

# TOPIC: VIRUSES



JURUA STEPEHEN

0762673288/0783570  
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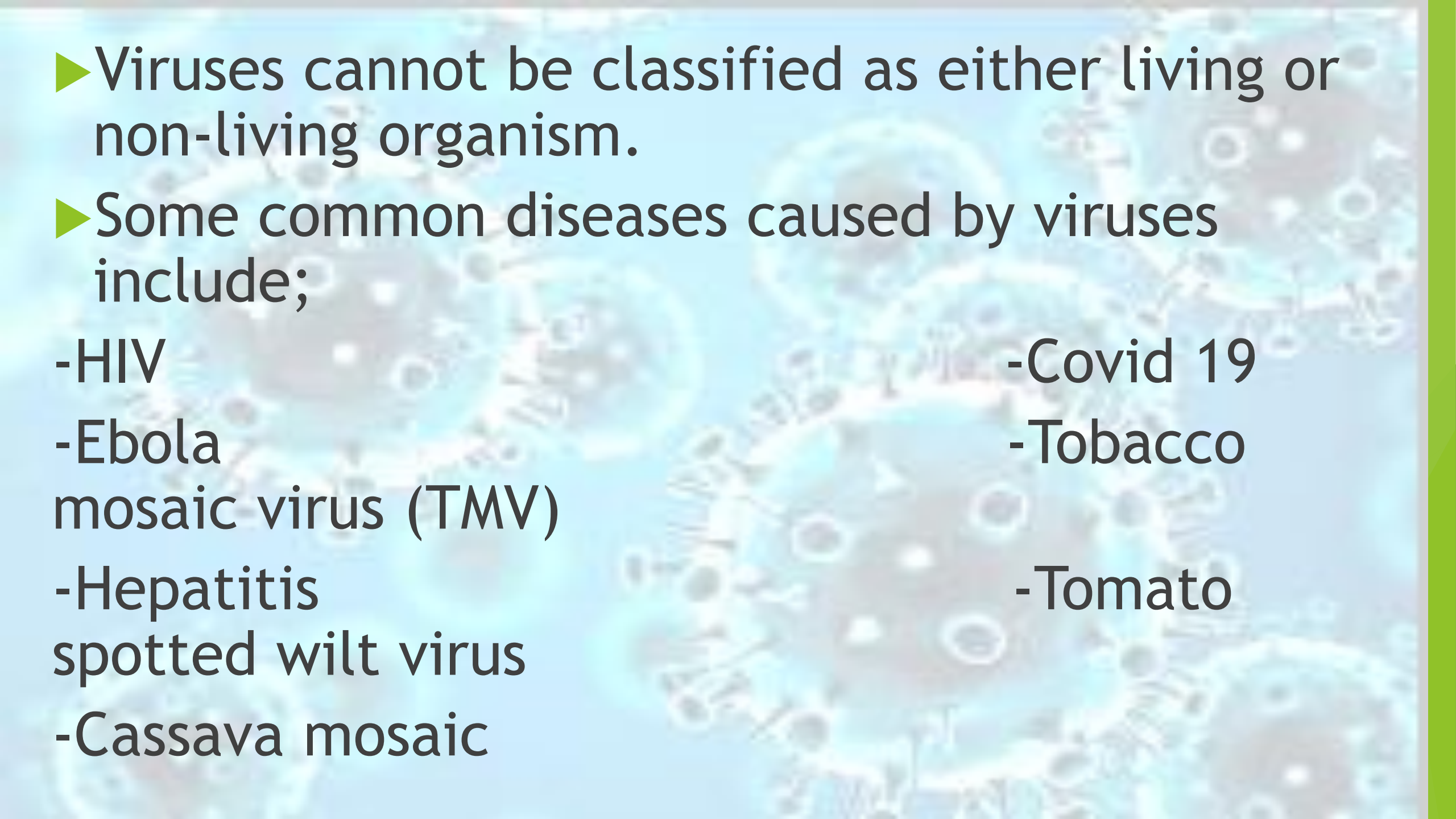
# EXPECTED LEARNING OUTCOME

- ▶ Understand the characteristics of viruses similar to other living organisms
- ▶ Understand key differences
- ▶ Understand the symptoms of; HIV, Ebola, Hepatitis, and cassava mosaic
- ▶ Understand mode of transmission and prevention of above viruses

# VIRUSES

- ▶ Viruses are microscopic organisms that are infectious to hosts like humans, plants and animals.
- ▶ They are a small piece of genetic material (DNA or RNA) inside a protective shell called capsid.
- ▶ Some viruses also have protein envelope.
- ▶ They are inactive while outside the host cell but become active and replicate when inside the host cell





► Viruses cannot be classified as either living or non-living organism.

