# ကျန်းမာရေး ဧရာမဓနု

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## တုတ်ကွေးရောဂါ အထူးထုတ်

## SPECIAL ISSUE: DENGUE

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*The procedure, explanations and treatment given in this publication are based on research and consultation with medical and nursing authorities. They all reflect accepted medical practices. Nevertheless they cannot be considered absolute and universal recommendations. The authors, the editor and the publisher disclaim responsibility for any adverse effects resulting directly or indirectly from the suggested procedures, from any undetected errors, or from the reader's misunderstanding of the text.*

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# Editorial

Dear Readers,

We are particularly pleased to publish this new issue of HEALTH MESSENGER MAGAZINE.

As you probably noticed, our activity has been interrupted since last June. Now we have the support of a new donor, IRC, with USAID funding, and are able to resume our publication.

This year, an epidemic of Dengue Fever and Dengue Haemorrhagic Fever affected some of the refugee camps along the Thai-Burmese border and we think it is necessary to bring you useful and updated information on these diseases. An epidemic erupts every two to three years. There is no cure and prevention is the only way to control the spread of the diseases.

We hope this issue will help you to get a clearer idea about the diseases and the important preventive measures against their spread.

Best regards.

Enjoy your reading!!!
*Dr. Seerat Nasir*
Editor


*Health Messenger Magazine Program*

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# Dengue in The South East Asia Region: Focus on Thailand and Myanmar

*With contribution by Elisabeth Emerson, WHO*

***Dengue is a disease of major concern in the SouthEast Asia Region. This article will discuss in brief the emergence of DF/DHF in this region focusing on Thailand and Myanmar.***

Dengue is a disease of the tropics and is one of the most serious emerging diseases, affecting nearly half of the world's population. It is estimated that there are between 50 and 100 million cases of dengue fever and about 500,000 cases of dengue haemorrhagic fever which require hospitalization each year.

In 1958, Thailand was the first country in the SouthEast Asia Region to experience a DHF epidemic. By 1997, most countries in the region, especially India, Indonesia, Myanmar, Sri Lanka and Thailand, had experienced large outbreaks. Currently, DF/DHF is endemic in seven countries of the region (Bangladesh, India, Indonesia, Maldives, Myanmar, Sri Lanka and Thailand) and approximately 1.3 billion people living in endemic areas are at risk of infection. Dengue is a notifiable disease in Indonesia, Myanmar, Sri Lanka and Thailand.

During the last thirty years, Thailand has seen an increase in the number of reported

cases of the disease. Dengue is characterized by a spectrum of diseases ranging from Dengue Fever (DF) to Dengue Haemorrhagic Fever (DHF) and Dengue Shock Syndrome (DSS). Dengue is caused by a virus which has four serotypes (discussed in the following article). All 4 serotypes are capable of producing the full range of disease and all four serotypes (DEN-1, DEN-2, DEN-3, DEN-4) have been identified in India, Myanmar, Indonesia ,Sri Lanka, Thailand and DEN-2 and DEN-3 have been reported in Maldives and Bangladesh.

**Factors responsible for the resurgence of epidemic DH/DHF in countries of the South-East Asia Region**

- Unprecedented human population growth
- Unplanned and uncontrollable urbanization
- Inadequate waste management and water supply
- Increased distribution and densities of vector mosquitoes
- Lack of effective mosquito control
- Increased spread of dengue viruses
- Co-circulation of multiple dengue virus serotype
- Deterioration of public health and surveillance systems

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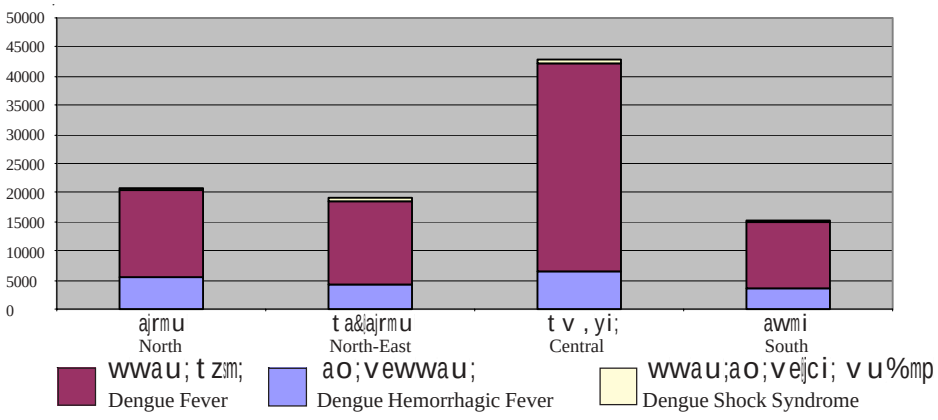
**Cases of Dengue Fever, Dengue Haemorrhagic Fever and Dengue Shock Syndrome in Thailand, January to September 2001**

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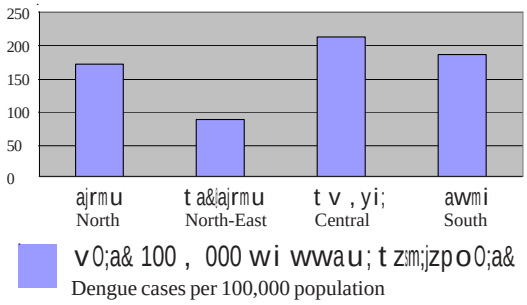
**Morbidity Rate of Dengue, by Region in Thailand, January to September 2001**




In India, Indonesia, Myanmar, Sri Lanka and Thailand, a large number of cases regularly occur in urban, suburban and rural areas, with increasing proportions of DHF and DSS. In Bangladesh, DF cases are generally confined to urban and suburban areas, and DHF/DSS occurs mainly in children under 15 years of age. In Maldives, no cases were reported between 1989 to 1997. In India, the estimated number of DF/ DHF cases is much higher than the number reported. During August-December 1996 in New Delhi, 10,000 cases of DHF and 400 deaths were reported, while in other states/ territories only 3,064 DHF cases and 60 deaths were reported.

## Thailand

Prior to this year, the last major epidemic of dengue fever in Thailand and Myanmar occurred in 1998. Typical of the 3-5 year cyclical nature of dengue, an epidemic occurred again this year. As of September 8, 2001, 97,979 cases of dengue have been reported in Thailand, surpassing the epidemic of 1998.

The highest rate of dengue this year has occurred in the Central Region, which includes Bangkok and the surrounding areas. In this area, 213 cases per 100,000 population were reported. In the NorthEast Region, 89 cases per 100,000 population were reported.

Improved case management has dramatically reduced the fatality rate for dengue. In 2001, the case fatality rate in Thailand was 0.19%, whereas, it had been 13.9% in 1958.

## Myanmar

The surveillance programme on dengue was first launched in 1964 and in 1966 the disease was notifiable. In 1969 DHF was first reported and in 1970 there was an epidemic in Yangon. In 1974 the disease started to spread to other states and divisions of Myanmar and by 1982 all the states/divisions were affected except Chin, Kayah and Southern Shan State. A major epidemic occurred in 1994 with the highest number of deaths recorded. At the same time a DHF epidemic occurred for the first time among adults in Lashio. In 1996 Aedes aegypti was found at 5000 ft about the sea level in Taunggyi. Another major epidemic broke in 1998 recording the highest number of cases. An epidemic also occurred in Taunggyi, a high land area. Adults were affected in Taunggyi and Kayah.

Dengue occurred in Myanmar at a two-year cycle until 1980; but high incidence at every 3 or 4 years after 1980. The case fatality rate (CFR) is now declining and has stabilized at 1-2% since 1995.

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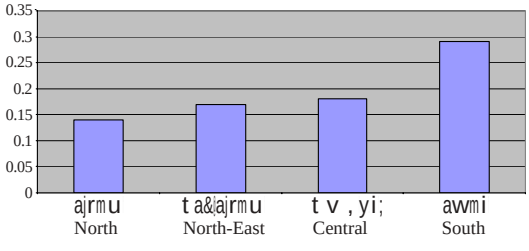
**Case Fatality Rates of Dengue, by Region in Thailand, January to September 2001**



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# Overview of Dengue Fever

*Health Messenger*

***Dengue Fever is caused by a virus that is transmitted by mosquito bites.***

## What is Dengue Fever?

Classical Dengue Fever is an acute febrile illness that is more common in adults and older children. Small children usually have a mild fever of undifferentiated fever (UDF). The disease is caused by a **virus**. A virus is a very tiny organism that cannot be seen even with the aid of a microscope. Viruses depend on human cells in order to grow and multiply. The virus that causes Dengue Fever invades the white blood cells of its human host. The human body then reacts to the virus by developing antibodies to fight the infection.

