

# **Prevention of Mosquito-borne Diseases**

**July 2023**

- Common mosquito-borne diseases
- Prevention of mosquito-borne diseases
  - Work of the Government
  - Elimination of Mosquitoes
  - Personal Protection

# Mosquito-borne Diseases

- Common diseases
  - Dengue fever
  - Japanese encephalitis
  - Malaria
  - Zika virus infection
- Others
  - Chikungunya fever, West Nile virus infection, Yellow fever

# Dengue Fever

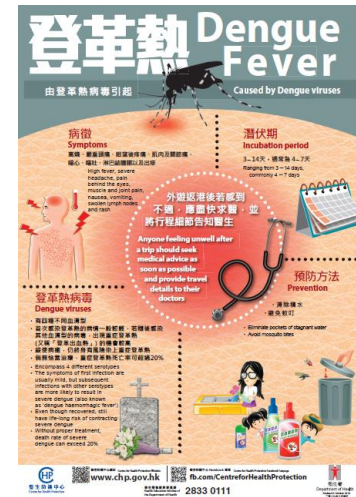
# Dengue Fever

## ■ Causative agent

- Dengue viruses
- encompass 4 different serotypes
- Each of which can lead to dengue fever and severe dengue (also known as 'dengue haemorrhagic fever')

## ■ Vectors

- *Aedes albopictus*
- *Aedes aegypti*



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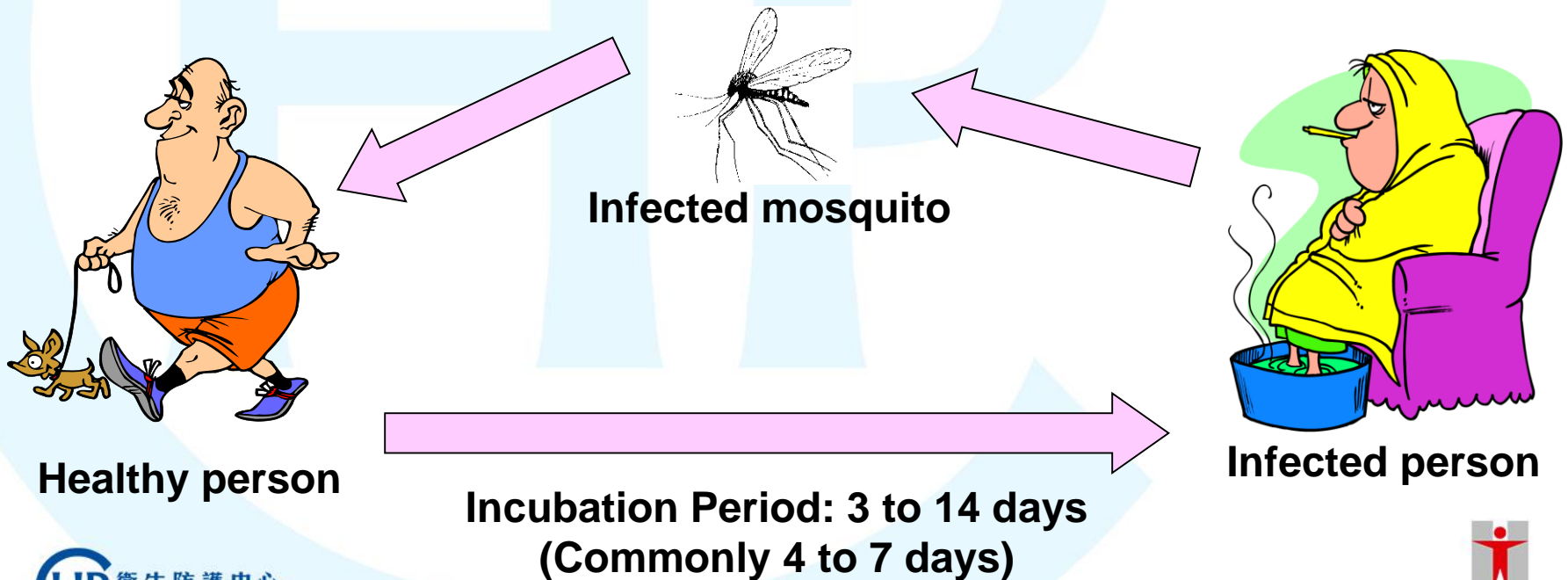
Food and Environmental Health Department

