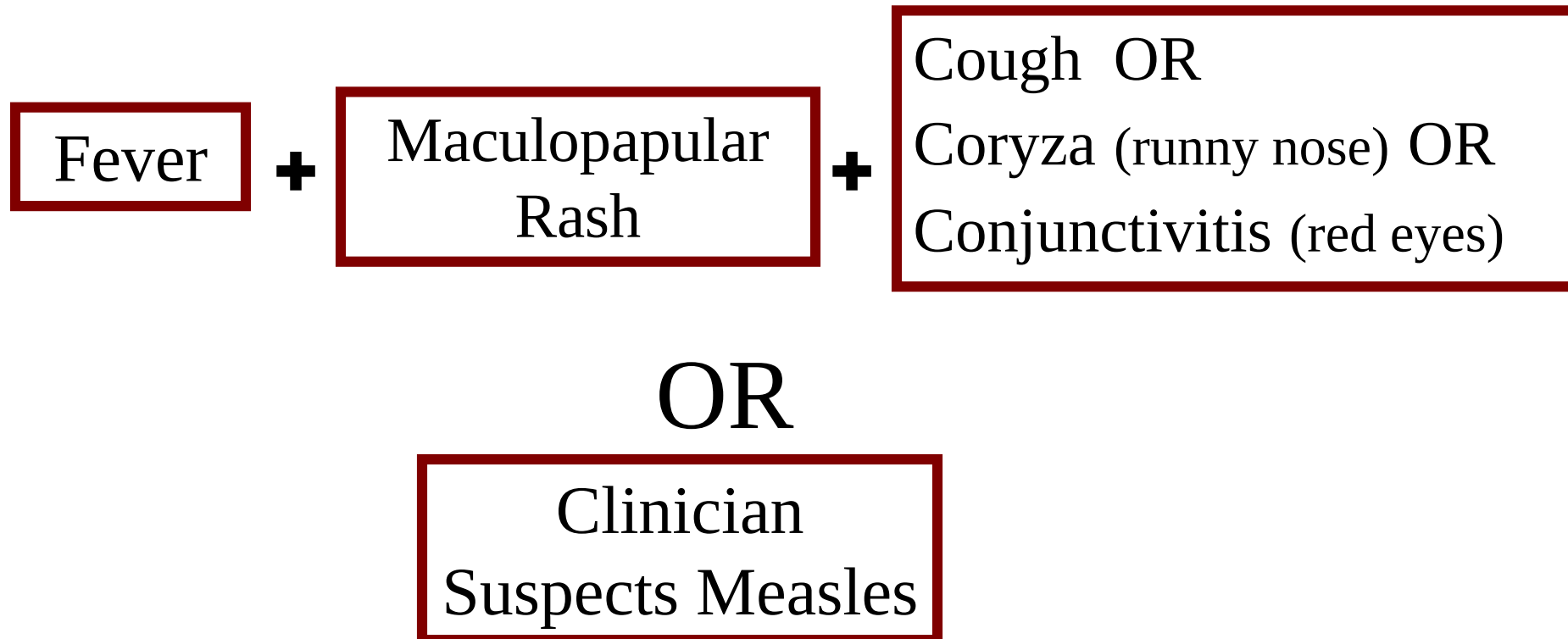
Introduction

- Measles is a highly contagious, serious airborne disease caused by a virus (**RNA paramyxovirus**) that can lead to severe complications and death.
- Measles vaccination averted 56 million deaths being between 2000 and 2021.
- Even though a safe and cost-effective vaccine is available, in 2021, there were an estimated 128 000 measles deaths globally, mostly among unvaccinated or under vaccinated children under the age of 5 years.
(WHO)

- Measles can affect anyone but is most common in children.
- Measles infects the respiratory tract and then spreads throughout the body. Symptoms include a high fever, cough, runny nose and a rash all over the body.
- Being vaccinated is the best way to prevent getting sick with measles or spreading it to other people. The vaccine is safe and helps your body fight off the virus.

- An estimated 128 000 people died from measles in 2021 – mostly children under the age of five years, despite the availability of a safe and cost-effective vaccine. (Globally) -WHO

Measles : Clinical Case Definition



Prevalence / Situation

- On 2 January 2023, an outbreak of measles was confirmed in Nepalgunj sub-metropolitan city (SMC) in Banke district, Nepal, following a cluster of cases of fever and rash. Following the confirmation and through active case search, the index case was identified, with the onset of symptoms on 24 November 2022.
- Between 24 November 2022 and 10 March 2023, **690 measles cases, including one associated death (case fatality ratio: 0.14 %)**, have been reported from seven districts in western Nepal, and three districts in eastern Nepal (mainly in the Terai ecological region). The majority of the cases (n=591; 86%) have been reported in children aged less than 15 years.

