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# U.S. President's Malaria Initiative

## ENSURING QUALITY COMMUNITY ENTOMOLOGICAL SURVEILLANCE

*A WORKSHOP FOR DISTRICT MALARIA FOCAL POINTS*

### FACILITATOR'S GUIDE

*SEPTEMBER 2020*



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# ACRONYMS

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CDC	Centers for Disease Control and Prevention
PBO	piperonyl butoxide
PSC	pyrethrum spray catch
SOP	standard operating procedures
WHO	World Health Organization

# ABOUT THIS WORKSHOP

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## GOAL AND OBJECTIVES

### Course Length

10 days

### Course Goal

This workshop is designed to prepare District Malaria Focal Points to successfully perform their role of ensuring quality community-based surveillance.

### Course Objectives

By the end of the workshop, participants will be able to:

- Explain the importance of entomological surveillance in malaria vector control
- Identify *Anopheles* mosquitoes to species level
- Train Community Mosquito Collectors on how to perform their role
- Collaborate with community stakeholders to identify villages and households for mosquito collection
- Identify and distribute entomology equipment and supplies needed for field data collection to mosquito collectors
- Supervise field entomological data collection by Community Mosquito Collectors
- Check the completeness and accuracy of completed Community-based Mosquito Collection Forms submitted by Community Mosquito Collectors
- Verify the morphological mosquito identification conducted by the Community Mosquito Collectors
- Provide ongoing on-the-job training and mentorship of Community Mosquito Collectors
- Conduct bioassay susceptibility tests in collaboration with a VectorLink entomologist
- Assess linkage of entomological and epidemiological data
- Provide data and mosquito specimens to appropriate VectorLink entities



## **DESCRIPTION OF PARTICIPANTS AND TRAINERS**

### **Participants**

- Participants in their training should be university graduates with some background in a science field. They are not expected to have entomology training or experience.
- Recommended number of participants for this course: up to 15

### **Trainers**

- Trainers will be VectorLink entomologists.
- Recommended number of trainers for this course: At least one for every three participants

## **WORKSHOP ASSESSMENTS**

### **Rationale**

Pre- and post- workshop assessments are recommended for this course. The pre-workshop assessment helps the facilitators understand participants' level of knowledge and experience as they enter the course, indicating areas where additional emphasis may be needed. The post-course assessment affirms that participants have gained the required knowledge and reached a level of competency adequate to oversee vector surveillance data collection at the village level.

### **Administration**

Most facilitators choose to have participants complete the assessment after the welcome and introductions. Facilitators should score the pre-workshop assessments during or the evening of Day 1, and then summarize key findings and share them verbally with participants on the next day. To keep assessment questions confidential, facilitators should not allow participants to keep the pre-workshop assessment.

Administer the post-workshop assessment after the review session. This assessment may be graded during a break or after the course has finished. Scores should be shared with participants, but they should not be permitted to keep a copy of the assessment.

### **Time Allocated for Assessment**

20 minutes

## PROPOSED WORKSHOP AGENDA (TO BE TAILORED TO LOCATION)

### ENSURING QUALITY COMMUNITY ENTOMOLOGICAL SURVEILLANCE: A WORKSHOP FOR DISTRICT MALARIA FOCAL POINTS

#### WEEK ONE

	DAY ONE	DAY TWO	DAY THREE	DAY FOUR	DAY FIVE	DAY SIX
AM	<p>Opening Session</p> <p>Pre- Workshop Assessment</p> <p><b>Session 1: Malaria &amp; Your Role</b></p>	<p>Review of Day One</p> <p><b>Session 5: Identification of Malaria-carrying Mosquitoes</b></p> <p><b>Session 6: Practical – Identifying adult Mosquitoes</b></p>	<p>(Field) <b>Collection of Adult Mosquitoes (continued)</b></p>	<p>(Field) <b>Collection of Adult Mosquitoes (continued)</b></p>	<p>Review of Days Two to Four</p> <p>(Field) <b>Session 12: Practical – Collecting <i>Anopheles</i> Larvae</b></p> <p><b>Session 13: Practical – Sorting <i>Anopheles</i> Larvae</b></p>	<p>Review of Day Five</p> <p><b>Session 16: Facilitating Training Sessions Using Adult Learning Principles</b></p> <p><b>Session 17: Training Techniques</b></p>
<b>LUNCH</b>						
PM	<p><b>Session 2: Mosquito Lifecycle</b></p> <p><b>Session 3: Adult Mosquitoes</b></p> <p><b>Session 4: Rearing Mosquitoes from Larvae to Adult</b></p>	<p><b>Session 7: Adult Mosquito Collection</b></p> <p>(Field)</p> <p><b>Session 8: Practical - Setting up CDC Miniature Light Traps</b></p>	<p><b>Session 9: Practical - Identifying Adult Mosquitoes</b></p> <p>(Field) <b>Session 10: Second Practical – Setting up CDC Miniature Light Traps</b></p>	<p><b>Session 11: Second Practical – Identifying Adult Mosquitoes</b></p>	<p><b>Session 14: Your Role in Community Entomological Surveillance Houses</b></p> <p><b>Session 15: Communicating with the Community</b></p>	<p><b>Training Techniques – continued</b></p> <p><b>Session 18: Giving Feedback</b></p> <p>(Field)</p> <p><b>Session 19: Practical - Setting up CDC Miniature Light Traps</b></p>