Dengue patients are usually infective for mosquitoes at an average of about 6-7 days during the febrile (fever) period and the mosquito becomes infective 8-12 days after the infected blood meal and remains so for life (~45 days).

There are several possible outcomes that can occur once a person is infected with the dengue virus. In a majority of the infections, the human host experiences no illness or only a mild fever, which is self-resolving. Those patients who are symptomatic typically experience a fever as well as headache, muscular/joint pain and rash. The most severe form is **dengue haemorrhagic fever** in which the blood vessels leak plasma, leading to hypoclycemia occasionally with bleeding and then leads to shock and eventually death.

## How is Dengue Fever transmitted?

Dengue is a vector borne disease with a mosquito serving as the vector. The dengue virus is transmitted from human to human through the bite of an infected female mosquito while she is feeding. The most important carrier that spreads Dengue Fever is called *Aedes aegypti*.

The dengue virus is a type of **arbovirus,** which is short for "arthropod borne virus." Arthropod in English means "insect". Arboviruses are therefore viruses that are transmitted to humans by insects. The dengue virus is the most important

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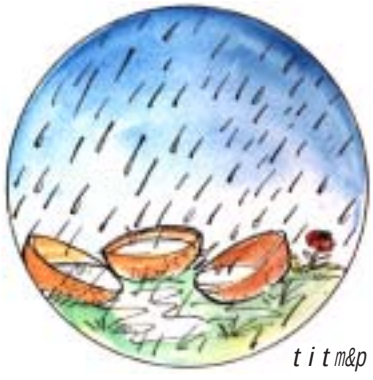
arbovirus in the world causing over 20 million infections and over 24, 000 deaths per year worldwide.

Dengue Fever can occur all year round, but it typically occurs in **epidemics** that follow the rainy season. During the rainy season, water can accumulate in man-made receptacles in and around the house, providing more breeding opportunities for mosquitoes.

## The Dengue virus and immunity

During infection, the body creates antibodies that are designed only to fight that virus type. This occurrence is known as immunity. There are four different types of dengue virus: DENGUE-1, DENGUE-2, DENGUE-3, and DENGUE-4 (or D1V, D2V, D3V, D4V) . Infection by one dengue type produces life-long protection against only that type of dengue virus. A cross protection for the other 3 serotypes persists for a short period.

When a person who has been infected with one type of dengue virus, later becomes infected with a different type of dengue virus, Dengue Haemorrhagic Fever, a more complicated disease, may result. The antibodies from the infection of the first type do not help to fight the second type. Instead, the first infection antibodies can cause further damage through a complex mechanism which produces some substances



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- Classical Dengue Fever with severe bone pain (Break bone fever) occurs mainly in adults.
- DHF is a distinct clinical entity, not a complication of DF. It attacks mostly children under age 16 years, but it can occur in adults.
- UDF or Undifferentiated Febrile illness or viral symptoms occurs mostly in very small children/infants infected for the first time. It usually presents with fever for 1-2 days occasionally with rash.

**Three Clinical Forms of Dengue Fever Disease**

1. Dengue Fever (DF) – an acute febrile disease with headache, bone or joint and muscular pain, rash, and/or decrease in white blood cell count (leukopenia).
2. Dengue Haemorrhagic Fever (DHF) – a sudden onset of high fever, followed by haemorrhagic manifestations (leaking of plasma), often accompanied by an enlarged liver (hepatomegaly) and in severe cases circulatory failure.
3. Dengue Shock Syndrome (DSS) – DHF cases with circulatory failure that develops low blood volume (hypovolaemic) shock resulting from plasma leakage. DSS can be fatal.

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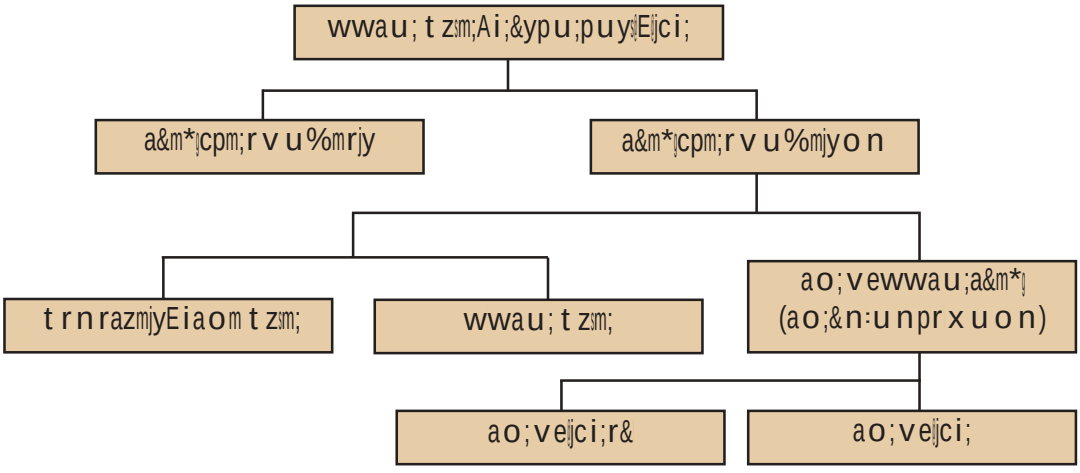


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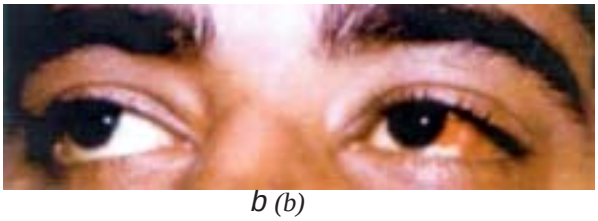

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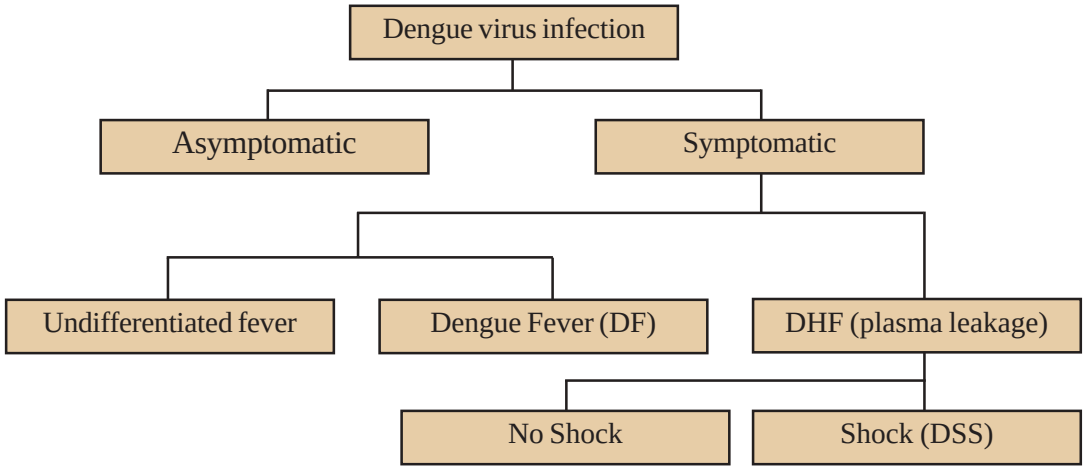
*Some clinical manifestations of DHF: (a) Rash in the legs, (b) & (c) Haemorrhage*

**Manifestations of Dengue Virul Infection**




that act on blood vessels by making them leak plasma and blood and also act on the blood clotting system.

Normally, the blood clotting system would repair the blood vessels using **platelets**. In DHF there are changes in the blood clotting system and both the number and quality of platelets are reduced. Thereby this allows the bleeding to continue to occur. When a dengue infection causes blood vessels to leak plasma, the disease is called Dengue Haemorrhagic Fever (DHF).

If a patient suffering from DHF loses too much fluids, he/she may go into shock and die. When a person infected with the dengue virus goes into shock, the condition is then known as Dengue Shock Syndrome (DSS). The risk of mortality is high when the condition of a patient turns to DSS,and death occurs quickly, within 12-24 hours.

***Special thanks to Dr. Suchitra Nimmannitya, Senior consultant, EPI and Polio Eradication Program, MOPH.***

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# Aedes: the vector of Dengue

*Health Messenger*

***This article will help health workers and community members to understand the life cycle and feeding habits of Aedes aegypti, the carrier of Dengue, thereby to find ways to control and prevent the disease spread.***

## What is a vector?

A vector is any organism that can serve as a transmission vehicle, much like a taxi, for a disease-causing agent, such as a virus or bacteria. Control of the vector can lead to the prevention and control of some diseases. However, in order to control vectors, detailed knowledge must be acquired about their life cycle, preferred hosts, and transmission cycles as well as surveillance of populations and habitats. The *Aedes aegypti* is the vector that transmits dengue virus to humans.