# Dengue Fever – Habitual Behaviour of *Aedes Albopictus*

- Usually breed in stagnant water
- Usually active in dark or shaded places outdoors, but indoor activity is also possible
- Distance of flight: less than 100 meters
- Most active: 2 hours before sunset (5 - 6pm) and then morning (8 - 9am)

# Dengue Fever – Mode of Transmission

- Transmitted to humans through the bites of infective **female Aedes mosquitoes**
- When a patient suffering from dengue fever is bitten by a vector mosquito, the mosquito is infected and it may spread the disease by biting other people



# Dengue Fever – Mode of Transmission

- Cannot be spread directly from human to human
- Low possibility of maternal transmission from a pregnant mother to her baby
- In Hong Kong, dengue fever is mainly spread by *Aedes albopictus*
- *Aedes aegypti* has not been found in recent years in Hong Kong



# Dengue Fever – Clinical Features

- High fever
- Severe headache
- Pain behind the eyes
- Muscle and joint pain
- Nausea and vomiting
- Swollen lymph nodes
- Rash

# Dengue Fever – Clinical Features

- Some infected people **may not have obvious symptoms**
- Some may only have mild symptoms like fever
  - Or have non-specific febrile illness with rash

# Dengue Fever – Clinical Features

- Symptoms of first infection
  - usually mild
  - Once recovered, lifelong immunity to that serotype of dengue virus will develop
- Subsequent infections with other serotypes of dengue virus are more likely to result in severe dengue

# Severe Dengue

- A **complication** of dengue fever
- Severe and potentially **fatal**
- Initially, there are **non-specific symptoms** of dengue fever
  - high fever, which lasts for 2 – 7 days and can be as high as 40 – 41° C
- Warning signs of severe dengue will follow:
  - such as severe abdominal pain, persistent vomiting, rapid breathing, fatigue and restlessness
- Later, there may be **bleeding tendency**:
  - such as skin bruises, nose or gum bleeding, and possibly internal bleeding (e.g. blood in stool or vomit)
- In severe cases:
  - circulatory failure, shock and death

# After Recovery

- Lifelong immunity against that serotype will develop
- **No** effective protection is conferred against subsequent infection by **the other 3 serotypes**
  - Cross-immunity is only partial and temporary
- Subsequent infections with any of the other 3 serotypes are more likely to result in severe dengue

# Dengue Fever – Management

- There is **no specific medication** for dengue fever and severe dengue
- Dengue fever is mostly self-limiting
  - most people will recover after a week
- Symptomatic treatment is given to relieve discomfort like fever and pain
- Patients with severe dengue need to be treated promptly with supportive management, with appropriate and timely treatment, death rate is less than 1%

# For more information about Dengue Fever

- Please visit the Centre for Health Protection website  
<https://www.chp.gov.hk/en/features/38847.html>

# Japanese Encephalitis



# Japanese Encephalitis

- **Causative agent**

- Japanese encephalitis virus

- **Vector**

- *Culex tritaeniorhynchus* (most active from dusk till dawn)

# Japanese Encephalitis – Mode of Transmission

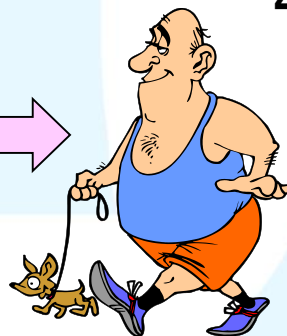
- The mosquito breeds where there is abundant water such as rice paddies
- Becomes infected by feeding on **pigs** or **wild birds** infected with the virus. The infected mosquito transmits the virus to humans and animals during biting



Infected  
mosquito



Within  
4 - 14 days



Healthy person

Infected person

# Japanese Encephalitis – Mode of Transmission

- While Japanese encephalitis is principally mosquito-borne, a human case of Japanese encephalitis transmitted by blood transfusion was recorded in Hong Kong
- In addition, overseas scientific literature showed that organ transplant is also considered to be a potential mode of transmission