- While measles is endemic in Nepal and is reported every year, the magnitude and extent of the current outbreak are unusually high compared to the previous years. Only sporadic isolated measles cases have occurred since 2004.

Response measures in affected areas have been implemented, including

- Active case search,
- Case management and
- Outbreak response immunization (ORI).

Epidemiological feature

A. Agent factor:

Agent:

- Measles virus of paramyxovirus family, single stranded RNA virus of the genus Morbilli virus.
- Measles virus is rapidly inactivated by heat, light, acidic pH, ether and trypsin.
- It has a short survival time (less than 2 hours) in the air or on objects.

Reservoir:

- The virus is an exclusive human pathogen and has no animal reservoir or vector.

B. Host factor:

- **Age:** It is highly contagious disease and leading cause of childhood mortality. It generally affects children below the age of 5 years.
- **Sex:** Both sexes are affected equally.
- **Immunity:** An infection with measles virus provides lifelong immunity against it.
- **Other risk factors:** lack of vaccination against measles, malnutrition, underlying immunodeficiency, pregnancy, Vit. A deficiency, crowded setting, and lower socio-economic status group are at increased risk.

C. Environmental factors:

- **Temporal pattern:** The disease is seasonal and in Nepal, the outbreaks of measles are more common in late winter and early spring (February to April).

Signs and Symptoms

Symptoms of measles usually begin 10–14 days after exposure to the virus. A prominent rash is the most visible symptom.

Early symptoms usually last 4–7 days. They include:

- running nose
- cough
- red and watery eyes
- small white spots inside the cheeks.

- Rash begins about 7–18 days after exposure, usually on the face and upper neck. It spreads over about 3 days, eventually to the hands and feet. It usually lasts 5–6 days before fading.

- Most deaths from measles are from complications related to the disease.

Complications can include:

- blindness
- encephalitis (an infection causing brain swelling and potentially brain damage)
- severe diarrhoea and related dehydration
- ear infections
- severe breathing problems including pneumonia.
- If a woman catches measles during pregnancy, this can be dangerous for the mother and can result in her baby being born prematurely with a low birth weight.

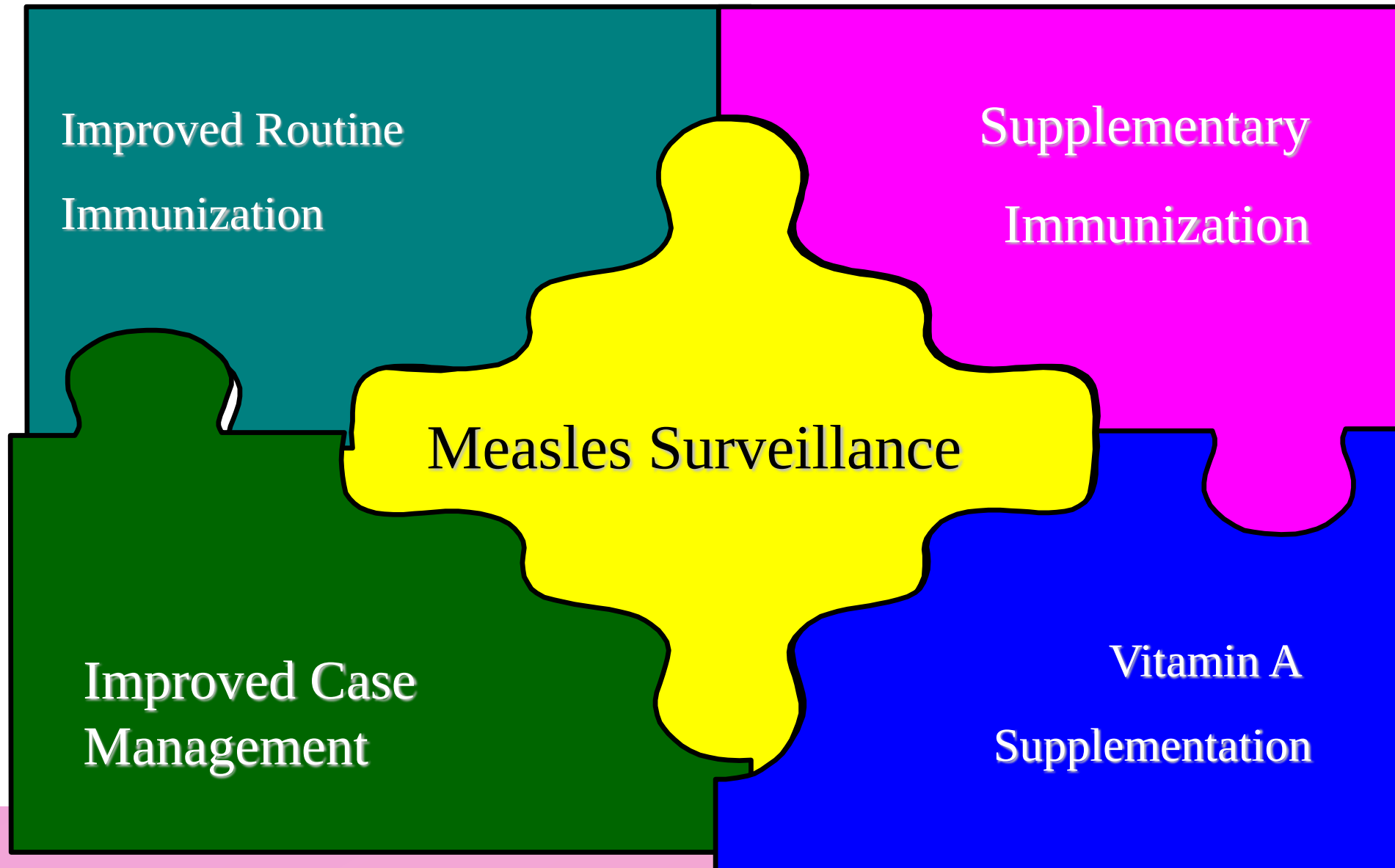
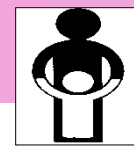
Mode of transmission