## Appearance of *Aedes aegypti*

Actual size is less than 1/8 th inch.

The female is smaller than other common mosquitoes.

The body is black with a white stripe behind the head and down the back.

The hind legs have white stripes.

The *A. aegypti* is called the tiger mosquito.

## Behaviour of *Aedes aegypti*

Only the female bites. Dengue is spread by the bite of an infected female, which harbors the virus after sucking the blood of an infected person with dengue.

The female is active during the day. She rests on shrubs, tall grass, and in sheltered areas. The Tiger Mosquito is a weak flyer, and will not travel more than 200 yards from breeding sites. Therefore, this mosquito stays close to people's houses and also in dark places inside the house (closets, hung clothes, etc).

This mosquito only lays eggs in tree holes or any kind of container that can catch and hold rainwater for at least one week.

Man-made containers often found around the home in which *A. aegypti* may breed include:

- Used automobile or truck tyres
- Buckets and cans
- Dishes placed beneath flowerpots
- Plastic covers and tarpaulins
- Rain barrels
- Clogged rain gutters

Due to the above reasons, Dengue Fever outbreaks and epidemics usually occur in

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urban areas where people live in crowded houses in close proximity of each other rather than in the rural areas. Increased mobility of people between urban and rural areas has brought the disease to villages as well.

*A.aegypti* is a day-biting species with increased biting activity for 2 hours after sunrise and in the late afternoon. The peak of biting occurs around one hour before sunset. Therefore, personal protection from mosquito bites is encouraged during these times of day.

## Life cycle of *Aedes aegypti*

The life of an Aedes mosquito has four stages – egg, larva, pupa and adult. Larva and pupa are always found in water.

A female A. aegypti mosquito lays its eggs inside containers that hold clear water. These can be man-made containers or natural ones such as holes in trees and rocks. Eggs of the Aedes mosquito are not harmed by dry or cold weather. Eggs can survive under dry conditions for up to six months. The eggs hatch when the container is flooded with water either by rainfall or by human water storage. Even in a small container there can be hundreds of larvae.

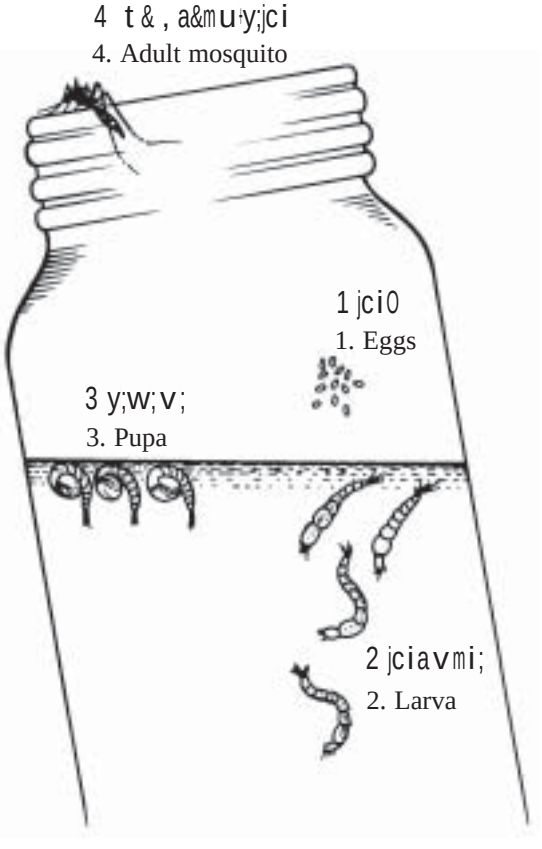
After the eggs hatch, mosquito larvae emerge. The larvae remain near the surface and hang slightly under the water as they continue to grow and develop. The larvae then surround themselves in a membrane where they change form. This is known as the pupa stage. The larvae and pupa stage last about 7 days. After which, an adult mosquito emerges.

After 48 hours, the new adult female will mate and then take her first blood meal. Five days later, the new female mosquito will lay her eggs and the life cycle will start over again.

In regard to vector control, eliminating possible breeding sites and using larvicides affect the larvae and pupa stages of the mosquito's life cycle. Personal protection and chemical spraying effect the adult stage.

**Special Concerns**

- *Aedes aegypti* is the carrier of Dengue Fever and Dengue Haemorrhagic Fever.
- Night time spraying of insecticides does not provide satisfactory control of this species.
- The most effective way to control this mosquito is to eliminate its breeding places.

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*Life cycle of A.aegypti*

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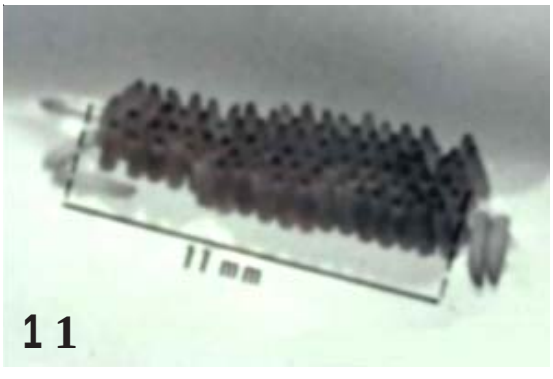


*jci0 Eggs*

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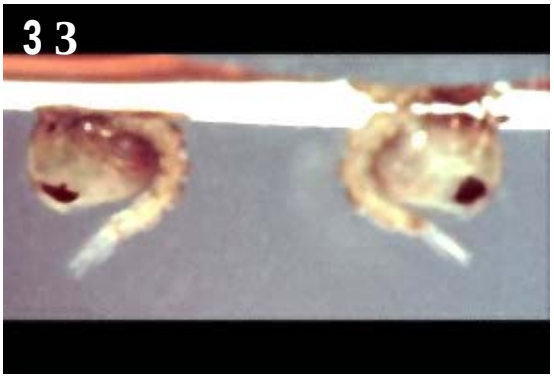


*y;w;v; Pupa*

*t&,a&mu·y;jci Adult mosquito*

## Differences between *Anopheles* and *Aedes aegypti* mosquitoes

| Characteristics | Anopheles | Aedes aegypti |
|---|---|---|
| Disease transmitted | Malaria | Dengue Fever |
| Biting times | Night time (from sunset to sunrise) | Day time (from sunrise to sunset) |
| Environmental preference | Mountainous and sea side | Urban and rural areas inside/ around houses |
| Breeding sites | Clean ponds and slow moving streams | Man-made and natural containers found around the house |
| Flight range from breeding site | Far distance: 1.5 km to 5 km | Short distance: 50 – 200 meters |

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# Prevention of Dengue Fever

*Nipaporn Intong, ARC and Christine Harmston, BRC*

***Dengue fever has no cure; as such prevention is the only way to control its spread. Vector control and personal protection are the two main strategies used to prevent Dengue fever. Preventive measures should also be taken to avoid further spread of the disease in the camps.***

## Dengue prevention in the refugee camps

Dengue fever is not well-known to the people in the refugee camps as compared to malaria. It is only this year that Dengue fever has been found in the refugee camps along the Thai-Burmese border. The cases reported are in Mae Sariang, Mae La, Tham Hin (about 300 cases of dengue reported in August—MSF), and NuPoh camps. In NuPoh camp, there were about 1 or 2 cases of Dengue fever reported in August and it was found that the affected cases carried the disease from Mae Sot. There was no further spread of the disease in the camp. However, Dengue fever has been a major health problem in Thailand for the past 30 years, particularly Dengue Haemorrhagic Fever. The outbreak period usually starts from May and peaks in July. With the movement of the refugee population and transportation between camps and local towns or cities, there is a high possibility of dengue transmission to the refugee camps. To be able to prevent the disease, we need to understand how the disease is spreading and increase awareness regarding preventive measures among the camp residents accordingly.

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*Water containers outside houses in the camp.*

### *Why is it important to prevent dengue?*

Dengue fever, especially life-threatening Dengue Haemorrhagic Fever (DHF) often occurs in massive epidemics. It spreads rapidly and affects many people within a short period of time. Children are at a higher risk for dengue transmission. People with severe dengue or DHF may die if not properly diagnosed and treated. In the refugee camps, due to the poor housing and living conditions the disease may spread rapidly, killing a large number of people within a short frame of time. Moreover, the health facilities are not enough to support a large number of infected people at one time.