# Japanese Encephalitis – Clinical Features

- Most infections occur without apparent symptoms or with mild symptoms such as fever and headache
- More severe infection is characterised by rapid onset of headache, high fever, neck stiffness, impaired mental state, coma, tremors, convulsions (especially in children), spastic paralysis and even death

# Japanese Encephalitis – Management

- There is no specific treatment for this disease
- Supportive therapy is the mainstay of treatment
- The case-fatality rate can be as high as 30% among those with symptoms
- Of those who survive, 20% – 30% suffer permanent intellectual, behavioural or neurological problems such as paralysis, recurrent seizures or inability to speak

# Japanese Encephalitis – Vaccination

- Vaccination for Japanese encephalitis is available in Hong Kong; it is safe and effective
- However, it is generally not recommended for members of the general public

# Japanese Encephalitis – Vaccination

- Vaccination is recommended for travellers who plan to stay one month or longer in endemic areas, particularly in rural areas
- For short-term (less than one month) travellers, if they plan to have significant extensive outdoor or night-time exposure in rural areas during the transmission season of the, they disease should also receive vaccination

# For more information about Japanese Encephalitis

- Please visit the Centre for Health Protection website

<https://www.chp.gov.hk/en/features/49712.html>



# Malaria

# Malaria

- **Causative agent**

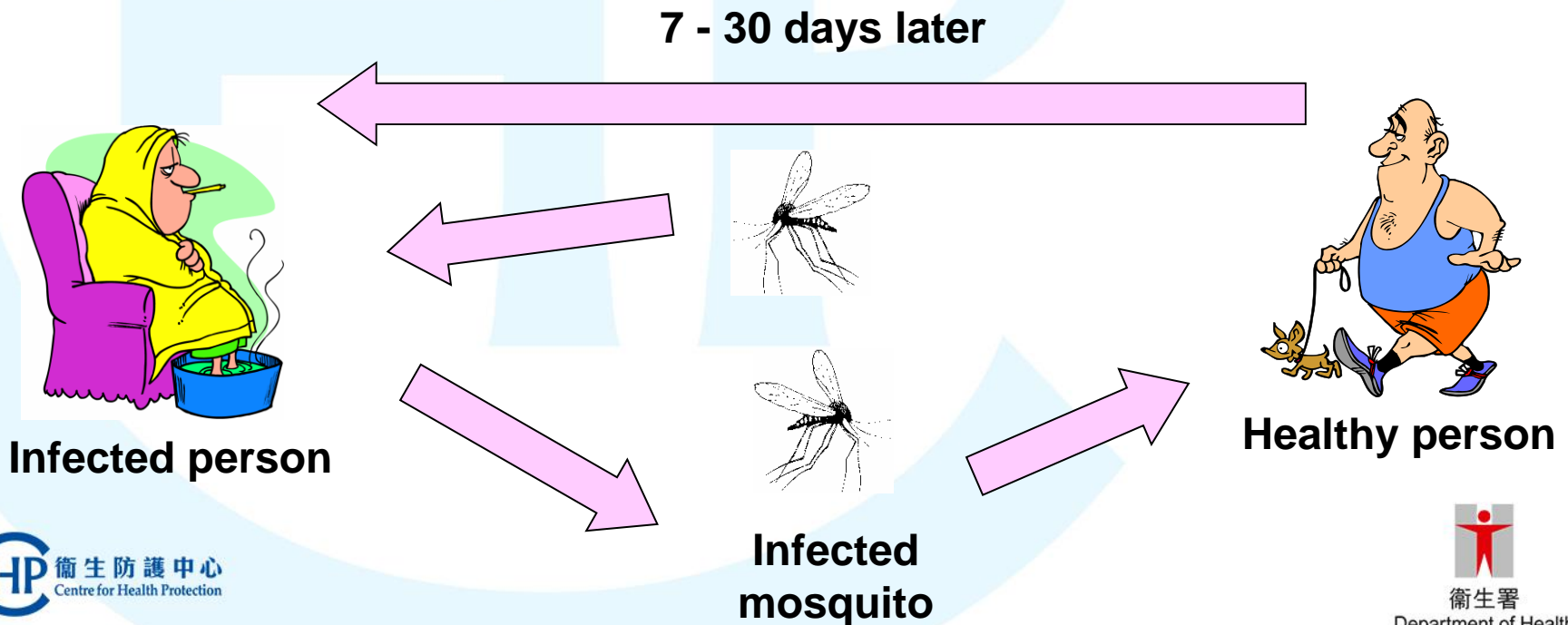
- A group of malaria parasites (commonly found regions: tropical and sub-tropical areas like Africa, South-East Asia and South America)

