

A photograph of a tropical village scene. In the foreground, a wooden house with a corrugated metal roof is partially obscured by lush greenery, including banana trees. A small boat is docked at the riverbank in front of the house. The background is filled with dense tropical trees under a cloudy sky. The text 'RENEW HEALTH PROMOTION TOOL KIT BOOKLET #6 MOSQUITO DISEASES' is overlaid in white on a yellow rectangular background.

**RENEW HEALTH PROMOTION  
TOOL KIT BOOKLET #6  
MOSQUITO DISEASES**

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# OVERVIEW

## GOAL

The goal of this booklet is to prevent and reduce suffering from mosquito-borne infections.

## GUIDING PRINCIPLES FOR ITS USE

Mosquito-borne diseases can cause serious illness or death. By becoming familiar with the different kinds of mosquito-borne diseases, local initiatives can reduce community disease.

## HOW TO USE THIS BOOK

Using the dramas and illustrations, engage the community in discussion of mosquito-borne illness's causes and possible points of prevention. Have the community make a plan to reduce sickness and death in their area. To view and download the entire package of Renew Health Promotion booklets and training materials, go to: [renewoutreach.org/health](http://renewoutreach.org/health)

# MOSQUITO-RELATED DISEASES

## DEFINITION

**These diseases include malaria, yellow fever, dengue, Zika and other serious illnesses (e.g. Chikungunya) which are spread by mosquitoes from sick people, who have these diseases, to healthy people.**

## CAUSATION

These diseases are caused by different microbes.

For example, there are 5 kinds of malaria microbes. These are bacteria.

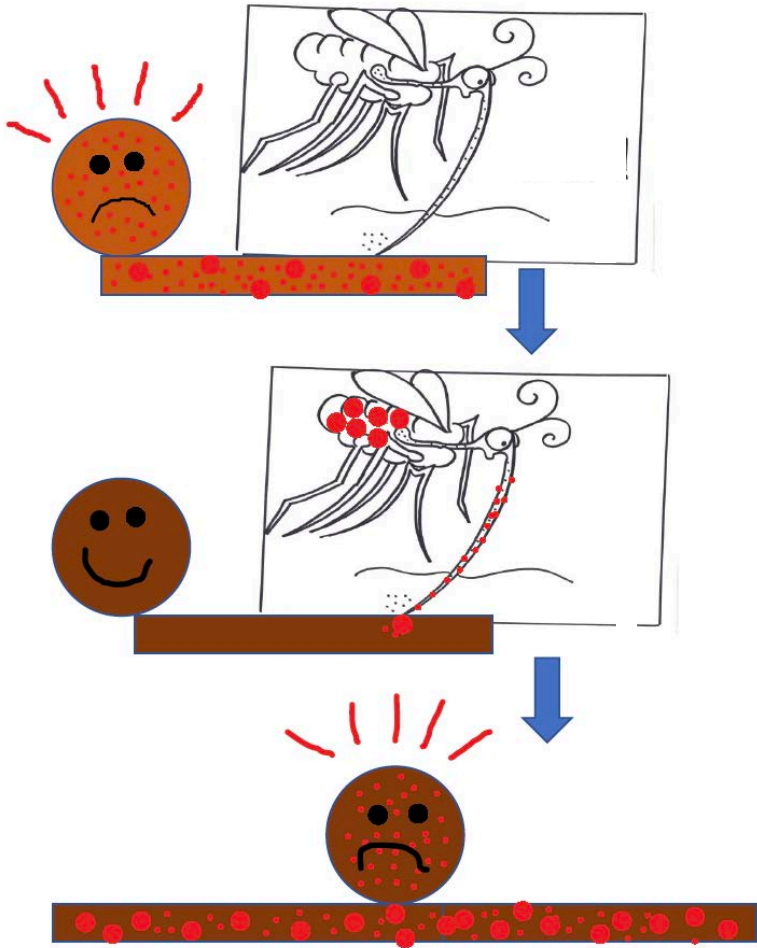
*Falciparum*, *vivax*, and *ovale* are the most common kinds in South America.

There are 4 different kinds of dengue microbes. These are viruses.

### **How a person gets the disease:**

*(See page 5 illustration)*

1. When mosquitoes ingest blood from an infected person, the microbes get into the stomachs of mosquitos.
2. Then, when these mosquitoes bite a healthy person, they squirt some of the microbes from their stomachs into the healthy person's blood.
3. The healthy person gets sick!



## LEARNING ACTIVITY

### DRAMA

#### CHARACTERS & SUPPLIES

You will need a “sick” person, 2 “healthy” people, a mosquito net, and a “mosquito-person” who wears a proboscis made of rolled up paper or a stick.