**NOTE: TO INCLUDE ONE 30-MINUTE BREAK IN AM AND ONE 30-MINUTE BREAK IN PM**

**WEEK TWO**

	DAY SEVEN	DAY EIGHT	DAY NINE	DAY TEN
AM	<p>Review of Day Six</p> <p>(Field) Collection of Adult Mosquitoes (continued)</p> <p>Session 20: Identifying <i>Anopheles</i> Mosquitoes to Species Level</p>	<p>Session 21: Practical - Identifying <i>Anopheles</i> Mosquitoes</p>	<p>Session 22: Resistance Monitoring and Practical</p> <p>Session 23: Practical - Identifying <i>Anopheles</i> Mosquitoes</p>	<p>Session 24: WHO Insecticide Susceptibility Bioassay - Results</p> <p>Session 25: Supervising Community Mosquito Collectors</p> <p>Session 26: Workshop Review &amp; Post-Course Assessment</p>
PM	<p>Practical - Identification of <i>Anopheles</i> Mosquitoes to Species Level (continued)</p>	<p>Practical - Identifying <i>Anopheles</i> Mosquitoes (continued)</p>	<p>Practical - Identifying <i>Anopheles</i> Mosquitoes (continued)</p>	<p>Closing</p>

**NOTE: TO INCLUDE ONE 30-MINUTE BREAK IN AM AND ONE 30-MINUTE BREAK IN PM**

# COURSE PREPARATION

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## PREPARING FOR THE COURSE

### At Least 4 Weeks in Advance

- Estimate the number of participants for the course
- Identify facilitators for the course
- Calculate the number of breakout groups, if appropriate (2-3 participants per breakout group)
- Send invitations to participants
- Identify the training venue and field locations. If possible, visit the training room. Assess space available for insectary practice
- Procure materials for the course (see the next section for the master list)

### At Least 2 Weeks in Advance

- Invite a guest speaker to open the course
- Invite a guest speaker to close the course (may be the same person who opened)
- Share facilitator's guide and course materials with the facilitation team (in digital form)
- Identify, obtain consent, and make logistical and travel arrangements for community households to be used for mosquito collection activities; ensure household number is painted
- Identify and make any travel arrangements for larvae collection

### Several Months in Advance

- **Prepare boxes of pinned mosquito specimens for mosquito identification training purposes.**

### At Least 1 Week in Advance

- Finalize the list of participants
- Set up insectary

## **At Least 1 Day in Advance**

- Set up classroom

## **MASTER LIST OF EQUIPMENT AND MATERIALS NEEDED**

### **Classroom**

- Name badges and table tent cards
- Markers for participants
- Pens and pencils for participants
- Blank sheets of white paper or card stock (2)
- Laptop, projector, and screen

### **Consumables and equipment needed for all trapping methods**

- Dissecting microscope with light or hand lens
- Mouth aspirator
- Thermo-hygrometer
- Paper cups
- Box for transporting paper cups
- Masking tape
- Torches and batteries
- Chloroform, Ethyl acetate or freezer (for killing mosquitoes)
- Cotton wool
- Jars for killing mosquitoes
- Fine forceps for sorting mosquitoes
- Capsule beems/Eppendorf tubes
- Silica gel or ethanol
- Ziploc bags
- Consent form
- Printed data collection forms and pen
- Untreated mosquito netting

### **Items for CDC light trapping**

- CDC miniature light trap

- 6V rechargeable battery (for light trap)
- Battery charger
- Collection bag, John Hock – part 1.42 (for CDC-LT)
- Spare light trap bulbs
- Mosquito nets (for bed with no net)

#### **Items for pyrethrum spray catch**

- Commercial aerosol (must contain piperonyl butoxide (PBO))
- White sheets
- Sacking material (for sealing gaps)
- Dust Mask
- Nitrile gloves
- Timer
- Filter papers
- Petri dishes

#### **Items for Prokopack aspiration**

- Prokopack aspirator
- Prokopack collection cups
- Power cord
- Battery
- Universal automatic 5 amp charger
- Extension pole
- Timer
- Filter papers

#### **Items for larval collection and mosquito rearing**

- Larval dippers
- 30cm<sup>3</sup> adult mosquito cages
- Larval rearing bowls
- Larval bowl covers
- Plastic disposable pipettes
- Cotton wool (*also listed under “Consumables” above*)

- Masking tape (*also listed under “Consumables” above*)
- Larval food, e.g. Tetramin fish food, yeast
- Sugar
- Mouth aspirator
- Whatman Filter paper
- Beakers
- Field water or dechlorinated water

**Items for WHO synergist assays (quantities stated to conduct one set of WHO tube tests):**

- 12 plastic tubes (4 x red dot to use for exposure tubes; 2 x yellow dot for control tubes; 6 x green dot for holding tubes)
- 6 slide units
- 6 pieces of clean paper (12 x 15 cm) to line holding tubes
- 12 spring wire clips (8 silver rings to hold six green dot holding tubes and two control tubes; 4 copper clips to hold exposure tubes)
- Two glass aspirators
- Insecticide impregnated paper
- Synergist impregnated paper
- Roll of tape
- Data reporting sheets
- Permanent markers
- Pens
- Timer
- Data recording sheets
- 120-150 non-blood fed female mosquitoes 2-5-day old (laboratory reared of wild strains)
- Negative control papers (oil treated papers)
- Cotton
- 10% glucose
- Thermo-hygrometer
- Wooden box with holes or cold chain box
- Towels
- Mosquito cages