- **Vector**

- Anopheline mosquito

# Malaria – Mode of Transmission

- When the Anopheline mosquito bites a malaria patient, the mosquito becomes infected and will pass on the disease when it bites another person
- Malaria is not transmitted from person to person



# Malaria – Mode of Transmission

- Can be transmitted through contaminated blood or blood product transfusion, organ transplant, or shared needles or syringes
- May also be transmitted from a mother to her foetus/newborn baby before or during delivery

# Malaria – Clinical Features

- Fever
- Chills
- Headache
- Muscle pain and weakness
- Cough
- Vomiting
- Diarrhoea and abdominal pain

# Malaria – Complications

- Include anaemia, generalised convulsion, circulatory collapse, organ failure such as kidney failure, coma and **death** if the disease is not treated promptly
- Malaria infection during pregnancy can have adverse effects on both the mother and the foetus
- Therefore, **pregnant women should not visit malarious areas** unless this is absolutely necessary

# Malaria – Management

- There are effective drugs against malaria
- Early diagnosis and prompt treatment are crucial
- Doctor would prescribe a course of anti-malarial drugs with other supportive measures
- Patient should complete the whole course of medication to ensure clearance of the malaria parasites

# Malaria – Vaccination

- There are currently **no** registered vaccines against malaria in Hong Kong
- the WHO advises only children in malaria-endemic regions to receive the vaccination but not the adults.
- For international travellers, vaccines are **not available** but **chemoprophylaxis** and **vector control methods** are advisable.



# Malaria – Special Notes when Travelling Abroad

- If travel to areas where malaria is common, arrange a consultation with doctor at least 6 weeks before the trip for preventive measures and obtain **anti-malarial drugs for prophylaxis** if necessary
- Should start taking the drugs before the trip, continue throughout the journey and until some time after leaving the area

# For more information about Malaria

- Please visit the Centre for Health Protection website  
<https://www.chp.gov.hk/en/healthtopics/content/24/30.html>

# Zika Virus Infection

# Zika Virus Infection

- **Causative agent**

- Zika virus

- **Vectors**

- *Aedes albopictus*
- *Aedes aegypti*

# Zika Virus Infection – Mode of Transmission

- Zika virus is primarily transmitted to humans through the bite of an infected *Aedes* mosquito
- *Aedes aegypti*, which is currently not found in Hong Kong, is considered the most important vector
- Other *Aedes* mosquito species such as *Aedes albopictus*, which is commonly found in Hong Kong, are also potential vectors

# **Zika Virus Infection – Other Mode of Transmission**

- Zika virus can also be transmitted from mother to fetus during pregnancy, as well as through sexual contact, transfusion of blood and blood products, and possibly through organ transplantation

# Zika Virus Infection – Clinical Features

- Most people infected with Zika virus infection are **asymptomatic** (i.e. no symptoms)
- The incubation period of Zika virus infection ranges from 3 - 14 days
- Include skin rash, fever, conjunctivitis, muscle and joint pain, malaise and headache. These symptoms are generally mild and usually last for 2 – 7 days

# Zika Virus Infection

- The current major concern is the association with adverse pregnancy outcome (microcephaly) and neurological and autoimmune complications such as Guillain-Barré syndrome (GBS)



# Zika Virus Infection

- Zika virus infection during pregnancy is a cause of microcephaly and other congenital malformations in the infant. Congenital malformations can occur following both symptomatic and asymptomatic infection. Zika infection in pregnancy can also cause complications such as fetal loss, stillbirth and preterm birth
- Zika virus infection can also cause Guillain-Barré syndrome, neuropathy and myelitis

# Zika Virus Infection – Management

- There is **no** specific treatment for Zika virus infection
- Symptomatic relief and prevention of dehydration is the mainstay of treatment
- If symptoms worsen, patients should seek medical care and advice

# Zika Virus Infection – Vaccination

- At present, there is **no** vaccine against Zika virus infection

# Zika Virus Infection – Special Notes when Travelling Abroad

- If going to areas of active Zika virus transmission, especially for persons with immune disorders or severe chronic illnesses and women planning to conceive or their male sexual partners, arrange a consultation with a doctor at least 6 weeks before the trip, and have extra preventive measures to avoid mosquito bites
- Take extra preventive measures to avoid mosquito bites such as using DEET-containing insect repellent on exposed parts of the body and clothing.