- Measles is one of the world's most contagious diseases, spread by contact with infected nasal or throat secretions (coughing or sneezing) or breathing the air that was breathed by someone with measles. The virus remains active and contagious in the air or on infected surfaces for up to two hours.

Prevention and control

- **Community-wide vaccination** is the most effective way to prevent measles. All children should be vaccinated against measles. The vaccine is safe, effective and inexpensive.
- Children should receive two doses of the vaccine to ensure they are immune. The first dose is usually given at 9 months of age in countries where measles is common and 12–15 months in other countries. A second dose should be given later in childhood, usually at 15–18 months.

Strategies to control Measles



Summary

- Causative agent - **RNA Paramyxovirus**
- • Incubation period - **10 -14 days**
- • Cases are only the source of infection. **The carriers are not seen.**
- • **Age group = 6 months to 3 years**
- • Mode of transmission - Droplet infection
- • Period of communicability - 4-days before and 5 days after the appearance of rash
- • *Shows: Cyclic trend with epidemic 2-3 years*
- • Secondary attack rate - **80 %**
- • On attack of measles confer life long immunity

- Maternal antibodies provide immunity up to 6 months of age.
- **C/Fs**
- • 3 stages; **prodromal** (fever coryza with sneezing, lacrimation), **eruptive** and **Post measles stage**
- • Also called **3 C disease**; Cough, Coryza and Conjunctivitis
- • Pathognomic feature of measles - **Koplik's spot**(**buccal mucosa opposite to lower 2nd molar**); seen in prodromal stage.
- • **Koplik's spot**: small, irregular, and red with whitish center on the mucous membranes.
- • They appear about **2 days before the rash and last 1–4 days** as tiny “table salt crystals” on the palatal or buccal mucosa opposite the molars.
- • Maculopapular rashes - starts behind the ears and spreads centrifugally

WHO Measles Elimination Strategy:

- • Catch up: Vaccination campaign targeting all children **9 months - 14 years**,
- • Keep up: **Routine services** aims at vaccinating more than 95%
- • Follow up: Subsequent nationwide vaccination campaigns conducted every **2-4 yrs** targeting all children born **after catch-up campaign**

Rubella (German Measles)

- Causative agent: RNA virus of **Togavirus**
- • Incubation period: **14-21 days**
- • **Source of Infection:** Cases or subclinical cases, there is no known carrier state (large no. of sub-clinical cases)
- • Rubella is much less infectious than measles (absence of cough)
- • **Mode of Transmission:** Air droplets or vertical transmission
- • **Period of Communicability** - One week before and one week after rash appears
- • Age group: **3- 10 years.**
- • *One attack of rubella confer lifelong immunity. Second attack rare*

- **50 -60 %** are asymptomatic
- • Mild and short duration (approx. 3 days) = so called 3 days disease
- • low grade fever, lymphadenopathy and maculo-popular rashes
- • **Complication:** Arthralgia, encephalitis thrombocytopenia
- **CRS(Congenital Rubella Syndrome)**
- Classical triad - **Deafness, cardiac malformation and cataracts**
- **The first trimester is the most disastrous time for the fetus**
- • Infection in early second trimester causes only deafness.
- • Infection after 16 weeks causes no major abnormalities.