- Clean mosquito nets
- Paper cups
- Untreated netting to cover the cups

## **PRINTING INSTRUCTIONS**

### **Print 1 Copy for Each Facilitator**

- Facilitator Guide
- Course agenda (to be tailored by location)
- Data collection form
- Pre- post- workshop assessment answer key

### **Print 1 Copy for Each Participant (Plus a Few Extra)**

- Participant Workbook for District Malaria Focal Point workshop
- Course agenda
- Pre- and post- workshop assessments (1 each per participant)
- Mosquito Data Collection Instructions form
- Community-based Mosquito Collection Forms (up to 7 copies for each participant, depending on number of collection methods used at location)
- Course materials for the Community Mosquito Collector workshop
  - Facilitator Guide
  - Participant Workbook
  - PowerPoint slides
  - Pre-/post- assessment
  - Workshop assessment form



# DAY ONE: OPENING SESSION

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<b>SESSION TIME</b>	80 minutes
<b>LEARNING OBJECTIVES</b>	By the end of this session, participants will be able to: <ul style="list-style-type: none"><li>• Explain the goals and objectives of this workshop</li><li>• Describe the backgrounds of their peers in the room</li></ul>
<b>MATERIALS</b>	<ul style="list-style-type: none"><li>• Name badges and table tent cards</li><li>• Markers for participants</li><li>• Workbooks for participants</li><li>• Course agenda for participants</li><li>• Pencils and pens for participants</li><li>• Pre-tests (one for each participant)</li><li>• Laptop, projector, and screen</li></ul>
<b>ADVANCE PREPARATION</b>	<ul style="list-style-type: none"><li>• Review and queue up slides to be projected:<ul style="list-style-type: none"><li>○ <i>Day 1 District FP</i></li></ul></li></ul>

## COURSE INTRODUCTION (60 MIN)

1. SHOW SLIDE 1 as participants walk into the room. ASK participants to write their names on the name tents using the markers on the tables.
1. INTRODUCE the guest speaker. The guest speaker opens the training, emphasizing the importance of entomology for malaria prevention and providing encouragement for participants.
2. After the guest speaker completes the opening remarks, WELCOME participants to the workshop. INTRODUCE yourself and briefly give your background in entomology and malaria.
3. THANK participants for their willingness to perform their new role as District Malaria Focal Points. They will play an important role in their districts in controlling mosquitoes who transmit malaria to humans. They will be training and overseeing the work of the Community Mosquito Collectors in monitoring the mosquito

population in their local areas, as well as sharing this information with VectorLink project entomologists.

- Since they will be training and supervising Community Mosquito Collectors, District Malaria Focal Points must be expert in all the tasks that Community Mosquito Collectors need to perform.
  - This workshop is designed so that they have the opportunity to learn and master a Community Mosquito Collector's skills before moving on to learn their own.
4. HAND OUT the course agenda and briefly explain the plan for the workshop and logistical information appropriate to that location (details about lunch, toilets, etc.)
  5. EXPLAIN the purpose of their Participant Workbook, as a resource guide, a workbook for workshop activities, and a place to take notes.
  6. SHOW SLIDE 2 and INVITE participants to form pairs to learn about each other. TELL them to be prepared to introduce their partners to the larger group after their conversation, giving their partner's information.
    - Your Name
    - District you work in (if some participants travelled from other districts to attend this workshop)
    - Why you decided to work as a District Malaria Focal Point
  7. After a few minutes, ASK each pair to introduce each other to the larger group. FIND appropriate times to COMMENT that you will ask them to offer insights and perspectives on their areas of expertise on during the workshop.
  8. SHOW SLIDES 3 and 4 and REVIEW the workshop goal and objectives.
  9. REASSURE participants that they do not need to have any previous knowledge of entomology – the study of insects. We will teach them everything they will need to know to do their jobs.

### **PRE- WORKSHOP ASSESSMENT (20 MIN)**

1. TELL participants that before we move forward, we will give them a pre-workshop assessment. EMPHASIZE that the assessment is not a test of their ability to do their jobs. It is to help us measure how effective this training is in teaching them what they need to know.
2. TELL participants that scores are confidential. They will be shared only with individuals working to keep improving the design of the training (and not your supervisors).
3. ASSIGN each participant a number to put on their pre-assessment form. They will need to use the same number for the post-assessment. TELL them to write their number down in a private location. To keep their assessments anonymous, you will not be keeping a list of these numbers, so it is important for them to remember them.

4. As participants complete each pre-assessment, TELL them to bring the assessment to you and then take a break. MAKE sure you tell everyone to be back at the same time, in approximately 30 minutes (depending on where you are in the schedule).
5. After 20 minutes, COLLECT the pre-assessments from any remaining participants and INVITE them to take a break.