# **Zika Virus Infection – Special Notes when Travelling Abroad**

- if travelling in rural areas of active Zika virus transmission, carry a portable bed net and apply permethrin (an insecticide) on it
- Permethrin should NOT be applied to the skin
- Seek medical attention promptly if feeling unwell

# Zika Virus Infection – Returning from areas of active transmission

- Travellers returning from areas of active transmission should apply insect repellent for **at least 21 days** after arrival in Hong Kong.
- If feeling unwell e.g. having a fever, the person should seek medical advice promptly, and provide travel details to the doctor

# **Zika Virus Infection – Prevention of Sexual Transmission**

- All travellers should practice safer sex (including correct and consistent use of condoms) or abstain from sexual activity during travel to areas of active transmission
- Male and female travellers returning from areas of active transmission should practice safer sex or abstinence for at least 3 months and 2 months respectively upon return

# Zika Virus Infection – Special Notes for pregnant women

- Pregnant women **should not** travel to areas with active transmission
- Pregnant women are advised to use DEET-containing insect repellent during travel to areas with active transmission



# **Zika Virus Infection – Pregnant women are advised to**



- Attend antenatal follow up regularly and inform the attending doctor about recent travel history
- 
- Observe for symptoms of Zika virus infection and seek medical advice as soon as possible if feeling unwell
- Sexual partners of pregnant women living in or returning from areas of active transmission should practice safer sex or abstain from sexual activity throughout pregnancy

# For more information about Zika Virus Infection

- Please visit the Centre for Health Protection website  
<https://www.chp.gov.hk/en/features/43086.html>

# Prevention of Mosquito-borne Diseases

# Work of the Government

- Effective prevention of mosquito-borne diseases relies on the support and cooperation of both public and private sectors with the government

# Publicity and Health Education

- Provide health education on personal protection against mosquito-borne diseases for general public
- Publicise personal protection against mosquito-borne diseases for travellers
- Latest updates on mosquito-borne diseases for healthcare workers through periodicals, mails and internet

# Disease Surveillance

- Dengue fever, Japanese encephalitis, Malaria and Zika virus infection have all been listed as a statutory notifiable disease
- Established a web-based Central Notification Office (CENO On-line) to facilitate disease surveillance

# Disease Surveillance

- Contact tracing, epidemiological investigations on disease outbreaks
- Liaise with relevant departments, e.g. Food and Environmental Department for following up control measures
- Collaborate with other departments and Hospital Authority in formulating response measures to prevent local spread of mosquito-borne diseases

# Disease Surveillance

- Maintain close liaison with nearby regions and overseas countries
- Make announcement to general public on reported cases and disease situation of nearby regions and remind public of preventive measures



The **most effective way** to prevent mosquito-borne diseases is to :

- Keep the environment clean
- Remove stagnant water
- Prevent breeding of mosquitoes
- Prevent mosquito bites

# Mosquito Elimination Checklist (1)

- Are containers and other items where water could accumulate disposed of properly? (e.g. throwing empty cans, foam rubber boxes, cups and bottles into a covered bin)
- Are water containers covered properly?

# Mosquito Elimination Checklist (2)

- Are ditches free from blockage?
- Are containers with stagnant water cleaned regularly? (For examples, vases, water storage device of an air-conditioner, water tanks and pools)
- Are uneven ground surfaces filled to prevent the accumulation of stagnant water?