#### THE DRAMA

It’s night time. The sick person gets “bitten” by the mosquito. Then the mosquito flies to and bites the healthy person who is asleep outside of a net. The mosquito then tries to bite the other healthy person, but cannot because the net is in the way.

The morning sun rises and the sick person is still sick. One of the previously healthy people is also sick. But the person who slept under the net is not sick but happy and healthy!

### THREE QUESTIONS

1. What did you SEE?
2. What does it mean?
3. What can we DO about it?



*The DARK Aedes Aegypti spreads dengue, yellow fever, & Zika.*



*The LIGHT Anopheles mosquito spreads malaria.*

## THE DIFFERENT DISEASES

	MALARIA	DENGUE	ZIKA
How are the mosquito-related diseases different?	5 kinds of plasmodium bacteria; <i>falciparum</i> and <i>vivax/ovale</i> are most common. Transmitted by <i>Anopheles</i> mosquito.	4 kinds of the virus. Transmitted by the <i>aedes aegypti</i> mosquito which live in standing water, often in urban settings.	Virus transmitted by <i>aedes aegypti</i> mosquito.
	Mostly dusk to dawn feeder.	Mostly day feeder.	Eats day and night.
	The bacteria get into the red blood cells where they multiply and cause the cells to explode. This can lead to persistent anemia and fatigue.	Immunity can happen, but if a person gets one kind of dengue, they are still vulnerable to the other 3 kinds.	Zika can also be transmitted during sex. The infected person may not have any signs of illness but still be contagious. Can be passed from infected mother to baby during pregnancy and result in serious or fatal birth defects.

## THE DIFFERENT DISEASES

	YELLOW FEVER	CHIKUNGUNYA
<b>How are the mosquito-related diseases different?</b>	Virus transmitted by <i>aedes aegypti</i> mosquito.	Virus transmitted by <i>aedes aegypti</i> mosquito.
	Usually bite during the day.	Usually bite during the day.
	A vaccine can prevent this disease	Once a person has had this disease, they are immune.



## THE SIGNS & SYMPTOMS

*SEE A CLINIC. These can be very difficult to diagnose. A blood test is needed.*

### MALARIA

### DENGUE

How are the mosquito-related diseases different?

*Below are the 2 most common types of malaria in South America:*

**Falciparum**– Serious. Flu-like illness with cold/hot-sweat cycle daily, irregular, or every 3 days. Also, loss of appetite, belly pain, nausea, vomiting, diarrhea, & dry cough.

Severe in children, HIV patients, and pregnancy.

Can cause coma, miscarriage, pneumonia, kidney failure (black water fever), anemia, jaundice, low blood sugar, & bleeding.

Falciparum is ***the most dangerous kind of malaria***, although all malaria can cause serious illness and death. The rate of death from falciparum is related to the severity of the disease and the age and health of the patient.

**Vivax/Ovale**– Same symptoms but there are fewer deaths.

The fever cycle is variable—it often occurs every three days. But, the diagnosis of malaria is made by a blood test, not by the pattern of fevers.

4 kinds with 3 levels of clinical presentations:

1. Mild or no symptoms.
2. High fever, rash, joint pain (bone break fever), eye pain, sensitivity to light, & big lymph nodes.
3. Very serious—dengue with above symptoms as well as bleeding which starts day 3-7. Large liver & belly pain. Bleeding may be visible in the teeth, gums, nose, or the skin with prolonged bleeding or easy bruising. Some bleeding may not be visible because it is inside the person's body.

Can result in liver failure, coma, and death.

## (CONT.) THE SIGNS & SYMPTOMS

### ZIKA

Headache, rash, fever, joint pain, red eyes, muscle pain.

One severe sign is a baby born to an infected mother with a small head and brain damage (microcephaly).

### YELLOW FEVER

Symptoms can be a mild flu-like illness with fever, headache, muscle aches especially in back and knees, sensitivity to light, dizziness, red eyes and red tongue, vomiting, & no appetite. Or it can be serious, leading to liver failure, yellow skin, bleeding in the gut with bloody or black stools, & death.

### CHIKUNGUNYA

Symptoms occur 4-7 days after the bite with sudden fever and joint pain, which can be severe and last for months.

Other symptoms include headache, rash, & muscle aches. Usually not fatal except in the sick or elderly.