### *How can we prevent dengue in the camps?*

Health Education and community awareness are the two important strategies that should be followed in the camps. *To have effective prevention, both* ***individual and community levels*** *need to cooperate in the prevention activities.*

Another strategy is vector control, which is usually followed during an outbreak of the

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disease. Chemicals and biological agents (See page 34) are used to kill both adult mosquitoes and their larvae. When the number of mosquitoes around a community is reduced, the risk of being infected with the dengue virus is lowered too. This is a short term emergency response in case of emergency, and it cannot replace health education in the long term.

## At the community level

In order to prevent a dengue epidemic in the refugee community, **environmental control** is an important strategy to undertake. The community can take the following actions:

- Water storage containers such as earthen jars, drums, tanks, barrels, and concrete storage vessels are needed for daily use. Management of essential water storage containers includes:

- Covering water jars when not in use either with a screen covering, or wooden lid.

- Covering containers that are used to collect rainwater with screen netting or cloth.

- Adding **larvicides** to water containers that are frequently used or need to be left open (See page 34).

- Pouring boiling water down the sides of water containers to kill larvae and eggs when water levels are low.

- Scrubbing and cleaning the edges and insides of water containers to remove possible deposits of *Aedes* eggs on a regular basis.

- Roof gutters ought to be repaired and cleaned of debris regularly.

- Tree holes around the house can be filled with sand or concrete to prevent breeding.

- Bamboo can be cut at the node to prevent water from collecting inside of it.

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In case of bamboo fencing, their tops can be filled with sand to prevent water accumulation.

- Household and garden utensils (bowls, buckets, cups, jars, cans etc.) should be turned upside down to prevent rainwater from collecting inside them.

- Small boats should also be turned upside down when not in use. Accumulated water inside the boat should be emptied.

- Ensure that there is a good system of regular garbage collection and disposal to avoid garbage being left to rot, which will make a good breeding ground for mosquitoes.

- Unused tyres should be kept away from households and arranged so that they will not collect rain. If possible, the tyres should be shredded or cut into pieces and discarded away from the community.

- Hold workshops to discuss the importance of Dengue Fever and inform community members how to prevent dengue. Discuss what collective actions can be taken to stop all potential mosquito breeding grounds from existing and monitor ongoing clean up activities. Community members will be more interested to take action against dengue if they have been involved in the brainstorming of ideas

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and the decision making process.

- Advertise the clean-up day in camp on radio and with posters.
- The control measures will include the use of insecticides applied through fogging or ultra-low-volume(ULV) spraying (contact local Thai Public Health or malaria control unit in your area). This will kill or reduce numbers of adult dengue mosquitos and help to halt the spread of the epidemic.

It is important to involve schools and youth groups in the prevention campaign. Students can play active roles in helping with clean up and information campaigns. They can also bring the prevention messages home to their families. The best way to provide young people health education and promotion is by involving them in the implementation of activities that can prevent illness and disease.

***At individual level*** personal protection against mosquito bites should be taken. Personal protection involves using various means to prevent adult mosquitoes from biting household members. The simplest method is to wear protective clothing during the daytime, especially during peak biting times, which is at sunrise and an hour before sunset.

Repellent can also be applied to exposed skin (feet, ankles, wrist, forehead, neck, etc.) or to clothing during the day to prevent mosquitoes from landing and biting. Repellents are best applied on a short-term basis and should not be used continuously, especially on children.

Domestic household insecticides can also be used, such as the mosquito coil. When the mosquito coil burns, it releases smoke into the air that contains insecticide. It is the cheapest among the other forms of insecticide that are available. Also it is culturally acceptable because of the old popular belief that smoke keeps mosquitoes away.

Lastly, insecticide treated bed-nets are another effective form of prevention. Insecticide treated bed-nets are more effective at preventing malaria. The *Anopheles* mosquito that transmits malaria is a night time biting mosquito. During the day, the insecticide treated bed-net can kill mosquitoes carrying dengue when they rest on the bed-net.

During the daytime, small children and babies can be placed under an insecticide treated bed-net to protect them from

mosquito bites while they are taking a nap. Bedridden patients and the elderly can also be kept under insecticide treated bed-nets during the day. Lastly, dengue patients who are being treated at home should be placed under insecticide treated bed-nets for at least five days to prevent further transmission of the dengue virus.

Eliminating mosquito breeding sites are also needed at this level. Health education regarding these two issues should be provided from house to house.

In summary, Dengue Fever and Dengue Haemorrhagic Fever diseases are preventable and at a low cost. It needs a lot of prevention efforts along with disease surveillance to control the outbreak. Vector control and improvement of reliable water supply and sanitation are main keys to the disease control and prevention.

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**Six strategies of the National Dengue Prevention and Control Plan (NDPCP), Thailand**

- Empowering individuals and communities in DHF prevention and control.
- Environmental modification to control breeding sites of *Aedes* vectors.
- Health promotion and medical services.
- Multisectoral networking for DHF prevention and control.
- Development of administrative and management systems.
- Technological development for prevention, control, and treatment of DF/DHF.

**Significant interventions**

- Strengthening Aedes larvae abatement programs.
- Integrating DHF control into Primary Health Care programmes.
- Campaigning massive public education.
- Running campaign for DHF control through multisectoral organizations.
- Intensive training of physicians and nurses in clinical diagnosis and disease control management.
- Establishing advisory groups on social and behavioral sciences to develop education materials.
- Training technical and operation trainers for community participation.
- Developing technical materials.
- Organizing an international conference on DF/DHF.

***Proceedings draft: The first international conference on Dengue and Dengue Haemorrhagic Fever.***

**Country strategies, Myanmar**

- Information, Education and Communication.
- Use of various media for community awarness.
- Health talks in schools.
- Distribution of posters and pamphlets.
- WHO Guidelines on DF/DHF is translated to Burmese for the health services.
- Guidelines on DF/DHF for NGOs were published.

**Prevention and control of DF/DHF**

- Mainly larval control.
- Preventive spraying at selected areas.

**Epidemic preparedness**

- DHF surveillance.
- Early warning system.
- Procurement of medical supplies & equipments.
- Advocacy meeting in epidemic years.
- Training of health personnel and development of training materials.
- Referral system.
- Biological control – larva eating fish *(poecillia reticulate).*

***Proceedings draft: The first international conference on Dengue and Dengue Haemorrhagic Fever.***

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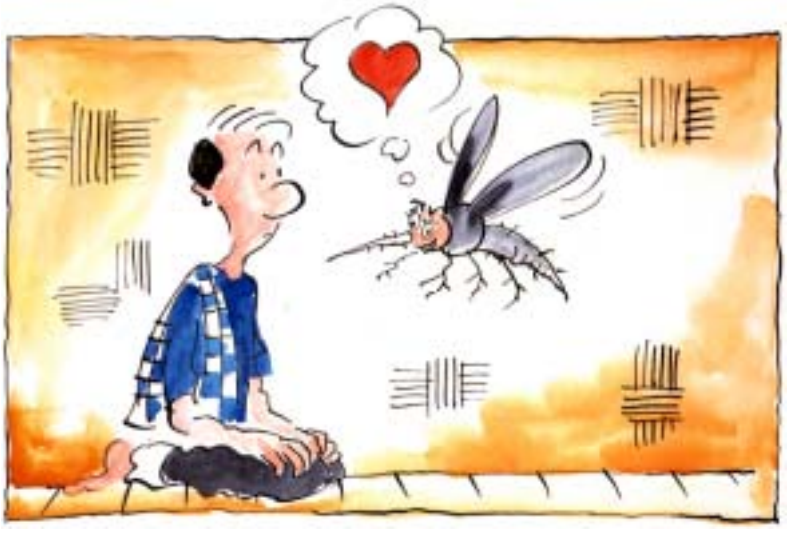

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# First International Conference on Dengue and Dengue Haemorrhagic Fever (DHF),Chiang Mai, Thailand

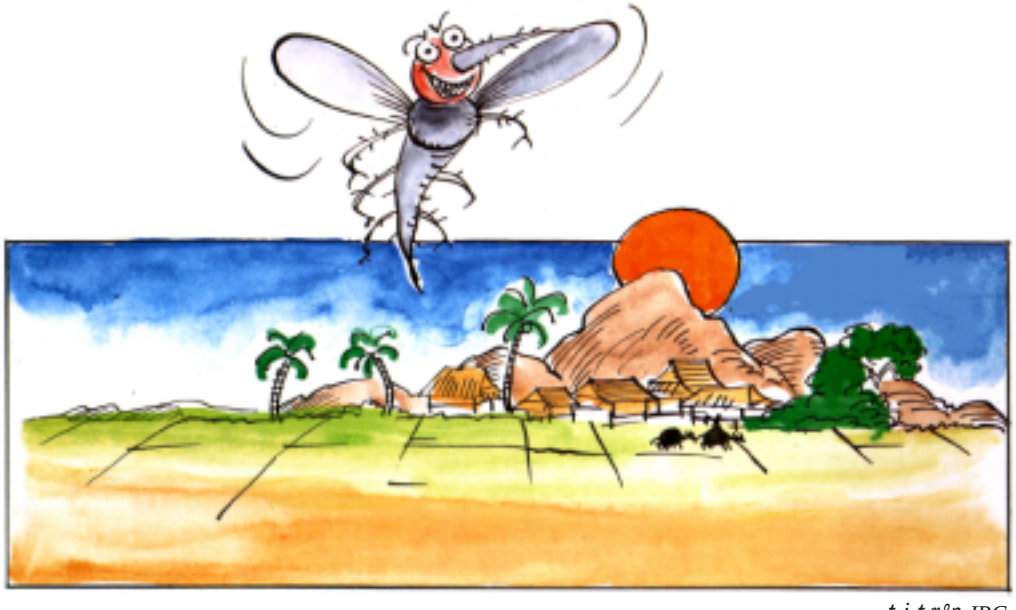
*With contribution by Elisabeth Emerson, WHO*