Priority groups for rubella vaccination

- • First priority: Women of child bearing age
- • *Second priority: Children 1-14 years of age*
- • *Third priority: All children at 1 year of age.*
- • If a female is vaccinated for rubella should defer pregnancy for **next 3 months.**

Mumps

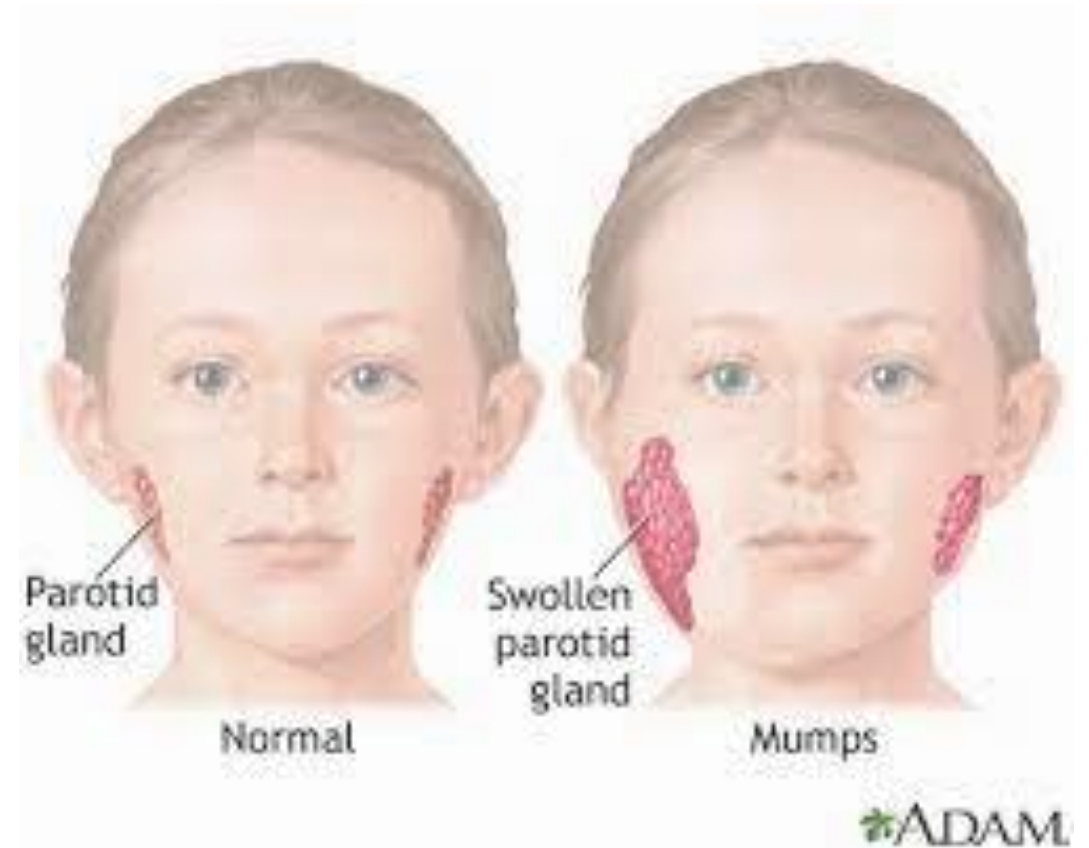


Introduction

- An acute viral infection caused by a Myxovirus parotiditis (RNA virus of the Myxovirus family) which affects mainly children of school age and young adults.
- Mumps is an acute viral infection of childhood that typically involves swelling of one or both parotid glands, although many different organs can be infected.

Contd..

Mumps is a highly contagious viral infection that causes pain and swelling in the parotid glands (the glands which produce saliva). It is contagious in the days prior to the appearance of mumps symptoms to a few days after the symptoms disappear. (Source:K.park)



Agent

- Myxovirus parotiditis (RNA virus of the Myxovirus family)

Host

- Age: all are susceptible, common in the age group 5-15 years. Commonest age of incidence is around 9 years. Children are protected up to 6 months due to passive immunity from mother.
- Sex: Both sex are susceptible
- Immunity: one attack gives life long immunity, but second attack can occur.