**FACILITATOR NOTE:**

*You should score pre-tests during Day 1. Summarize and share key findings verbally with participants the next morning. To keep the assessment questions confidential and not compromise the results of the post-test, do not allow participants to keep the pre-workshop assessments.*

# SESSION 1:

## MALARIA AND YOUR ROLE

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<b>SESSION TIME</b>	80 minutes (1 hour 20 minutes)
<b>LEARNING OBJECTIVES</b>	<p>By the end of this session, participants will be able to:</p> <ul style="list-style-type: none"> <li>• State key facts about malaria</li> <li>• Explain how malaria is transmitted from person to person</li> <li>• Analyze the factors that ensure effective mosquito control</li> <li>• Explain how their role will support effective mosquito control</li> </ul>
<b>MATERIALS</b>	<ul style="list-style-type: none"> <li>• Laptop, projector, and screen</li> <li>• Flipchart stand, flipchart paper pads, and markers</li> </ul>
<b>ADVANCE PREPARATION</b>	<ul style="list-style-type: none"> <li>• Prepare and post on opposite walls in front of the room: <ul style="list-style-type: none"> <li>○ Sign that reads “True”</li> <li>○ Sign that reads “False”</li> </ul> </li> <li>• Create flipcharts titled: <ul style="list-style-type: none"> <li>○ Controlling transmission</li> <li>○ Focus for entomologists</li> <li>○ Check if working</li> </ul> </li> <li>• Review and queue up slides to be projected: <ul style="list-style-type: none"> <li>○ <i>Day 1 District FP</i></li> </ul> </li> <li>• Queue up video: <ul style="list-style-type: none"> <li>○ <i>PMI VectorLink Approach to Managing Insecticide Resistance</i></li> </ul> </li> </ul>

## **SESSION OBJECTIVES (5 MIN)**

1. WELCOME participants back from break.
2. SHOW SLIDES 5 and 6: INTRODUCE the session and its objectives.

## **REVIEW OF MALARIA FACTS (30 MIN)**

1. BEGIN by asking participants to share their experiences with malaria. How have they seen its effects? Is it common in their community?
2. After leading a short discussion, ANNOUNCE that we are going to have a fun “Malaria: Myths & Facts” activity to review (or learn for the first time) some important facts about malaria.
3. ASK everyone to stand up.
4. EXPLAIN the activity:
  - On one side of the room is a sign that reads “TRUE” and on the other side of the room is a sign that reads “FALSE.”
  - As the facilitator reads each statement, if a participant thinks the statement is true, they should go and stand under “TRUE;” if they feel it is false, they should stand under “FALSE.”
  - READ the following statements, one at a time, and allow participants time to align themselves with their responses. DEBRIEF each question and share the correct response before moving to the next question.
    - Malaria is only found in Africa.  
—FALSE: Malaria is found on other continents and many countries worldwide.
    - Malaria is a disease that can be fatal for adults and children. —TRUE: There were an estimated 228 million cases and 405,000 deaths globally in 2018.
    - Africa has about 94% of cases and 94% of all deaths caused by malaria. TRUE: As reported in the World Malaria Report 2020.
    - Pregnant women should be careful that they do not get malaria. The disease can complicate pregnancy and be passed to the baby. — TRUE
    - Malaria does not need to be treated by a clinician; just take Paracetamol and wait several days to see if you feel better.  
—FALSE: If you believe you might have malaria, you should go to the clinic for diagnosis and treatment.
    - Older people are most vulnerable to malaria. – FALSE: The majority of deaths occur in children under 5, which comprise 67% of the malaria deaths).

- Malaria is carried from an infected person by a mosquito that spreads the infection when it bites another person. —TRUE
- Malaria rates tend to go up during the rainy season, as there are more mosquitoes in communities. —TRUE
- Children who have been exposed to malaria develop resistance and cannot get the disease as an adult. —FALSE: It is possible for anyone to get malaria, at any point during their lives. For children, pregnant women, and the elderly, malaria can be more serious.

5. INVITE participants to return to their seats.

## **CONTROLLING MALARIA (45 MIN)**

1. INTRODUCE participants to the PMI VectorLink project.

- Despite malaria's crippling effects on people's health, education, and employment, the world has seen major reductions in morbidity and mortality from malaria in the past decade.
- The majority of those gains have been in Africa and are primarily due to investments in vector control interventions by the U.S. President's Malaria Initiative (PMI), the Global Fund, and country governments.
- Since 2006, PMI has protected millions of people in Africa from malaria through the deployment of insecticide-treated bed nets (ITNs) and indoor residual spraying (IRS), which kills the mosquitoes that transmit malaria by spraying insecticide on the walls, ceilings and other indoor resting places of those mosquitoes.
- In September 2017, the United States continued its commitment to tackling malaria, launching the five-year PMI VectorLink Project.

2. SHOW SLIDE 7. EXPLAIN that the PMI VectorLink Project works across 25 countries in sub-Saharan Africa as well as Cambodia. The Project is equipping countries to plan and implement safe, cost-effective, and sustainable IRS, ITN, and other life-saving malaria vector control interventions.

3. STATE that entomology plays a significant role in the VectorLink Project.

4. SHOW a video that describes this role within VectorLink: *PMI VectorLink Approach to Managing Insecticide Resistance*.

5. TELL participants that they will be working very closely with VectorLink entomologists.

6. SHOW SLIDE 8 and explain that before we can do any work in eliminating mosquitoes, we need to understand how malaria is transmitted from person-to-person. ENSURE you make the following points:

- Malaria is not a virus but a parasite, which means it is an organism that lives in or on an organism of another species. In the case of malaria, the

parasites grow and multiply first in a human's liver cells and then in the red cells of their blood.