# Remove Stagnant Water

- Change the water in vases at least once a week
- Avoid using saucers underneath flower pots
- Cover water containers tightly
- Ensure air-conditioner drip trays are free of stagnant water
- Put all used cans and bottles into covered dustbins



# Prevent Breeding of Mosquitoes

- Store food and dispose of garbage properly

# Prevent Breeding of Mosquitoes



- Cover all water containers, wells and storage tanks tightly

# Prevent Breeding of Mosquitoes



- Remove or puncture any dumped tyres to prevent the accumulation of stagnant water

# Prevent Breeding of Mosquitoes

- Keep ditches free from blockage





# Prevent Breeding of Mosquitoes

- Remove stagnant water immediately if mosquitoes are found to be breeding
- Use environmentally friendly insecticides such as larvicidal oil if necessary

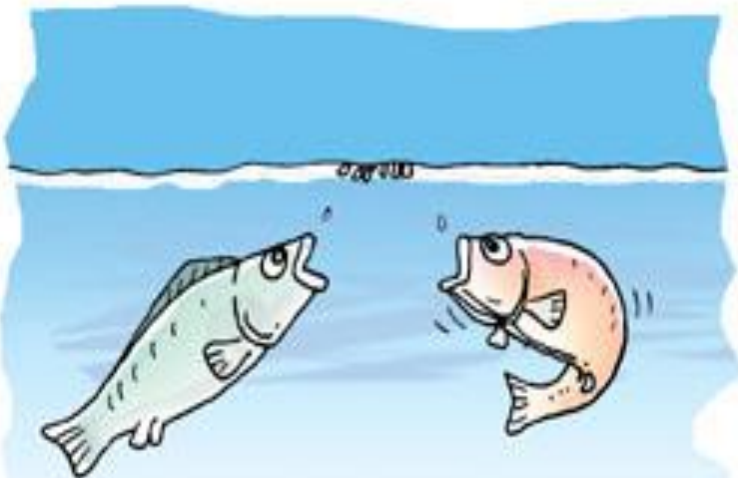


# Prevent Breeding of Mosquitoes

- Top up all defective ground surfaces



# Prevent Breeding of Mosquitoes



- In cultivation ponds, water tanks or large containers, biological controls such as keeping fishes to eat mosquito larvae would be a good option

# Elimination of Mosquitoes at Home



- Dispose of domestic wastes, empty bottles, cans and lunch boxes properly into a covered bin to prevent the accumulation of stagnant water

# Prevent Mosquito Bites – Personal Protection

- Wear loose, light-coloured, long-sleeved tops and trousers, and use **DEET-containing** insect repellent on exposed parts of the body and clothing
- Use mosquito screens or bed nets when the room is not air-conditioned
- Place anti-mosquito devices near entrances such as windows and doors



# If Travelling in Rural Affected Areas...

- Carry a portable bed net and apply permethrin (an insecticide) on it
- Permethrin should NOT be applied to skin
- Seek medical attention promptly if feeling unwell

# Preventive Measures While at Outdoors

Take additional preventive measures when engaging in outdoor activities:

- Avoid using fragrant cosmetics or skin care products
- Re-apply insect repellents according to instructions

# Tips for using insect repellents




- Pregnant women and children of 6 months or older can use DEET-containing insect repellent
- For children who travel to countries or areas where mosquito-borne diseases are endemic or epidemic and where exposure is likely, children aged 2 months or above can use DEET-containing insect repellents with a **concentration up to 30%**
- For details about the use of insect repellents and the key points to be observed, please refer to 'Tips for using insect repellents' at: <https://www.chp.gov.hk/en/features/38927.html>



# If Having Symptoms...

- Having been bitten by a mosquito and displaying symptoms afterwards; or
- If feeling unwell after returning from affected areas e.g. having fever
- Should **seek medical advice promptly**, and provide travel details to doctor

# Enquiries / Websites

- Centre for Health Protection, Department of Health  
Website: [www.chp.gov.hk](http://www.chp.gov.hk)
- Travel Health Service, Department of Health  
Website: [www.travelhealth.gov.hk](http://www.travelhealth.gov.hk)
- Health Education Infoline of the Department of Health  
 2833 0111
- Food and Environmental Hygiene Department  
 2868 0000 or  1823  
(Both are 24-hour hotlines handled by “1823”)  
Website: [www.fehd.gov.hk](http://www.fehd.gov.hk)

**Elimination of mosquitoes is the most effective preventive strategy**

**Let's remove stagnant water and eliminate mosquitoes**

# Thank you!