***Proceedings draft from the First International Conference on Dengue and Dengue Haemorrhagic Fever, 20-24 November 2000, Chiangmai, Thailand***

An international conference with over 700 public health specialists from 41 countries was held in Chiang Mai, Thailand, in November of the year 2000 to discuss the most important mosquito-borne viral disease of humans:Dengue Fever. This First International Conference on Dengue/DHF was organized by the Ministry of Public Health in Thailand, and held in collaboration with the World Health Organization, National Research Council of Thailand and USAMC-AFRIMS. Delegates at this conference included representatives from Thailand, Myanmar and Cambodia.

Together, these experts recommended that all countries at risk for dengue transmission should develop and implement sustainable prevention and control programs and made the following resolutions:

- To strongly endorse the WHO global strategy for prevention and control of DF/DHF.
- To advocate increased political commitment and resources for improved and sustained prevention and control efforts.
- To promote active intersectoral partnerships involving international, regional, national and local agencies, NGOs, foundations, private sector and community organizations.
- To build and strengthen capacity of health systems for DF/DHF treatment, surveillance, prevention and control.
- To pursue, encourage and support the development, application and evaluation of new and improved tools and strategies for DF/DHF prevention.



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*Dr. Danielle Stewart, examining a patient.*

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# DHF Epidemic in Tham Hin Camp

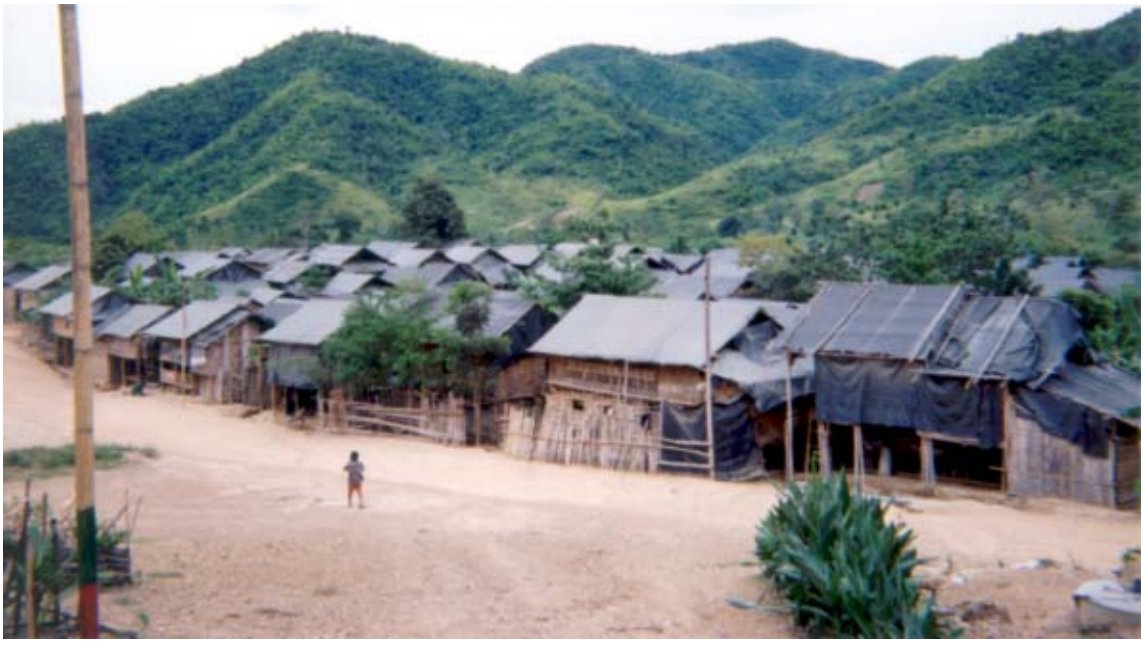
*Dr. Danielle Stewart, MSF*

***In this article Dr. Danielle Stewart provides a short description of events since the beginning of the DHF epidemic.***

In Tham Hin Camp the DHF epidemic spread quickly. The first week we had five cases of DHF, but the number of patients quickly climbed to 40 the second week. With two simultaneous epidemics, DHF and Typhoid, within a few days, more than 100 patients were hospitalized in the IPD. The number of patients became an extra and heavy workload for nurses and midwives. Some of the nurses became sick. At the same time some of the medics and nurses became affected as well as their families. Everybody was working extra shifts and extra days. As there were too many patients to take care of at the same time, the staff were tired, very stressed and worried. There were three deaths in the first week alone.

DHF is a very difficult disease to predict. Some people were not seriously ill one day and developed a very severe form the next day. Some had mild bleeding for five days without developing a severe form. **Every patient needed close supervision as the course of the disease was unpredictable.**

Sometimes the members of an entire family got ill with DHF and they were all admitted into the IPD. It was really a sad situation when all three children of a family arrived with severe bleeding, and all of them had to be referred to the local hospital where



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one of them succumbed to death. One of the most difficult tasks for me was to decide when to refer a patient to the hospital. There were so many patients with bleeding. We could refer no more than 10 patients per day. We had to manage quite severe forms of DHF at the IPD and only referred patients with uncontrolled shock or very severe form of haemorrhage that we could not stop.

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*Dr. Danielle Stewart.*

There were too many things to be taken care of at the same time. For instance, due the massive inflow of patients, all the toilets of the IPD overflowed and we had to build extra latrines. Extra buildings were used to accommodate more people in the IPD. We had to order extra medicine and extra IV fluids. We bought a large number of mosquito nets for the patients in IPD to keep them inside the nets at all times. We had the clinic fumigated to eliminate mosquitoes.

It was a difficult situation for all of us as there is no real cure for this disease. The people in the camp would not stop coming to the clinic to ask for medicine. They asked for antibiotics that could cure DHF. They would not believe us when told that there is no such medicine. It was quite difficult for us to make them understand that the disease has no cure. We tried to explain to them that for DHF there is no medicine which could kill the germs. The only thing we could do was to give paracetamol for fever and IV fluid to maintain the body's fluid balance and refer the seriously ill people to the hospital.

Our blood tests showed that almost everyone had secondary infections, which meant that this was not the first time that they had dengue. Actually a large percentage of people infected for the first time only develop a mild flue-like fever, and it is most often during the second or third attack that they develop DHF.

As the camp is very crowded and Aedes mosquitoes were present already, once the dengue virus was introduced into the camp, this was sufficient to cause a huge outbreak.

**Table 1. Tham Hin Refugee Camp: Population census, April 2001**

| Age group | Female | Male | Total |
|---|---|---|---|
| <9 months | 114 | 126 | 240 |
| 9 months-5 years | 582 | 687 | 1269 |
| 5-15 years | 1280 | 1363 | 2643 |
| 15-45 years | 1706 | 1606 | 3312 |
| >45 years | 399 | 453 | 852 |
| **TOTAL** | **4081** | **4235** | **8316** |

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**Table 2. Attack rate per age group**

| Age | Population | Cases | Sex Ratio M/F in cases | Attack Rate /1000* |
|---|---|---|---|---|
| <9 months | 240 | 0 | 0/0 | 0 |
| 9 months- 4 years | 1269 | 11 | 6/5 | 8.7 |
| 5-14 years | 2643 | 45 | 17/28 | 17.0 |
| 15-44 years | 3312 | 41 | 14/27 | 12.3 |
| >44 years | 852 | 2 | 0/2 | 2.3 |
| **TOTAL** | **8316** | **99** | **37/62** | **11.9** |

* Cumulative incidence from 25/05/01 to 28/06/01

**Dengue in Tham Hin Camp: Chronology of events**

On the 27th of May 2001, a 41 year-old woman was admitted into the IPD for fever, on the 31st her platelet count was 67000/cumm. She was then referred to the Thai hospital for vaginal and gum bleeding on the 9th of June, where she died of general haemorrhagic syndrome 3 days later.