# PREVENTION



## QUESTIONS

*(The red dots are mosquitoes)*

**Ask:** *Where do mosquitoes live?*

*They live in water & tall grass. The dengue mosquito likes to live in cities or villages in the standing water, in leaves, little ponds and puddles, in shady dark places, garbage, and empty small uncovered containers with water.*

## QUESTIONS (CONT.)

**Ask:** What can we *do* to reduce the places where they can live in our communities?

1. Destroy places mosquitoes may breed near the house.
2. Cut down tall grass where they hide and live. Rake leaves that hold water.
3. Get rid of standing water like in small ponds, garbage, and small uncovered containers.
4. Spray or treat standing water and dark hiding places with mosquito killer.

**Ask:** *When* do mosquitoes bite?

*The malaria mosquito bites at dawn, dusk, and throughout the night. The dengue like to eat during the day. The Zika and yellow fever mosquito eats both day and night!*

**Ask:** What can we *do* to avoid getting mosquito bites when they are eating?

1. Everyone should sleep with a bed net—especially if they have malaria!
2. Use screens or window covers to keep mosquitoes out of the house.
3. Make sure the walls of the house do not have a space above them that mosquitoes can get through.
4. If necessary, spray a mosquito-killing pesticide around the places where mosquitoes may be hiding.
5. Do not bathe at dusk or dawn when the malaria mosquito will be feeding.

**Ask:** What are mosquitoes' favorite color?

*They like dark clothing!*

**Ask:** What can you *do* to reduce mosquitoes on your clothes or skin?

1. Wear light colors
2. Wear long sleeves, especially at dawn and dusk, to avoid malaria mosquito bites.
3. Use DEET or other mosquito repellants if you have them. Note that different repellants work for varying lengths of time. Reapply as necessary.

**Ask:** What *do you already do* in your communities to keep from getting bitten by mosquitoes? How does it work?

**Ask:** Which of the above do you think your community *could do* to further reduce disease from mosquitoes?

*Consider doing a SOLUTION GRID EXERCISE (pg 12) at the end of this lesson.*

# SOLUTION GRID EXERCISE

## GOAL

Lead the community in a health-related problem-solving exercise to design an action plan to prevent mosquito-borne disease. Then, implement this community-initiated solution to reduce suffering and death.

## METHOD

Facilitate a Solution Grid. This participatory exercise involves writing a chart, or grid, on the ground or on paper with words or illustrations. *The person facilitating this should be a person of leadership, who is able to communicate well, illicit answers from the participatory community, be welcoming and inclusive, be patient and allow the group to freely brainstorm.*

- ① Review all the things that contribute to mosquito-borne diseases. Have the group “brainstorm”, coming up with multiple potential solutions. All potential solutions are welcome. Try for at least 5 solutions.
- ② Chart the solutions and for each one, ask the following questions:
  - What is a potential solution?
  - Who would do it?
  - How much would it cost in time or money or other resources?
  - How much time will it take to do? (Optional Question: How will you know if it is working?)
  - When will you all meet again to discuss how the solution went and what would you do next?
  - Do you want to initiate another solution for this problem, or take action on another problem?
- ③ Vote on the solution the group would like to try first. *Remember, simple is the best way to start.*
- ④ Take action! Be sure to set a time when the group will meet next to discuss:
  1. What was done?
  2. What worked?
  3. What problems were encountered?
  4. What can be improved?
  5. What's next?
- ⑤ When you all meet again, celebrate all that is positive—community participation, actions taken, leadership shown, an incomplete success but with something learned, etc.

## SOLUTION GRID

*There may be many more or fewer potential solutions. Welcome all ideas!*

WHAT IS THE PROBLEM? \_\_\_\_\_

WHAT are possible solutions?	WHO would do it?	HOW MUCH will it cost?	HOW much TIME will it take?	WHEN will you meet again to see if it is working and make further plans?
1				
2				
3				
4				
5				
6				

# DIAGNOSIS & TREATMENT

## DIAGNOSIS

These diseases look similar.

All these diseases require a blood test for an accurate diagnosis. *Seek local medical care where they are equipped to perform the right diagnostic test.*

For malaria, the best test is a “thick and thin smear” by an experienced lab person.

## TREATMENT

Treatment is based on the right diagnosis.

*Follow government recommendations for treatment.*

This is important because malaria in different areas are treated with different medications and doses have to be adjusted for the patient. Some medications are not safe in children or during pregnancy.

## EMERGENCY TREATMENT FOR SUSPECTED MALARIA

Standby emergency care is controversial because of the potential for a missed or wrong diagnosis!

Consider treating without a blood test if:

1. Emergency care is over 24 hours away.
2. Symptoms are severe.
3. The patient is at high risk for complications (e.g. pregnant, HIV, small child).