Environment

- Mumps may occur around the year. But usually prevalence more in winter, disease occurrence is more in crowded population due to high contact rate.

Mode of transmission

- The disease is spread mainly by droplet infection and after direct contact with an infected person.
- Directly contact
- Droplet infection
- Fomites-rarely
- Entry –nose and mouth
- Possible by urine

Incubation Period

- Varies from 2 to 4 weeks, usually 14-18 days.

Signs and symptoms:

- Approximately 30-40% of infections are subclinical
- Fever
- Muscular pain (especially in the neck)
- Headache
- Malaise

Complications

- Complications are most are more common in young adults and adolescents.
 - Orchitis
 - Pancreatitis
 - Oophoritis
 - Myocarditis

Diagnosis

- **IgG and IgM antibodies** are most commonly used for diagnosis
- The microbiological diagnosis is by **serology** or **virus culture**

Treatment

- There is no specific antiviral therapy; treatment is entirely supportive
- Antipyretics (Acetaminophen or Ibuprofen are indicated for fever)
- Best rest should be guided by the patients needs, but no evidence indicates that it prevent complications. The diet should be adjusted to the patients ability to chew.

Prevention:

- Immunization
 - Live attenuated vaccine is available
 - The initial mumps immunization, usually as measles, mumps and rubella (MMR) vaccine is recommended at 12-15 months of age
 - A second immunization, also as MMR, is recommended routinely at 4-6 years of age.

Control

- Hygiene measures
 - Proper cleaning of spoons, cups and other utensils must be handled
 - Concurrent disinfection of articles soiled with nose and throat secretions
- Report to local health authority in case of epidemics
- The patients should be isolated, if possible, children should be kept out for school for 9 days after onset of parotitis

Contd..

- Investigation of contacts and source of infection
- Epidemic measures: immunization of susceptible contacts particularly those at risk of exposure. Immunization after exposure to natural disease does not prevent the disease
- Quarantine: Exclusion of susceptible from school or workplace from the 12th to 25th days after exposure.

- **Causative agent** - Myxovirus parotitidis, RNA virus
- • Majorly affects **parotid glands**
- • I.P - **14 -21 days(2-4 weeks), 18 days**
- • **Mode of transmission** - Air droplets
- • **Period of communicability** - 4-6 days before and 7 days after the appearance of symptom
- • Secondary attack rate - **86 %**
- • Age groups - **5 - 9 years**

- Man is the only **natural host**, clinical or subclinical cases are the **source of infection**.
- • **One clinical attack** of mumps also confers *life long immunity*.
- • About **30 - 40 %** cases are clinically inapparent
- • pain and swelling on the one or both **parotid gland**
- • Most common complication - **Aseptic Meningitis**
- • Most common complication in Adolescents - **Orchitis and Oophoritis**



Dengue

Introduction

- Dengue is a mosquito-borne viral disease
- Dengue virus is transmitted by female mosquitoes mainly of the species *Aedes aegypti* and, to a lesser extent, *Ae. albopictus*.
- This mosquito also transmits chikungunya, yellow fever and Zika infection.
- Dengue is widespread throughout the tropics, with local variations in risk influenced by rainfall, temperature and unplanned rapid urbanization.
- Severe dengue (also known as Dengue Haemorrhagic Fever) was first recognized in the 1950s during dengue epidemics in the Philippines and Thailand.

Contd..

- Dengue hemorrhagic fever (DHF) is a severe, often fatal, complication of dengue
- Dengue fever and dengue haemorrhagic fever are the most common mosquito-borne viral diseases in the world



Epidemiology

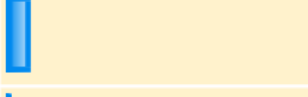
- The incidence of dengue has grown dramatically around the world in recent decades.
- The actual numbers of dengue cases are underreported and many cases are misclassified.
- About half of the world's population is now at risk of dengue with an estimated 100–400 million infections occurring each year.
- The number of cases reported increased from 505 430 cases in 2000 to 5.2 million in 2019(**WHO**)

Contd..

- The disease is now endemic in more than 100 countries in the WHO Regions of Africa, the Americas, the Eastern Mediterranean, South-East Asia and the Western Pacific.
- The Americas, South-East Asia and Western Pacific regions are the most seriously affected, with Asia representing around 70% of the global disease burden.
- A high number of cases were reported in Bangladesh (101 000), Malaysia (131 000) Philippines (420 000), Vietnam (320 000) in Asia in 2019.