- A female *Anopheles* mosquito becomes infected by biting an infected person and feeding on the blood that contains the parasite.
  - The parasite grows and develops in the *Anopheles* mosquito.
  - When the mosquito bites another human, she passes along the parasite and the human becomes infected.
  - Only female mosquitos bite humans because they need to take a blood meal to produce eggs, so they are the ones that transmit malaria.
  - The male mosquito feeds on nectar from flowers and plant juices and doesn't bite and take blood from humans, so it doesn't transmit malaria.
7. ASK: Now that you know how malaria is transmitted from person-to-person by infected mosquitoes, what are some ways you think we can prevent or control this transmission?
  8. CAPTURE responses on a flipchart. Answers to include using mosquito nets, staying indoors in a screened room during the time of day mosquitoes are active, spraying insecticides, eliminating areas that mosquitoes live, etc. PROBE to get as many responses as possible.
  9. SUM up by saying that, as they can see, there are many different ways to control the transmission of malaria. However, in their role, they will be focusing their work on the malaria-carrying mosquitoes.
  10. ASK: Why is it important for us to study insects? INVITE participants to call out their responses. Answers to include:
    - Learn about how insects affect our environment
    - Learn how insects affect our crops and our food supply
    - Learn whether and how insects pose a threat to our health and our lives
    - When insects pose a threat, by studying their life cycle we can learn how to control their population
    - Learn ways we can successfully kill harmful insects
  11. SAY: Most entomologists focus on a particular type of insect. ASK: What information do you think an entomologist focusing on mosquitoes would they need in order to accomplish what we just discussed?
  12. CAPTURE responses on a flipchart. Answers to include where mosquitoes live, identifying the different types of mosquitoes, when mosquitoes are active, etc.
  13. SHOW SLIDE 9. DEFINE "vector" and "vector control:" organisms, such as mosquitoes, tsetse flies, sand flies, and ticks, that transmit diseases or parasites from one living being to another are called "vectors." When they hear people talking

about “vector control,” they are talking about ways to control these insect populations.

14. REFER participants to page 6 in the Workbook to take notes.
15. ASK: When the district conducts activities to eliminate malaria-carrying mosquitoes, what information do entomologists need to make sure that these activities are working? CAPTURE their responses on a flipchart. Answers should include:
  - Are we killing the right mosquitoes?
  - Is the number of adult mosquitoes going down in those areas where we are conducting vector control activities?
  - Is the number of adult mosquitoes infected with malaria parasites remaining the same after an insecticide has been applied? This likely means that the mosquitoes are beginning to adapt and build resistance to the insecticide being used.
16. EXPLAIN:
  - It is critical to monitor the local mosquito populations to select the right vector control activities and monitor to see if those activities are successful.
  - There are not enough entomologists in the district and regional levels to be able to go to all these locations to gather this information.
  - Community Mosquito Collectors play an important role in collecting and reporting local information to entomologists so that they have the information they need to design effective vector control interventions.
  - District Malaria Focal Points play an important role in overseeing and supporting the work of Community Mosquito Collectors.
17. REVIEW the items on the flipchart, PUT a check next to the ones that Community Mosquito Collectors will be doing to support entomologists, and EXPLAIN how they will be providing this support.
18. EMPHASIZE that the Community Mosquito Collector will likely be a secondary school graduate with limited or no background in science.
19. SHOW SLIDE 10. GO OVER the role of the Community Mosquito Collector and how a District Malaria Focal Point will supervise, train, and support the Community Mosquito Collector in successfully performing their role. We will be talking in more detail about the variety of ways the District Malaria Focal Points will be doing so on Day 5 of this workshop.
20. INVITE participants to take a one-hour lunch. When we return, we will be talking about mosquito lifecycles.



# SESSION 2:

## MOSQUITO LIFECYCLE

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<b>SESSION TIME</b>	90 minutes (1 hour 30 minutes)
<b>LEARNING OBJECTIVES</b>	<p>By the end of this session, participants will be able to:</p> <ul style="list-style-type: none"> <li>• Describe how scientists organize animals into groups</li> <li>• Describe the mosquito lifecycle</li> <li>• Explain the differences between the eggs of <i>Anopheles</i>, <i>Aedes</i>, and <i>Culex</i> mosquitoes</li> <li>• Explain the difference between the larvae of <i>Anopheles</i>, <i>Aedes</i>, and <i>Culex</i> mosquitoes</li> <li>• Visually identify <i>Anopheles</i> mosquito larvae</li> <li>• Describe habitats where <i>Anopheles</i> mosquitoes prefer to lay their eggs</li> </ul>
<b>MATERIALS</b>	<ul style="list-style-type: none"> <li>• Laptop, projector, and screen</li> <li>• Flipcharts and markers</li> </ul>
<b>ADVANCE PREPARATION</b>	<ul style="list-style-type: none"> <li>• Review and queue the slide set:             <ul style="list-style-type: none"> <li>○ <i>Day 1 District FP</i></li> </ul> </li> <li>• Queue up video: <a href="https://www.youtube.com/watch?v=3Tv55loXael">https://www.youtube.com/watch?v=3Tv55loXael</a></li> </ul>

### CLASSIFICATION OF MOSQUITOES (10 MIN)

1. SHOW SLIDES 11 and 12: INTRODUCE the session and its objectives.
1. SAY: In your job as a District Malaria Focal Point, you will need to identify an *Anopheles* adult mosquito down to its species level, as well as ensure that Community Mosquito Collectors can identify the two main malaria-carrying mosquito species groups *Anopheles gambiae* s.l. and *Anopheles funestus* s.l.