On the 13th of June, a 6 year-old girl died after a history of fever for 7 days with convulsions and nose bleeding. She rapidly developed a shock syndrome and died the same day despite IV fluid infusion and referral.

During the second week of June 2001, a rapidly increasing number of fevers often with rash were referred from OPD to IPD. On the 13th, the first serologically proven Dengue Fever case was a 14 year-old boy.

At the same time, all fever cases seen with rash or bleeding were suspected of Dengue and admitted into IPD. They were hydrated, given paracetamol for managing fever and pain, and closely monitored and followed-up. Many were referred to Suan Phung Hospital in the beginning because of the trauma of the first 3 deaths. Only cases with haemorrhage and/or with platelet counts less than 20000 were referred to the hospital.

Since the 2nd week of the outbreak, home visitors were informed and worked on health education (reduction of mosquito breeding sites by covering water containers) and active case finding. Fumigation with the help of the Thai Vector Borne Disease Control were conducted in the camp on the 16th, 18th and 21st of June. Larvicide is being used for exterior water reservoirs.

***Courtesy: Dr. Elise Klement, MSF***

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# Anti-Vectorial Response in Case of Dengue Fever Outbreak

*Rene Collard, MSF*

***This article focuses on the control of Aedes mosquitoes in Tham Hin Camp during the Dengue Fever epidemic.***

Health Education is no doubt the best way to fight *Aedes* mosquito. A well informed population is the most effective weapon against Dengue Fever. Often ignorance and lack of care are responsible for the spread of the disease. Once I found the difference between two households only 80 meters apart; one was full of *A. aegypti* and the other had none as the inhabitants covered their water containers.

During an outbreak of dengue, vector control is one of the most effective measures taken to control the epidemic. There are some discussions regarding the usefulness of vector control by chemical space spraying. However, this anti-vectorial strategy has proven to be effective in areas of high population density, such as the refugee camps, and especially in case of Tham Hin Camp.

## Measures to be taken by the sanitation team during Dengue Fever outbreak

Two different approaches are to be taken during the outbreak

1. Thermal Fogging and ULV Space Spray Operations to fight the adult mosquitoes.

2. Chemical or biological treatment of water containers to fight the larvae.

### 1. Thermal Fogging and ULV Space Spray Operation

Before starting the operation the following should be considered:

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**a) Counting the larvae: Counting larvae, BEFORE and AFTER fogging and spraying is important in order to assess the situation and to evaluate the effectiveness of the operation.**

The sanitation team has to visit all the houses within the targeted area and control as many water containers as possible. The team then has to collect the larvae with a small water pump, and calculate an index. There are 2 indices currently used:

**Bertaux Index (BI):** Number of positive containers / number of controlled containers X 100

**Pulpal Index (PI):** Number of larva/ Number of controlled houses

**b) Preparation:** The area to be treated should not be less than 300 meters around the houses where the Dengue Fever cases were found. Residents should be informed about the timing of the operation and warned beforehand so that food is covered, fires extinguished, and pets are moved out along with the occupants. Doors and windows of

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*Preparing the machine for fogging*

the houses should remain open.

**c) Timing:** The temperature is usually lower and the weather cooler, during the early morning and late evening hours. Cool weather is more comfortable for workers wearing protective clothing. Also, adult *Aedes* mosquitoes are most active during these hours.

**d) Frequency:** The spraying should be repeated at an interval of seven to ten days to eliminate the breeding of new mosquitoes.

**THE PROCEDURE SHOULD NOT BE UNDERTAKEN IN PRESENCE OF RAIN OR MEDIUM TO STRONG WIND.**

**SAFETY MEASURES: SPRAYMEN SHOULD USE PROTECTIVE CLOTHING AND MASKS.**

### *Thermal Fogging*

This method consists of vaporizing a liquid containing insecticides at a high temperature with a Thermal Fogging machine. The insecticide can be mixed with oil or water. Mixture with oil (diesel) produces dense clouds of white smoke, whereas mixture with water produces a colorless fine mist.

To be most effective, the fog should just moisten the hand when the hand is passed quickly through the fog at a distance of about 2-3 meters in front of the fog tube.

Portable spray units can be used to treat buildings and congested housing areas, such as camps. One machine with 2 or 3 operators can treat an average of 80 houses per day.

The fogging is done from house to house; always starting from downwind and finishing upwind. All doors inside the houses should be kept open. Fogging should be done from the upper floors to the ground floor

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and from the back of the building to the front. The attached buildings and the space under the stilts should not be forgotten. All the windows and doors should then be shut for half an hour after the fogging to ensure good penetration of the fog and for maximum effectiveness.

While fogging outdoors (courtyards, gardens...), it is important to direct the fog at all possible mosquito resting sites, including hedges, covered drains, bushes and tree shaded areas.

### *Ultra-Low Volume (ULV) space spray*

This method uses a small quantity of concentrated liquid insecticide (we used permethrine), as little as 2 liters / Ha. The fog may be applied by portable machine and vehicle mounted generators. ULV is often described as the method of the future but it is difficult to use inside the houses and to assess whether an area has been properly sprayed because the liquid is almost invisible.

In case of Dengue Fever outbreak, ULV space spray operation can be done in addition to thermal fogging to spray the outside walls of the houses from a distance of 15 meters, as well as the surroundings of the houses.

Each spray squad consists of 4 spraymen and one supervisor.

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**2. Chemical or Biological treatment of water containers**

***Chemical larvae killer:*** Temephos 1% sand granules, also called Sand Abate is used as larvae killer. One (1) gm of sand granules/ 10 liters is poured in all water containers of the houses to kill the larvae (including the toilet pit). This dose is effective for 8-12 weeks, especially in porous earthen jars.

***Surface treatment:*** A protective film of 2% solution at the surface of water prevents the larvae to develop. (50 gm of sand abate / 10 liters / 50 sq.m).

Although this is a very efficient vector control method, people are sometimes reluctant to use it because of the smell.

***Bacillus thuringiensis H-14 (Bt.H-14):*** Bt.H-14 is a bacteria, available under a number of trade names which is a proven environmental-friendly mosquito larvae killer, entirely safe for humans. It can be used with confidence in drinking water.

***Fish:*** Larvae eating fish such as *Gambusia affinis* or *Poecilia reticulata* (guppy) have been extensively used for mosquito control in Southeast Asia. It has for instance proven to be very efficient in the Khmer refugee camps at the border with Cambodia. Its applicability depends on the type of containers.

**In both cases we have been helped by experts from a specialized Thai NGO called SPA.**

## Conclusion

A strategy to fight a dengue outbreak must always include a vector control component for both the adult mosquito and its larvae form: the measures that we have described are the only emergency solutions. Health Education and Vector Control remain the most effective actions to prevent an epidemic.

***Courtesy: The sanitation team of Maela and Tham Hin and Mrs. Pathomasak Imvitayaf from SPA for her advice.***

**Mae La: Camp 1& 2**
Conditions: 38000 people; large, open, hilly land with lots of gardens and vegetation
Sanitation team: 32 people
Epidemic: DF, no severe cases or deaths out of more than 500 cases
***Response:*** The operation has not covered the entire camp, which would have been too heavy, but the section where the rate of DF was the highest, and the patient's houses all over the camp have been smogged inside and spread outside as well as below the stilts with ULV. Fogging/ULV campaigns and general distribution of sand abate for 5 weeks.
**Result: The epidemic eventually decreased but in this case it is more difficult to evaluate the impact of the treatment because of the low density of the camp and its hilly premises.**

**Tham Hin camp**
Conditions: 8500 people; very crowded (15 sq.m/people); no garden, no hill.
Sanitation team: 22 people
Epidemic: DHF; 6 deaths out of 300 cases in 2 months
***Anti-vectorial Response:*** Comprehensive fogging campaign every 2 weeks in all the 1650 houses of the camp. Each campaign lasted 6-days/ machine, 2 machines were used for 3 days and 10 persons were involved. During each campaign, the Home Visitors followed-up adding sand abate to every water container in all the houses.
275 houses treated / day/ machine
Cost: diesel+fuel+deltacide= 10 baht/house
**Result: a sharp decrease of the epidemic.**

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# Interviews at Tham Hin Camp

***This article is based on the interviews with a medic and a home visitor from Tham Hin Camp who share their experience after the Dengue outbreak***

**M. Ler Gay (31 years)**
**Medic**

M. Ler Gay is a medic with an extensive experience, first in Burma and for five years in Tham Hin Camp. This outbreak was the first he has ever encountered.

He could not tell how the disease outbreak occurred in the camp. First he observed more and more people coming to the OPD. As the medics did not know what was happening, they consulted the doctor, who later made a DHF diagnosis. It was their first experience and they knew nothing about DHF. We asked M. Ler Gay some more questions.