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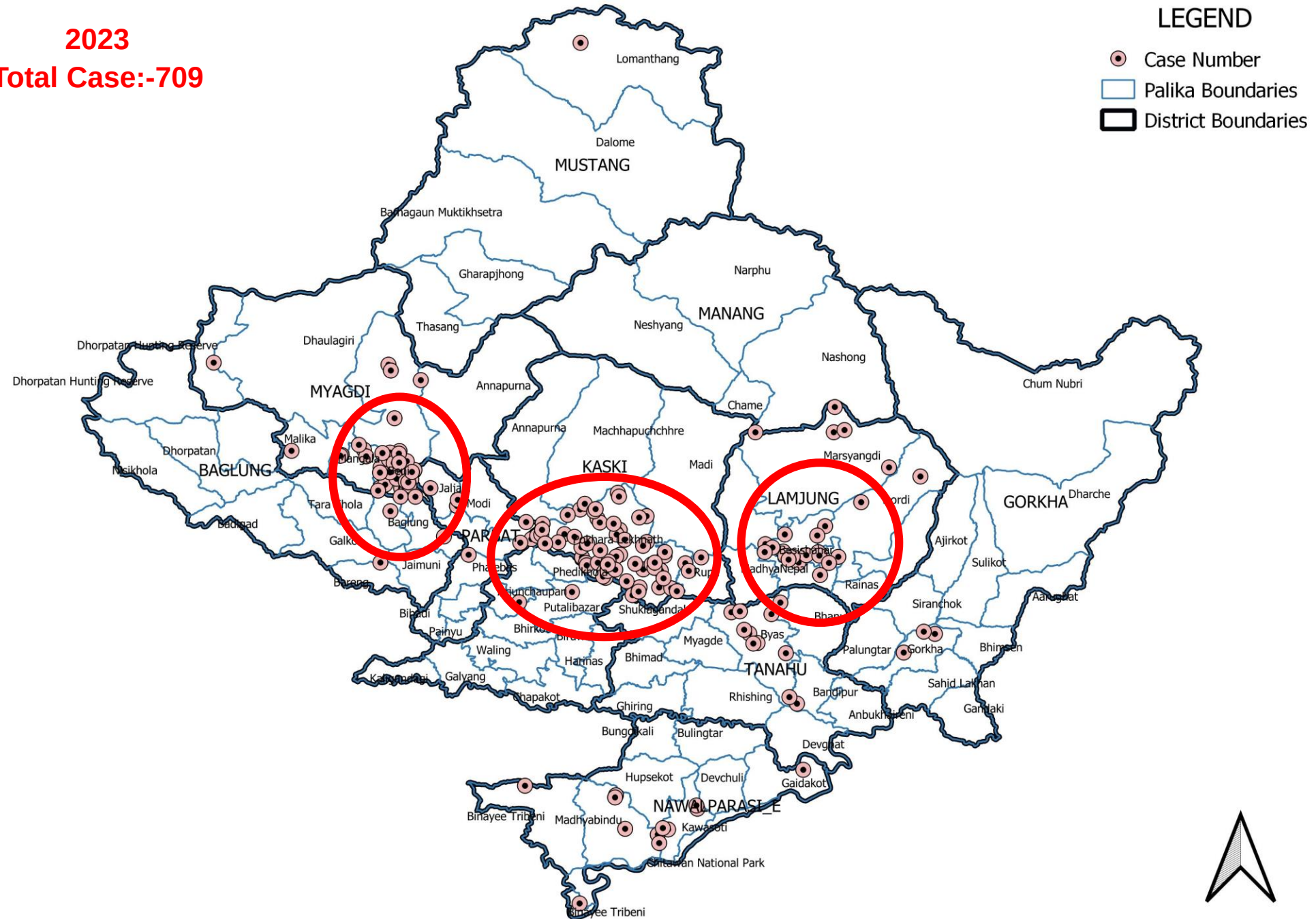
- The earliest cases were detected as early as 2005. The sporadic cases continued and outbreaks occurred in 2006 and 2010.
- Dengue has become a rapidly growing concern in Nepal.
- In 2023 total number of cases reported 51243 in Nepal

DENGUE CASES BY PROVINCE			
	Province	No. of Dengue Cases	% of National Bu
	KOSHI	26021	
	MADHESH	889	
	BAGMATI	7704	
	GANDAKI	12688	
	LUMBINI	1571	
	KARNALI	322	
	SUDURPASCHIM	2048	