2. SHOW SLIDE 13: REVIEW that scientists organize all animals into groups that have something in common. These groups start from the most general to the most specific. All the group names are in Latinized.
3. USE the example of human beings as an introduction to the groups.
4. EXPLAIN that, in community entomological surveillance, the most important groups for them to know are “genus” and “species.” Specifically:
  - Define the Culicidae and explain that there are over 3,000 mosquito species in the world.
  - The most common genera of mosquitoes found in Africa are in the genera *Culex*, *Aedes*, and *Anopheles*.
  - The genus *Anopheles* mosquito is the one that carries malaria.
  - However, not all species of the *Anopheles* carry the malaria parasite. This is why it will be important for them to identify which species they are monitoring and collecting information on.
  - Those species that carry the parasite and regularly bite humans are the most dangerous. If a mosquito bites an infected human and then bites an animal, that animal cannot be infected with human malaria. Therefore, the chances of transmission are higher for mosquito species that predominantly feed on humans. PAUSE to answer any questions.

## LIFECYCLE OF MOSQUITOES (15 MIN)

1. TRANSITION: Now that we know what it means to identify a mosquito down to the species level, let’s look at the lifecycle of mosquitoes in general.
2. INTRODUCE participants to the mosquito lifecycle by showing a short video of a mosquito lifecycle at the following link:  
<https://www.youtube.com/watch?v=3Tv55loXael>
3. DEBRIEF the video by asking participants what they noticed. Answers to include: the female mosquito lays eggs in water, the first three mosquito forms live in the water, there are four phases in the lifecycle of a mosquito.
4. REFER participants to page 10 in the Workbook to take notes.
5. SHOW SLIDE 14. Summarize the lifecycle:
  - Mosquitoes go through four stages in their life cycle: egg, larva, pupa, and adult.
  - Adult females lay 50-200 eggs per cycle. *Anopheles* eggs are laid one at a time directly on water. Eggs need to be in water and normally hatch within 2-3 days.
  - Larvae are the most active aquatic form of the mosquito. Mosquito larvae must always be in water.
6. SHOW SLIDE 15 and SAY:

- Mosquito larvae have a well-developed head with fan-like mouth brushes that sweep water at their mouths from in front of them. *Anopheles* larvae use these mouth parts to filter out small particles of decaying materials, algae, bacteria, and microorganisms in the surface layer of the water, which they then eat. They are constantly feeding since growing through their stages requires a huge amount of energy and food.
- Note that larvae also have hairs (setae) that stick out all over the place. These tiny hairs help the larvae feel around them and also to float in the water.

7. RETURN to slide 14 and CONTINUE:

- At the end of each stage, the larvae molt, shedding their skin, to allow for further growth.
- Larvae can float, which is important because mosquito larvae need air just as we do. They must come to the surface frequently to breathe and dive below in only when they see unexpected light or are otherwise disturbed. They move by wriggling. As seen on this slide, the larvae develop through four stages. At the end of each stage, they shed their skin to allow room to grow.
- It can take larvae five to ten days to go through the four stages.

8. SHOW SLIDE 16 and continue:

- Pupae look like commas from the side. They also stay in the water and need to come to the surface to breathe, but do not feed and therefore, have no mouth. Instead of siphons, they have breathing “trumpets.”
- They swim by a sort of kicking motion. Like larvae, the pupae are also sensitive to light changes, swimming to the bottom if anything moves over the water.
- If pupae become stranded due to the drying out of their water pool, they are still able to turn into mosquitoes, if they are not first eaten or exposed to conditions that are too dry.
- After two or three days, the surface exoskeleton splits down the back side and the adult mosquito comes out and sits on the water.
- The time from egg to adult varies and depends on the temperature. It can be as little as seven days but in the tropics is usually 10-14 days.
- Adult mosquitoes feed on sugar sources for energy. Females also require a blood meal for the development of eggs. After obtaining a full blood meal, the female will rest for a few days while the blood is digested and eggs are developed (2-3 days). After laying her eggs, the female goes to look for another blood meal to develop more eggs. She does this until she dies (1-2 weeks to a month).

9. NOTE that Community Mosquito Collectors will be collecting both adult mosquitoes and larvae as part of their jobs. They will be rearing larvae to adult and then contacting you, the District Malaria Focal Points, to come and identify the mosquitoes.

## IDENTIFYING MOSQUITO EGGS AND LARVAE (60 MIN)

1. TRANSITION to the topic of this session: We are now going to focus on the first three phases and how to be able to differentiate between *Anopheles*, *Aedes*, and *Culex* mosquitoes during these phases.
2. EXPLAIN that to be able to find the mosquito larvae to collect, we need to know where *Anopheles* mosquitoes lay their eggs.
  - NOTE that recently an Asian malaria-carrying *Anopheles* mosquito has recently been discovered in some areas of Africa.
  - The typical breeding locations of this new *Anopheles* mosquito are more like those of the *Aedes* mosquito than the *Anopheles*.
3. SAY: Earlier, we mentioned that different types of mosquitoes prefer different types of water to lay their eggs. Let's take look at the differences in how *Anopheles*, *Aedes*, and *Culex* mosquitoes lay their eggs.
4. SHOW SLIDE 17 of typical *Aedes* breeding locations. ASK: Based on these photos, how would you describe the breeding locations that the *Aedes* (*Ae. aegypti* and *albopictus*) mosquitoes prefer? Answer is small containers of water (such as small cans, car tires, flower pots and tree holes).
5. SHOW SLIDE 18 of typical *Culex quinquefasciatus* breeding locations. ASK: Based on these photos, how would you describe the breeding locations that these *Culex* mosquitoes prefer? Answer is a little harder to categorize from the photos but *Culex quinquefasciatus* mosquitoes prefer dirty water.
6. SHOW SLIDE 19 of typical *Anopheles gambiae* s.l. breeding locations. ASK: Based on these photos, how would you describe the breeding locations larval habitats that the *Anopheles* mosquitoes prefer? Answer is clear, unpolluted, sunny pools of water. Common types of *Anopheles gambiae* s.l. larval sites are flooded rice fields, water in animal hoof prints, temporary puddles from rainfall, and borrow pits. Larvae of *Anopheles* mosquitoes have been found in grassy ditches, the edges of streams and rivers, and small, temporary rain pools. The malaria-carrying *Anopheles gambiae* larvae prefer open, sun-lit pools.
7. ADD: Unfortunately for those looking for a specific type of mosquito, mosquitoes can change their behavior and all genera can be found in any type of water, sometimes even in the same place at the same time.
8. SHOW SLIDE 20 and ask participants what characteristics do they notice about *Anopheles* eggs. Answer is: laid singly, with floats, on top of water.