The suspected kind of malaria may be based off of what has been present in the area.

### **For Falciparum:**

Malarone—4 tablets/a day for 3 days OR Coartem—4 tablets for 6 doses.

### **For Vivax and Ovale:**

Chloroquine is used in South America. 1,000 mg (600 mg base) PO, then 500 mg (300 mg base) PO in 6 to 8 hours, then 500 mg (300 mg base) PO once daily for 2 days. Total dose is 2.5 g chloroquine phosphate (1.5 g base) in 3 days.

Another medication called primaquine is also needed after the chloroquine to prevent ongoing infection and symptoms of vivax and ovale. However, a different blood test should be done to be sure that primaquine is safe for that person. If possible, in order to receive the right treatment, see a health care provider, even if emergency treatment is given.

## (CONT.) DIAGNOSIS & TREATMENT

### MALARIA

### DENGUE

How are the diseases treated? Diagnose with a blood test by a lab that knows how to do them.

**SUPPORTIVE CARE SAVES LIVES:** Fluids, paracetamol, & nutrition. Treat anemia.

See the following section “How to Care for a Sick Person” (page 18).

Medicines depend on the type of malaria and part of the world the person lives in.

#### **FALCIPARUM**

Nonpregnant adults with non-severe falciparum: Malarone 4 tablets a day for 3 days. Pregnant women and severe falciparum should be treated with IV medication. Begin oral treatment and transport. Children’s dose is calculated by weight.

#### **VIVAX/OVALE**

Quinidine, Larium, or Malarone. Vivax and Ovale can relapse, therefore the treatment must be followed up with Primaquine. Before treating with Primaquine, check for 6GPD deficiency.

**SUPPORTIVE CARE SAVES LIVES:** Fluids, rest, & paracetamol.

See the following section “How to Care for a Sick Person” (page 18).

There are no medications but seek medical care if symptoms are severe or if there is bleeding.

Antibiotics do not work for viruses.



## (CONT.) DIAGNOSIS & TREATMENT

ZIKA	YELLOW FEVER	CHIKUNGUNYA
<p><u>SUPPORTIVE CARE SAVES LIVES:</u> Fluids, rest, &amp; paracetamol.</p> <p>See the following section “<b>How to Care for a Sick Person</b>” (page 18).</p> <p>If pregnant- see a health provider to help monitor pregnancy.</p> <p>Antibiotics do not work.</p>	<p><u>SUPPORTIVE CARE SAVES LIVES:</u> Fluids &amp; rest. BUT <i>avoid paracetamol—it is too hard on the liver. Yellow fever microbe damages the liver.</i></p> <p>See the following section “<b>How to Care for a Sick Person</b>” (page 18).</p> <p>There are no medicines for a virus.</p> <p>Antibiotics do not work.</p>	<p><u>SUPPORTIVE CARE SAVES LIVES:</u> Fluids, rest, &amp; paracetamol.</p> <p>See the following section “<b>How to Care for a Sick Person</b>” (page 18).</p> <p>If the person is elderly or already sick, seek medical care because the risk of death is higher in these people.</p> <p>Antibiotics do not work.</p>