► Some common diseases caused by viruses include;

-HIV

-Ebola

mosaic virus (TMV)

-Hepatitis

spotted wilt virus

-Cassava mosaic

-Covid 19

-Tobacco

-Tomato

# GENERAL CHARACTERISTICS OF VIRUSES

- ▶ Viruses are very minute (small) organisms, 20-400nm
- ▶ They reproduce only when inside a living cell using materials provided by the host cell
- ▶ They are pathogenic, and cause range of diseases to living organisms
- ▶ They crystallize (become particle) when outside a living cell
- ▶ They lack cell components
- ▶ They consist of genetic material (DNA or RNA) surrounded by protein coat called capsid
- ▶ They are specific to the host they infect
- ▶ They can easily change their shape and structure (mutation).

# LIVING CHARACTERISTICS OF VIRUSES

- ▶ Ability to multiply inside a host plant or animal cell
- ▶ Ability to cause diseases
- ▶ Possession of nucleic acid, protein envelope and enzymes
- ▶ Ability to undergo mutation
- ▶ They are affected by same factors that affect the host  
e.g. temperature, chemicals.

# NON-LIVING CHARACTERISTICS OF VIRUSES

- ▶ They have no cellular organelles such as cell membrane, cytoplasm, and nucleus.
- ▶ They cannot reproduce by themselves
- ▶ They can be crystallized
- ▶ They do not carry out metabolism
- ▶ They possess either DNA or RNA but not both
- ▶ They depend on host cell ribosome and nutrients to make their own proteins

# COMMON VIRUSES

- ▶ There are a range of viral diseases affecting man, plants and animals.
- ▶ Examples include;
  - AIDs
  - Covid-19
  - Hepatitis A,B,C
  - Flu
  - Tobacco mosaic
  - Ebola etc
- ▶ Some viral diseases can not be cured but can be prevented through vaccination or treated using antiviral drugs.

## Activity.

In groups of 5 members; research and discuss to find out the symptoms, ways of transmission and prevention measures of;

a) HIV    b) Ebola    c) Hepatitis    d) Cassava mosaic



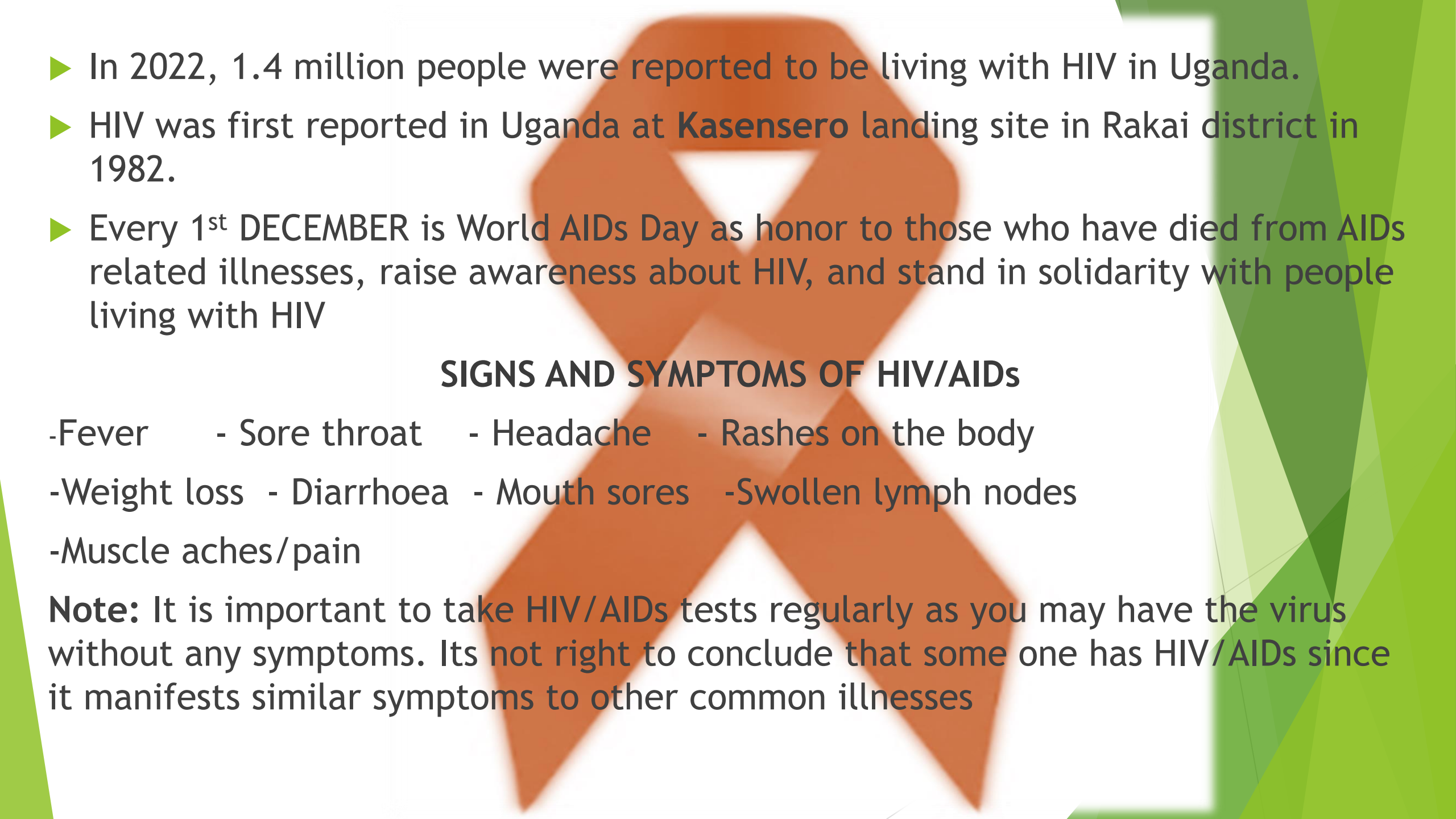
## a) Human Immunodeficiency Virus (HIV)