9. SHOW SLIDE 21 of *Culex* and *Aedes* eggs and ask participants what characteristics do they notice about these. *Culex* eggs are laid in rafts on the water. *Aedes* eggs are laid singly and do not have floats. The eggs are laid on soil where they wait until rain or floods wash them into shallow puddles, pools, or containers.
10. SHOW SLIDE 22 and transition to mosquito larvae. The photos on the slide are of *Anopheles* larvae. Note that there are four stages of growth of the larvae (as in the lower right photo). At each stage, larvae shed (molt) their skins, growing larger after each molt.
11. ASK: What do they notice about the way the larvae are situated in the water?  
Answer is parallel to the water. *Anopheles* larvae need oxygen just like other types of mosquitoes. They have breathing openings along their abdomen. They do not have a breathing tube (called a siphon) and lie parallel to the water surface to get a supply of oxygen through this breathing opening.
12. SHOW SLIDE 23 and compare *Culex* and *Aedes* larvae to the previous slide. In this photo they can also see how the next phase – pupae – looks like compared with the larvae. The *Culex* and *Aedes* larvae have a siphon and hang down from the water.
  - *Aedes* and *Culex* larvae are very similar. But looking at the siphon you'll notice that the ones from *Culex* are longer and have a lighter color; their body is also "hairy" compared to *Aedes*. Using a microscope, look at the morphology of the combs, they are very different.

## IDENTIFYING LARVAE (5 MIN)

1. TELL participants that they will now have an opportunity to practice identifying larvae.
2. In front of the room, DISPLAY two or three containers with larvae of different types, one per container. INVITE participants to get up and to look closely at each one. After each participant has had an opportunity to look at each container, ASK participants to identify which one is the *Anopheles* and then explain why they came to this conclusion.
3. INVITE participants to take a 30-minute break.

# SESSION 3: ADULT MOSQUITOES

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<b>SESSION TIME</b>	115 minutes (1 hour 55 minutes)
<b>LEARNING OBJECTIVES</b>	<p>By the end of this session, participants will be able to:</p> <ul style="list-style-type: none"><li>• Describe the anatomy of a mosquito</li><li>• Distinguish between a male and female mosquito</li><li>• Describe the features of an adult <i>Anopheles</i> mosquito used to distinguish them from other commonly found mosquitoes</li><li>• Differentiate between female <i>Anopheles</i>, <i>Aedes</i> and <i>Culex</i> mosquitoes</li><li>• Determine the correct <i>Anopheles</i> mosquito blood digestion stage</li></ul>
<b>MATERIALS</b>	<ul style="list-style-type: none"><li>• Laptop, projector, and screen</li><li>• Flipcharts and markers</li></ul>
<b>ADVANCE PREPARATION</b>	<ul style="list-style-type: none"><li>• Review and queue the slide set:<ul style="list-style-type: none"><li>◦ <i>Day 1 District FP</i></li></ul></li><li>• Queue video clip: <a href="https://www.youtube.com/watch?v=iLM576y-kxc">https://www.youtube.com/watch?v=iLM576y-kxc</a></li><li>• Prepare the following flipcharts for this session:<ul style="list-style-type: none"><li>◦ Sheet with 2 columns: one titled Anopheline and one titled Culicine</li></ul></li></ul>

## ANATOMY OF A MOSQUITO (45 MIN)

1. WELCOME participants back from break.
2. SHOW SLIDES 24 and 25: INTRODUCE the session and its objectives.
3. SHOW SLIDE 26 and TRANSITION: Now let's take one phase of the mosquito lifecycle – the adult mosquito. NOTE:

- Like all insects, the body is divided into three parts: the head, thorax, and abdomen; the thorax has three pairs of legs.
  - Three pairs of legs and a single pair of wings are attached to the thorax.
4. SHOW SLIDE 27 of an adult female *Anopheles* mosquito as an example. POINT out the following:
    - Mosquitoes have one pair of visible wings, which show a defined pattern. Long ago there was a second set of wings but through evolution only small drumstick-like pieces remain. These are called halteres, which are used for steering when mosquitoes fly.
    - The antennae have receptors to detect carbon dioxide. Between the antennae, mosquitoes have a long proboscis, which is the part that pierces the skin and sucks the blood.
    - The palps at the top of the head near the proboscis detect the odor of chemicals that are released in human sweat.
  5. EXPLAIN that the antennae can be used to tell the difference between a female mosquito and a male mosquito. Since the female mosquito is the only one that takes a blood meal and carries diseases, this can be important to know.
  6. SHOW SLIDE 28. ASK: What differences do they note between the two mosquitoes on the slide? ENSURE responses note that in one (female) the *Anopheles* palpi are as long as proboscis but on *Mansonia* mosquitoes the palpi are shorter than the proboscis.
  7. SHOW SLIDES 29-31. REMIND participants that you had mentioned earlier that the *Culex*, the *Aedes*, and the *Anopheles* are the most common mosquitoes found in Africa. This and the next two slides will show the differences between the male and female in those types. In addition to the bushier antennae, male mosquitoes are usually smaller and have a shorter lifespan than females.