Gandaki Province

Dengue Case Distribution in Local Level (2023)

2023
Total Case:-709



Trends in dengue cases

- The number of reported dengue cases have increased from **489 in FY 2077/78 to 733 in FY 2078/79**. The gradual rise in cases throughout FY 2078/79 and the early months of FY 2079/80, up until the preparation of the annual report, indicates a potential for dengue outbreak in 2079/80.
- In 2078/79, the highest number of cases were recorded in Lumbini province with 174 cases, followed by Bagmati province with 169 cases. By district, the highest number of cases were reported from Sankhuwasabha 79 cases, 55 cases in Dhading and 44 cases in Rupandehi.

Distribution of Dengue Cases by Province (FY 2078/79)

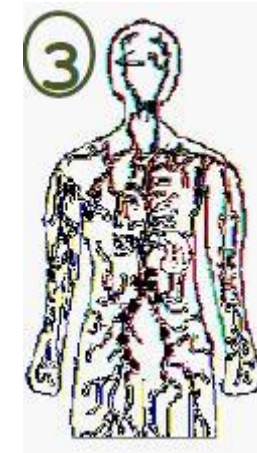
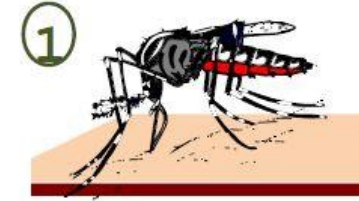


Mode of transmission:

- The *Aedes aegypti* mosquito is the primary vector of dengue. The virus is transmitted to humans through the bites of infected female mosquitoes.
- Infected symptomatic or asymptomatic humans are the main carriers and multipliers of the virus, serving as a source of the virus for uninfected mosquitoes.

Replication and transmission of Dengue virus

1. Virus transmitted to human in mosquito saliva
2. Virus replicates in target organs
3. Virus infects white blood cells and lymphatic tissues
4. Virus released and circulates in blood



Incubation Period

- After virus incubation for 4–10 days, an infected mosquito is capable of transmitting the virus for the rest of its life

Agent

- Arthropod-borne virus belonging to the family Flaviviridae
- Four known serotypes: DEN-1, DEN-2, DEN-3, and DEN-4
- Infection with one virus does not protect a person against infection with another
- Epidemic potential: viremia level, infectivity, virus serotype
- Principal vector- *Aedes aegypti*
- Humans serve as an amplifying host, though some monkeys may also serve as a source of the virus

Host

- Risk factors for dengue hemorrhagic fever
 - a person's age
 - immune status
 - type of infecting virus
- Repeatedly infected persons with one or more types of dengue virus are at greater risk for developing dengue hemorrhagic fever

Environmental factors

- The population of *Aedes Aegypti* fluctuates with rainfall and water storage
- Climate change
- Population density



Signs and symptoms:

- High fever for 2–7 days
- Severe headache
- Backache, joint pains “breakbone fever”
- Nausea and vomiting
- Eye pain
- Rash- on the feet or legs three to four days after the beginning of the fever

Symptoms usually last for 2–7 days, after an incubation period of 4–10 days after the bite from an infected mosquito.