- ▶ This virus causes Acquired Immune Deficiency Syndrome (AIDs).
- ▶ HIV/AIDs is a life long condition with no cure
- ▶ The virus weakens the immune system by killing body cells making it hard for the body to fight against other infections like;

Tuberculosis, malaria, cancers, common cold and flue.

- ▶ The virus is found in blood, sexual fluids, breast milk



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- ▶ In 2022, 1.4 million people were reported to be living with HIV in Uganda.
  - ▶ HIV was first reported in Uganda at **Kasensero** landing site in Rakai district in 1982.
  - ▶ Every 1<sup>st</sup> DECEMBER is World AIDs Day as honor to those who have died from AIDs related illnesses, raise awareness about HIV, and stand in solidarity with people living with HIV

### **SIGNS AND SYMPTOMS OF HIV/AIDs**

- Fever      - Sore throat      - Headache      - Rashes on the body
- Weight loss      - Diarrhoea      - Mouth sores      -Swollen lymph nodes
- Muscle aches/pain

**Note:** It is important to take HIV/AIDs tests regularly as you may have the virus without any symptoms. Its not right to conclude that some one has HIV/AIDs since it manifests similar symptoms to other common illnesses

## Ways of transmission of HIV/AIDs

- Through blood transfusion of infected blood
- Through breast feeding from infected mother to baby
- Sharing sharp objects with infected person eg injection drug equipment
- Sexual intercourse with infected persons
- Accidents involving infected persons

**Note:** You don't get HIV from; -Touching or hugging infected person -  
Public bathrooms or swimming pools -Sharing cups, utensils, phones -  
Bug bites - Donating blood

# Prevention measures of HIV/AIDs

Research and write a report about the strategies used to prevent the spread of HIV/AIDs in Uganda. Submit your report for assessment.

- ▶ Providing HIV counseling and Testing
- ▶ Voluntary medical male circumcision
- ▶ Access to PEP (Pre-exposure prophylaxis)
- ▶ Prevention of mother to child transmission through hospital deliveries
- ▶ Access to HIV post exposure prophylaxis (PEP)
- ▶ Promote condom use
- ▶ Reducing on multiple or concurrent sexual relationships
- ▶ Reducing on transactional sex which involve people exchanging goods, services, money for sex
- ▶ Reducing on cross generational and early sex
- ▶ Delaying sexual debut (initiation) among youths
- ▶ Provision of biomedical services such as blood screens, STIs treatment etc
- ▶ HIV awareness programs and responsible living





## b) Ebola virus

- ▶ This virus is rare but very deadly
- ▶ It causes Ebola Hemorrhagic Fever (EHF) or simply Ebola
- ▶ It spreads fast through body fluids causing quick body weakening and death

### Signs and symptoms of Ebola

- Fever    - Vomiting blood    - Bloody stool    - Headache    - Body weakness
- Sore throat    - Bleeding from body openings    - Fatigue and muscle pain
- Passing out bloody urine





## Transmission of Ebola

Ebola can be transmitted through;

- ▶ Direct contact with an infected person's body fluids eg sweat, urine, blood
- ▶ Touching the items/objects contaminated by infected person
- ▶ Contact with infected dead bodies
- ▶ Contact or eating of bush meat for animals affected with ebola

## Prevention measures of Ebola

- ▶ Avoid contact with body fluids of infected people
- ▶ Avoid touching items used by infected persons
- ▶ Avoid funerals that involves death due to ebola
- ▶ Retrain from eating raw bush meat esp. bats, monkeys, antelopes
- ▶ Use of personal protective equipment like gowns esp. health workers
- ▶ Ebola vaccination for those at high risk of catching the virus.