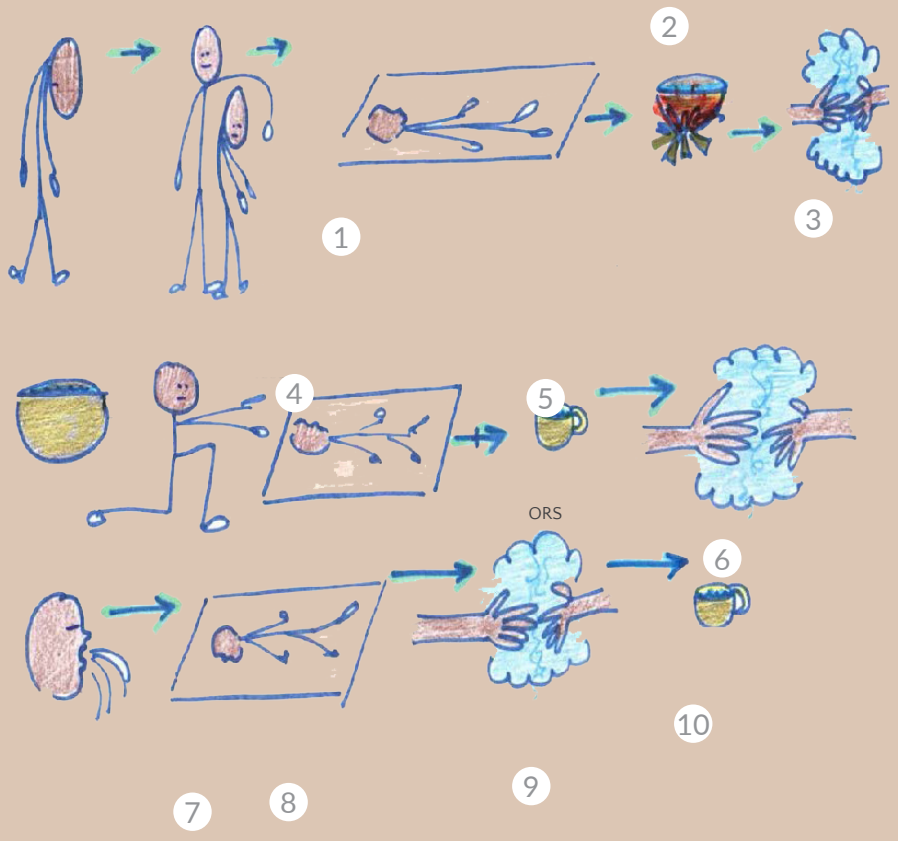
# HOW TO CARE FOR A SICK PERSON

## SUPPORTIVE CARE

- 1 If someone becomes ill, let them rest in a clean, pleasant, & safe place.
- 2 Prepare clean water.
- 3 Wash your hands!
- 4 Bathe them or their face.
- 5 Offer them clean cooled water to drink and paracetamol\*.
- 6 Wash your hands.
- 7 If they vomit, turn them to their side. Clean up them and the vomit.
- 8 If they have diarrhea, clean them and where they are lying. Change the mat or bedding.
- 9 Wash your hands.
- 10 Offer them water or ORS\*\* in little sips. But give enough! The fluid lost with diarrhea, vomiting, & sweating must be replaced to prevent dehydration.

\*Paracetamol is another name for acetaminophen (generic name) or Tylenol (brand name). It is a pain-relieving medication, only to be taken as directed. It is well tolerated and safe for mothers and babies in the right doses. **NOTE: It should be avoided in people with liver disease & yellow fever.**

\*\* ORS (Oral Rehydration Solution)– Providing ORS to people who are at risk for dehydration saves lives. Prepared packets of ORS with instructions are available in some parts of the world. It can also be made at home with **1 liter of clean water, 8 tsp of sugar, & a little salt (1/2 tsp)**. **DO NOT** mix up the ratio of sugar and salt in a dehydrated person–too much salt can be deadly.

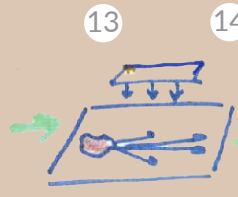


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# HOW TO CARE FOR A SICK PERSON (CONT.)

## SUPPORTIVE CARE (CONT.)

- 11 Wash hands.
- 12 If they are hot, fan them. Use cool, wet, clean cloths on forehead and body.
- 13 If they are cold cover them to keep them warm.
- 14 Offer them ORS and water. Encourage them to drink, even if in sips.
- 15 Sit them up if they can sit. If possible, have them stand and be as active as they can.
- 16 Wash hands!
- 17 Offer them food and feed them if they can eat.
- 18 Help them groom. Wash their face and hair, comb their hair, & change their clothes.
- 19 Let them receive guests unless they are contagious or their guests are contagious.
- 20 Keep washing your hands, offering them food and drink, & allowing them to rest but do not let them lie in the same position all the time. Have them change positions and increase activity as they are able. If they are coughing, remind them to always cough into their elbow, not into the air or onto their hands.



## BIBLE VERSES

### **READ GENESIS 1:27-31**

Was there malaria, dengue, Zika, yellow fever, sickness and death before sin?

### **READ ROMANS 5:17-19, ROMANS 8:2, JOHN 10:10, 2 PETER 1:3**

Through one man (Adam), sin came into the world. Along with sin came sickness and death. But through one man (Jesus Christ) came life and wholeness to us all.

### **READ ROMANS 8:19-23, REVELATION 21:1-5**

Someday, all of creation will be restored and God will make all things new.

### **READ 1 JOHN 3:1-3**

Now we are learning that we are his children. He is a good and generous Father. We are learning about “the good he has stored up for us” (Psalm 31:19), as we come to know him and walk with him. He transforms our minds and our hearts and gives us his wisdom.

### **READ MATTHEW 6:10**

We pray for his Kingdom to come (his rule and reign) and his will to be done on earth as it is in heaven. There are no mosquito diseases in heaven!







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