***How did you manage the outbreak?***

We kept the bleeding patients in the IPD. If they could not eat or drink we gave them IV fluid. If the bleeding was too severe, we referred them to the Thai hospital in Suan Phung.

***What kind of problems did you face?***

There were many patients with bleeding nose, gums or vagina. Many had blood in their vomit and stool. There was a large number of patients, but we were able to admit all of them.

*q&m a t r v ma*; M. Ler Gay*

***Do the people in the camp understand why all this happened?***

Yes, now they know that mosquitoes transmit the disease. We tried to explain it clearly to them. We explained it to the health committee, to each zone committee, and to all social leaders. We told them that every family has to clean their house and surroundings. For instance it is important to clean the places with water, like the latrines, and also to remove the clothes hanging around in the houses as the mosquitoes can hide inside them.

***Do you think that this may happen again?***

We still have some patients with DHF in IPD, and there are mosquitoes as well, so this might happen again.

***What advice would you like to give to medics who have never faced DHF?***

I would advise them first to explain to their communities the basic prevevtion rules, to stop mosquitoes breeding in water around the house and to use mosquito nets.

**Hter Nay Clay (40 years)**
**Home Visitor Supervisor**

Hter Nay Clay joined MSF in May 1998. Before, he worked in Burma as a teacher.

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He also took two years of medic training in the late 80's.

***According to you, why did this DHF outbreak happen in Tham Hin Camp? Why was the epidemic serious in this camp?***

I think the epidemic was serious in Tham Hin because of the close proximity of the houses. Therefore, many houses are very dark inside, especially those that are covered with black plastic sheets. This helps the mosquitoes to hide. The supply of mosquito nets was not enough - only one for three persons. There is a possibility that those sleeping at the edge of the nets were bitten by the mosquitoes. One of the main problems was that there were many places with dirty water inside and around the houses, and this helped the mosquitoes to breed.

***How did you manage to solve the problems you encountered?***

To manage the problems we first gathered all home visitors, and explained to them again about hygiene. We showed the home visitors how to cover all wet pits and water containers, and how to tell people to keep open their houses and their latrines during the day so that they get enough light to chase the mosquitoes out. It was also advised that the people should use mosquito nets when they sleep even in the daytime. Later the home visitors went to visit all the families in the camp to spread the information. The Thai Public Health came to fumigate around the camp, and later a MSF sanitation team fumigated each house separately to eliminate the mosquitoes. Sand abate was added in the latrine bucket, and in all water containers. In order to do this properly, the sanitation team came and explained to the home visitors the correct ways to use it.

***What kind of resistance did you face?***

Some people complained that before, when they were living in Burma, they never cared about things like having pots or containers with water, in or around the house, and that they were never sick with DHF. So they did not understand why they should pay attention to it now. Other people said that they don't have enough bamboo to build houses with more sunlight. So, we, the home visitors, are trying to understand the people and to educate them slowly and with empathy.

***Do you think it may happen again?***

Yes. Given our living conditions, it can happen again. If we stay longer like this - so many people in such a small crowded place - not only DHF and typhoid can strike again, but other epidemics can also occur.

***What advice would you like to give to home visitors who have never faced DHF?***

The first thing they should do is to improve their knowledge about DHF, and about the ways to prevent it. They should work side by side with the medical team and follow their advice. The most important thing is to make sure that people clean the surroundings of their houses, cut grass and close all water pits and containers.

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# The case of Maung Maung Soe

*Dr. Danielle Stewart, MSF*

***This is a case study of a boy named Maung Maung Soe from Tham Hin Camp, who was affected by DHF.***

Maung Maung Soe is a 10 year-old boy living in Tham Hin Camp. He has a 12 year-old sister. Maung Maung Soe goes to school in the afternoon. In the morning he helps his mother collect water and plays with his friends near the river before going to school. Even though he sleeps under a mosquito net at night, he is bitten by mosquitoes sometimes, especially when he is helping his mother in the house during daytime.

One day, his sister developed a high fever all of a sudden. She stayed in bed all day. The next day Maung Maung Soe got a very high fever too. He was too sick to eat or drink. He had a bad headache. The day after, he felt no better and had a small amount of nose bleeding. His eyes were very red and painful.

His mother took him to the clinic, where the medic found the following on examination:

- General appearance - tired, weak
- Temperature 40 C, Pulse 120, RR 40
- Eyes red (blood shot)
- Other examination (chest, abdomen etc.) - normal

**What diagnosis is possible at this state?**

Any cause of fever, especially:

- Malaria
- Meningitis
- Leptospirosis

But it is hard to say without specific signs at the moment.

The medic told Maung Maung Soe's mother he was dehydrated, and she put him on an IV infusion to correct the dehydration. She advised a blood test for malaria screening, and prescribed paracetamol to reduce the fever. Later the MS result was found to be negative.

Maung Maung Soe did not get better in the next 2 days. On day 5, his fever stopped rather suddenly and on the same day a strange reddish rash appeared all over his body. It was intense on his legs, and was made up of lots of very tiny red dots. The right upper area of his abdomen was very painful and he was unable even to drink. His nose bleeding was getting worse, sometimes lasting one hour.

The medic found on examination:

- An enlarged & very tender liver
- A confluent petechial rash on the legs and petechiae scattered on the arms, chest and back.

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She did a tourniquet test by putting a blood pressure cuff on for 5 minutes at a pressure between diastolic and systolic. There was sudden appearance of petechiae on Maung Maung Soe's arm. There were more than 20 spots in a 2.5 cm square, so the test was positive. The medic said: "I know exactly what the diagnosis is now!"

## The following factors also support DHF diagnosis

The mosquito, which transmits dengue, likes to bite in the first few hours after sunrise and before sunset, so even though the mosquito net protected Maung Maung Soe at night, he was probably bitten in the

**The case definition of Dengue Infection**

Patients with sudden onset, of high fever for at least 7 days and showing at least one of the following: severe body pain and/or maculopapular rash, and/or haemorrhagic signs in an epidemic and also a negative malaria slide.

**The case definition of DHF**

- Fever lasting 2-7 days
- Haemorrhagic signs; at least one of the following:
  - a positive tourniquet test
  - petechiae, bruises or purpura
  - bleeding from the nose, gums, gastrointestinal tract, venepuncture / IV/ injection sites or anywhere else
  - vomiting blood or black stool (malaena)
- Signs of "plasma leakage" such as pleural effusion, ascites or oedema of hands and feet plus some blood test results (not available at all clinics)
  - low platelet count (<100,000)
  - raised haematocrit (approximately >40)

Possibilities:

- Meningitis – NO: (not likely after 5 days of fever, which has now stopped and no rash until day 5).
- Measles – NO: (the measles rash is different, it is called maculopapular and is made up of red patches, usually starting behind the ears).

"It is dengue!" said the medic. "And not just Dengue Fever, but the more severe form called Dengue Haemorrhagic Fever."

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*Rash in the legs due to Dengue Fever.*

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*Rash in the legs due to Dengue Fever.*

morning before he went to school. The mosquito only flies a short distance, so it often spreads dengue within the same house or houses in close vicinity. Maung Maung Soe's sister probably had Dengue too, and the same mosquito might have bitten them both.

**What would be the management plan now?**

- Continue IV fluid, using either Ringer's lactate or NSS, not dextrose.
- Monitor carefully for signs of shock as DHF can turn to a worse form called Dengue Shock Syndrome. If shock develops, treat as an emergency using NSS or Ringer's solution at a fast rate.
- **Do not give Aspirin (ASA) as it reduces platelet activity and may make bleeding worse.**
- In general, depending on your facilities, you should refer to the hospital any patient with severe haemorrhage or shock.

**What advice or education would you provide?**

- If Maung Maung Soe has signs of shock or if he still has significant bleeding, refer him to the local hospital.
- If this is the first dengue case, report it to the local health authority.
- Beware of an epidemic; one case can signal an outbreak is about to start.
- Talk immediately to the doctor, health committee or logistician in the camp, they should act quickly to eliminate the mosquitoes and clean all areas where the mosquitoes may breed.
- Protect yourself against mosquito bites by using mosquito nets and preventing the mosquito from breeding, by keeping water containers covered and cleaning them out each week so that the mosquito eggs can not grow in the water.

The strategy of DF/DHF management focuses more on decreasing the risk of death once a person has already been infected. Such prevention can occur with early case detection and proper management of fluid treatment. Hospital nurses, midwives, health centre staff and even community members must be educated about the signs and symptoms of Dengue Fever and the importance of seeking early treatment. If a person with DHF receives fluid treatment early, then the risk of the patient going into shock and dying is reduced.