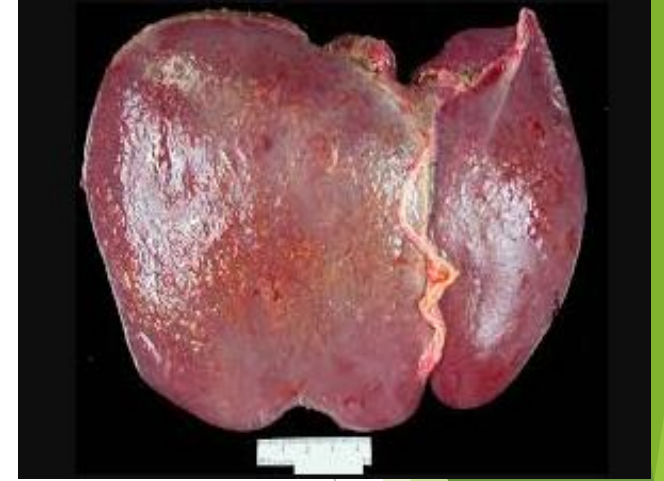
## c) Hepatitis

- ▶ Hepatitis is an inflammation of the liver (swelling of the liver)
- ▶ It can be caused by several factors but commonly hepatitis virus
- ▶ The liver performs several functions such as regulation of sugars, bile production, toxins removal. Therefore, its inflammation impairs its functions.
- ▶ There are three common types of hepatitis;
  - Hepatitis B** ; -caused by hepatitis B virus (HBV), it causes severe liver infection.
  - Hepatitis C**; -caused by hepatitis C virus (HCV), it causes swelling of the liver.
  - Hepatitis D**; -caused by hepatitis D virus (HDV), it's the major cause of liver cancer.

Hepatitis can also be caused by heavy alcohol, drug use, other infections, toxins accumulation etc

# Signs and symptoms of Hepatitis

- ▶ Abdominal pain
- ▶ Dark urine
- ▶ Fever
- ▶ Joint pain
- ▶ Loss of appetite
- ▶ Nausea and vomiting
- ▶ Weaknesses and fatigue
- ▶ Yellowing of the skin and the eyes (jaundice)



# Transmission of Hepatitis

Hepatitis can be transmitted through the bodily fluids such as blood, semen etc

- ▶ Sharing sharp items with infected persons eg needles, syringe
- ▶ Having unsafe sex with infected person
- ▶ Sharing items such as toothbrushes, razors, or medical equipment with infected person
- ▶ From mother to child during birth
- ▶ Transfusion of blood from infected person



# Prevention strategies of hepatitis

- ▶ HBV vaccination of all infants and adults
- ▶ Screening of donor blood for Hbv before transfusion
- ▶ Safe and appropriate use of injection equipment eg by sterilization
- ▶ Community sensitization on transmission and prevention
- ▶ Avoid sharing sharp instruments such as needles
- ▶ Safe sex practice through condom use
- ▶ Regular medical check up
- ▶ Proper nutrition and balanced diet for strong immunity



When not treated, hepatitis develops into a chronic liver inflammation that leads to sudden death.



## d) Cassava mosaic virus

- ▶ Cassava mosaic virus causes cassava mosaic, a diseases in cassava plant.
- ▶ Cassava mosaic disease (CMD) reduces productivity leading to great losses for farmers especially in areas where cassava is a staple food

### Signs of Cassava mosaic disease

An infected plant the following signs;

- ▶ White or pale yellow leaves
- ▶ Twisted, distorted and stunted leaves
- ▶ Stunted/retarded/dwarf growth
- ▶ Pale green spotted leaves.



# Transmission of Cassava mosaic disease

- ▶ Through movement of infected stem cuttings during propagation
- ▶ Within the field, its spread by White fly vector (*Bemisia tabaci*).
- ▶ Use of unclean agricultural implements

## Prevention strategies of Cassava mosaic disease

- ▶ Use of cassava resistant varieties
- ▶ Use of disease free planting materials ( stem cuttings)
- ▶ Disinfecting/ sterilization of agricultural implements after use
- ▶ Destroying infected plants



- ▶ Controlling white flies by spraying
- ▶ Avoid planting alternative hosts of the virus like castor bean, tomatoes

## Activity

1. Research and write a report on the signs and symptoms, ways of transmission and prevention measures of Covid-19 (corona virus)