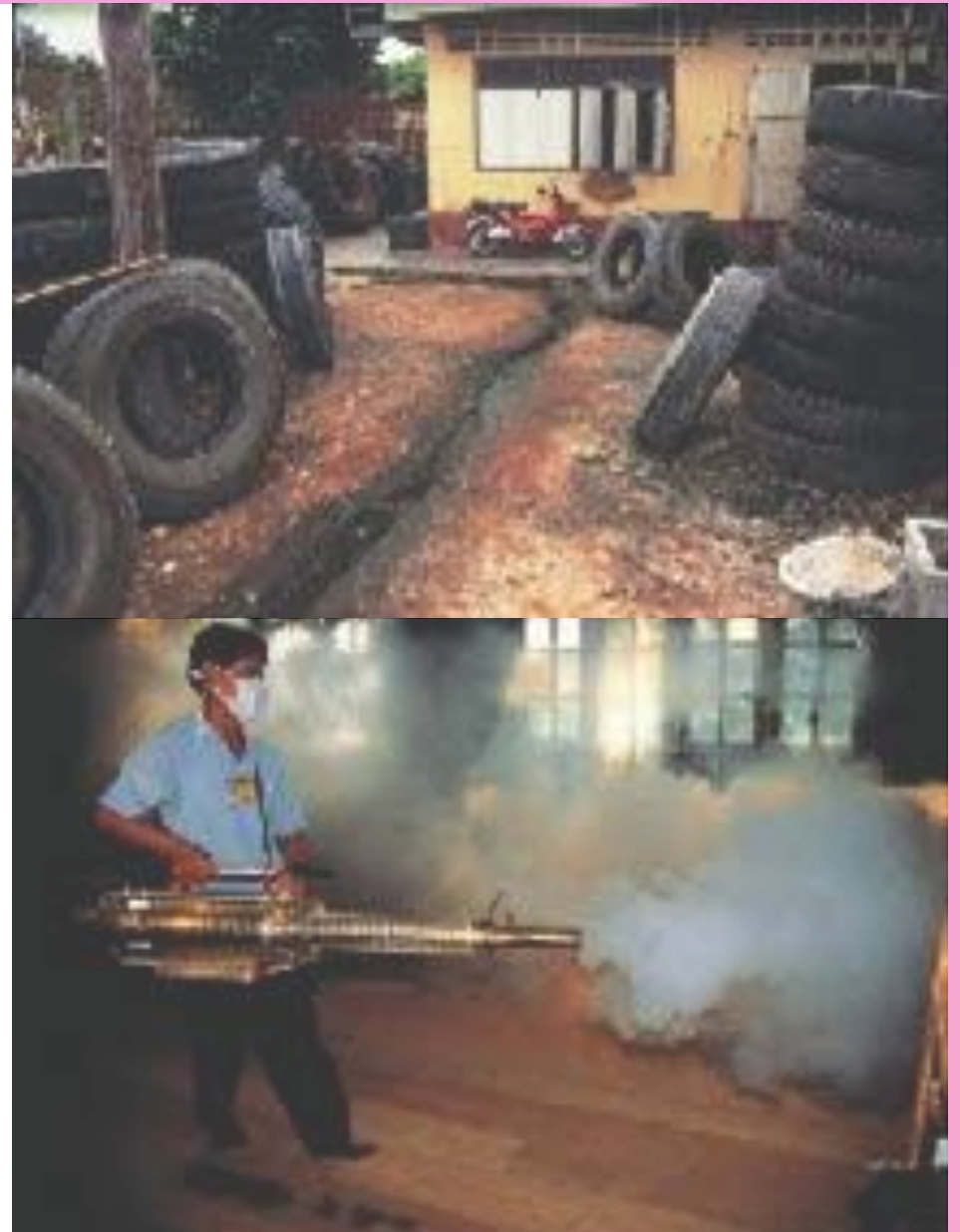


Complication

- Bleeding gums
- Fatigue or restlessness
- Persistent vomiting
- Rapid breathing
- Severe abdominal pain

Prevention and Control

- Combat the vector mosquito through chemical control and environmental management
- Community-based clean-up campaigns eliminating potential breeding sites for vector mosquitoes
- Treat larval habitats with insecticide





Prevention and Control

- Disposing of solid waste properly and removing artificial man-made habitats;
- Covering, emptying and cleaning of domestic water storage containers on a weekly basis;
- Using of personal household protection such as window screens, long-sleeved clothes, insecticide treated materials, coils and vaporizers;

Contd..

- Active monitoring and surveillance of vectors should be carried out to determine effectiveness of control interventions.
- Effective implementation of dengue control program

Prevention and control programmes of Nepal

- Development of appropriate control measures for vector control
- Capacity building for surveillance
- Operational research on vector behaviour and social acceptance of control measures
- Public awareness and education
- Distribution of diagnostic test kits and technical information about DF to border district hospitals and Health Offices
- Outbreak investigation

Treatment

- No specific treatment for dengue
- Treatment usually involves
 - managing fever, general aches and pains
- Intravenous fluids and oxygen therapy for patients who experience shock during their illness



Major activities in FY 2078/79 (Annual report)

- • Conducted orientation to multi-stakeholders at local levels for advocacy on dengue prevention and control including support for search and destroy activities.
- • Conducted ‘search and destroy’ activities at local levels to search for the potential breeding sites of Aedes mosquitoes and destroy them.
- • Routine surveillance of Dengue through EWARS (118 sentinel sites). EDCCD also conducted data verification of dengue cases reported from the EWARS.
- • Vector surveillance at provincial levels
- • Procurement and supply of rapid diagnostic test kits (IgM).
- • EDCCD conducted a stakeholder meeting with Hotel Association of Nepal (HAN) as well as school associations such as PABSON and National PABSON as a preparedness for outbreak