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*A boy hospitalised for treatment of DHF.*

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# The Wise Rabbit

*Health Messenger*

***This is the story of how Pho Phyu, the rabbit that saved his village by simply giving some very good advice.***

In a peaceful and beautiful village, lived Pho Phyu - the Wise Rabbit. Everybody in the village and from other villages comes to get advice from Pho Phyu. People from all over the country travel great distances just to visit this very wise and famous rabbit.

Pho Phyu was not always famous. He was very shy as a young rabbit. The villagers did not know him then. But they all knew his best friend Pho Lone who was strong, fast and very handsome. The villagers felt that one-day Pho Lone would become the Village Chief.

Pho Phyu's village was not too far from the big city. The villagers heard a rumor that Tiger Mosquitoes attacked the big city and many mosquitoes were now going to the small villages around the big city. All the villagers knew that biting by the Tiger Mosquitoes could make young children very sick, which is known as Dengue Fever.

One morning Pho Phyu found Pho Lone near the school playground, where he was throwing small stones angrily towards a tree. He looked very upset. Pho Phyu asked him, "Pho Lone , what's wrong? Why are you so upset?"

"We came to know this morning that my youngest cousin in our neighbouring village has a fever," replied Pho Lone.

"Does he have Dengue Fever?" asked Pho Phyu.

"Yes, my aunt took him to the health centre. That's what the nurse found out after

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examination," said Pho Lone.

"I really don't like those Tiger Mosquitoes. I don't want those mosquitoes to invade our village too… but how can we stop them? What can we do about it?" yelled Pho Lone, throwing another stone.

Pho Phyu thought about this question for sometime and then he replied, " We've learned at school that these mosquitoes like water. They need water to breed, don't they? So why don't we get rid of all of the water from around our houses? If there is no water, the Tiger Mosquitoes will not want to come to our village."

"That's a great idea! Let's go and start doing it now!" said Pho Lone.

The two young rabbits ran off. All afternoon they cleaned up all of containers in front of their houses. They covered their water jars with wooden lids. Then they cleaned out the gutters and even burnt or buried all the garbage around their houses. When they almost finished their work, the Village Chief walked by. As Pho Lone was the most popular young rabbit in the village, the chief started to talk to him.

"Hello Pho Lone you look very tired. What are you doing?", asked the Village Chief.

"Hello Chief, we are indeed very tired. We are cleaning up around our houses," replied Pho Lone.

"Why are you doing that?" asked the Village Chief.

"Those vicious Tiger Mosquitoes like to breed in the water. So if we destroy all of the containers that could collect water from around the house, the mosquitoes won't be able to breed and they won't come to the village," replied Pho Lone.

"You are a very smart rabbit, Pho Lone. That is a very good way to protect the children in our village from Dengue Fever," said the Village Chief.

"But Chief," said Pho Lone, "It was not my idea… it was in fact Pho Phyu's idea!"

"Who is Pho Phyu?" asked the Village Chief.

Pho Phyu suddenly became very nervous. He had never talked to the Village Chief before. He peered from behind Pho Lone and said, "I…I am Pho Phyu."

"Well Pho Phyu, you are a very wise little rabbit. I praise you both for cleaning up the front of your houses. But there are still so many other water sources in the village. What do we do about those?" asked the Village Chief.

Suddenly Pho Phyu had an idea. He took a deep breath and gathered all of the courage inside him to speak to the Village Chief, "Well Sir, the village is home to all of us. If the whole village works together, then we can eliminate all the mosquito breeding places in the

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village. Why don't we have a village clean-up day?"

The Village Chief smiled at Pho Phyu. "You are indeed a very wise young rabbit. Thank you for the very good advice. I am on my way to the village meeting. I would like both of you to join me." So the three of them headed off towards the meeting place.

When they arrived, the whole village was already there. Everyone was talking about the Tiger Mosquitoes coming to their village. The Village Chief stood before them and the place became quiet. "I know that all of you are worried about the Tiger Mosquitoes. But a very wise rabbit gave me a very good advice." At this point, the Village Chief told the community members about Pho Phyu's idea to have a clean-up day. Immediately everyone agreed to that clean-up day.

The community decided they would all work together. The village artist volunteered to create a banner to hang over the main street. The schoolteacher volunteered to organize the students so that the school would be cleaned up.

The health centre staff volunteered to distribute Abate larvicide to put in more permanent water sources.

Everyone at the meeting was very excited and praised the Village Chief for his idea. The Village Chief again stood up and drew everybody's attention. When the place was quiet, the Village Chief said "Thank you for your praise. But it is not I who deserve it. I am only telling you the advice that a very wise young rabbit in our village has given me. His name is Pho Phyu." The Village Chief then invited Pho Phyu to stand next to him and all the villagers cheered.

The clean-up day was very successful. All the community members worked together. The mosquito breeding sites were destroyed totally. The Tiger Mosquitoes never came to the village….. Thanks to the little rabbit Pho Phyu for his advice.

***From there Pho Phyu's vocation was born: to take care of others and help them.***

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**1. PROTECT YOURSELF FROM MOSQUITO BITES. ALWAYS SLEEP UNDER A MOSQUITO NET IN THE DAY OR AT NIGHT.**

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**2. ALWAYS COVER YOUR SKIN AS MUCH AS POSSIBLE, ESPECIALLY IN THE MORNING AND DUSK.**

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**3. ELIMINATE MOSQUITO BREEDING SITES, SUCH AS, DISCARDED AUTOMOBILE OR TRUCK TYRES, BUCKETS AND CANS, DISHES PLACED BENEATH FLOWERPOTS, TREE HOLES, ETC.**

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**4. KEEP WATER JARS COVERED. ANYWHERE THAT WATER CAN COLLECT IS A POTENTIAL BREEDING SITE.**

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# GLOSSARY

***1. Clotting:*** Action of coagulating. Formation of a jelly like substance from blood shed at the site of an injury to a blood vessel. This action usually halts blood flow from the wound.
***2. Coagulation :*** The process of clotting.
***3. Febrile :*** State caused by a fever. A febrile disease is a disease with fever as one of the main symptoms.
***4. Haematocrit :*** A tube with graduated markings used to determine the volume of packed red cells in a blood specimen by centrifugation.
***5. Haemorrhage or (Haemorrhagic) :*** Abnormal internal or external discharge of blood. Capillary haemorrage : when blood is of reddish color and exudes from tissues (like skin).
***6. Haemoconcentration :*** Increase in the percentage of red blood cells because the volume of plasma is reduced. (opposite of Haemodilution).
***7. Hepatomegaly :*** Condition where the liver becomes very large.
***8. Hypovolaemic shock :*** Condition occuring when there is an insufficient amount of blood in the circulatory system.
***9. Oedema :*** Swelling of part of the body caused by accumulation of fluid in the intercellular tissue spaces.
***10. Petechial rash :*** Rash marked by the presence of petechiae.
***11. Petechiae :*** Small, purplish, haemorrhagic spots on the skin that appear in certain severe fevers. May be due to abnormality of blood clotting mechanism.
***12. Platelets :*** Small blood cells which encourage the coagulation of blood.
***13. Purpura :*** A small haemorrhage (up to about 1 cm in diameter) in the skin or mucous membrane, which may be caused by various factors, including blood disorders, vascular abnormalities, and trauma.
***14. Rash :*** Mass of small spots which stays on the skin for a period of time, and then disappears. Usually temporary, rash is a shade of red and varies with the type of disease.
***15. Sepsis :*** Febrile state resulting from the presence of bacteria and their toxins in the blood system (usually following the infection of a wound), which kill tissue and produce pus.
***16. Shock :*** Clinical syndrome in which the peripheral blood flow is inadequate to return sufficient blood to the heart for normal function. It may be caused by a variety conditions including haemorrhage, infection, trauma, drug reaction, poisoning, dehydration.
***17. Shock syndrome :*** Serious life threatening, life endengering medical emergency that requires very careful therapy and monitoring. It is a group of symptoms (pale face, cold skin, low blood pressure, rapid and irregular pulse) which show that a patient is in a state of shock.
***18. Thrombocytopenia :*** Condition where the patient has an abnormally low number of platelets in his blood.

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## Question from the Field

**Q: Why isn't Health Messenger published in the Karen language?**
-- Health workers from the Tham Hin Camp.

**A:** It is true that most of the readers of the magazine in the camps are Karen. But the Health Messenger is also distributed to other refugees from Burma; for instance, the Karenni in Mae Hong Son province, and to the Mon resettlement sites inside Burma. If we publish Health Messenger in Karen language, the other refugees will not be able to use it, and it is not possible for us to produce 4 versions (Burmese, Karen, Karenni and Mon).

This is the reason why the Health Messenger Magazine is published in the Burmese language only.

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