## IDENTIFYING ADULT MOSQUITOES (60 MIN)

1. EXPLAIN that the information collected during mosquito sampling is only useful if the mosquitoes are correctly identified. This way they can determine if these are actually those mosquitoes that transmit malaria.
2. SAY: We will introduce the differences between an *Anopheles* and Culicine mosquitoes (which include both the *Aedes* and *Culex*) by watching the following video.
3. NOTE that the video will also talk about *Anopheles* and Culicine mosquito eggs, larvae, and pupae, as well as adult mosquitoes, so it will provide both a review and new information.
4. INVITE participants to take notes on page 16 of the Workbook as you SHOW video at this link: <https://www.youtube.com/watch?v=iLM576y-kxc>
5. REVEAL flipchart divided into two columns titled *Anopheles* and Culicine.

6. DEBRIEF the video by asking participants to call out the differences between the *Anopheles* and Culicine adult mosquitoes that they remember from the video. CAPTURE their responses on the appropriate column of the flipchart.
7. NOTE that in some countries, Community Mosquito Collectors may need to collect *Aedes* mosquitoes as well as *Anopheles*. Therefore, they will also need to be able to distinguish between *Aedes* and *Culex* mosquitoes.
8. SHOW SLIDES 32 and 33. REVIEW the differences between *Aedes* and *Culex* mosquitoes and then how they compare with *Anopheles*.
  - *Aedes* mosquitoes can be identified by the tip of the abdomen which is pointed rather than rounded. Note that the *Aedes* collected most frequently around houses are black with white patches.

## IDENTIFYING *ANOPHELES* MOSQUITO BLOOD DIGESTION STAGES (10 MIN)

1. TRANSITION: The last thing that you and your Community Mosquito Collectors will need to know is how to identify are the *Anopheles* mosquito blood digestion stages.
2. SHOW SLIDE 34. EXPLAIN:
  - A blood digestion (abdominal) stage refers to the appearance of the abdomen of the female *Anopheles* mosquitoes as the result of blood digestion and ovarian development.
  - In *Anopheles*, ovary maturation (egg development) occurs at the same time as blood digestion.
  - Based on their blood digestion stage or abdominal condition, *Anopheles* can be grouped as unfed, freshly fed, half-gravid, and gravid.
    - Unfed – The abdomen is flattened.
    - Freshly fed – Abdomen appears bright or dark red from the blood in the midgut. The ovaries occupy only a small area at the tip of the abdomen and this part is not red; it includes only two segments on the ventral surface and at most five segments on the dorsal surface.
    - Half-gravid – The blood is dark in color, almost black, and occupies three to four segments on the ventral surface and six to seven on the dorsal surface of the abdomen. Ovaries occupy most of the abdomen.
    - Gravid – The blood is reduced to a small black patch on the ventral surface or may be completely digested. The ovaries occupy all the rest of the abdomen.
3. ASK: What stage is the *Anopheles* female mosquito on the right side of the slide?
4. ANSWER any questions and MOVE to next topic.



# SESSION 4: REARING MOSQUITOES FROM LARVAE TO ADULT

<b>SESSION TIME</b>	60 minutes (1 hour 10 minutes)
<b>LEARNING OBJECTIVES</b>	By the end of this session, participants will be able to: <ul style="list-style-type: none"> <li>List the materials you need to raise larvae to adult mosquitoes</li> <li>Explain how to raise larvae to adult mosquitoes</li> </ul>
<b>MATERIALS</b>	<ul style="list-style-type: none"> <li>Flipcharts and markers</li> </ul>
<b>ADVANCE PREPARATION</b>	<ul style="list-style-type: none"> <li>Set up an insectary in the classroom or another part of the building where the class is held</li> </ul>

## PROCESS OF REARING MOSQUITOES FROM LARVAE TO ADULT (60 MIN)

1. **TRANSITION:** As mentioned earlier, one of the tasks of a Community Mosquito Collector is to take care of the mosquito larvae they collect and raise them to adult mosquitoes. During this session, we will learn how to do this.
2. **DIVIDE** participants into groups of four or five (as appropriate).
3. **DISTRIBUTE** one sheet of flipchart paper and markers to each group.
4. **ASK** each group to reflect on everything they have learned about the lifecycle of a mosquito. How would they go about taking care of mosquito larvae and raise them to adulthood? Consider the needs of the larvae, pupae, and adult mosquitoes. What would they need? How could Community Mosquito Collectors satisfy this need?
5. **TELL** participants they will have 15-20 minutes for this discussion and to put together a plan for the Community Mosquito Collectors caring for the larvae and pupae into adulthood.
6. After 15-20 minutes, **END** the group discussions. **ASK** each group, one at a time, to report out their plans in their discussions. **INVITE** participants from outside the group to ask questions. In the case that an element of the group's plan is based on misunderstood information, gently correct and guide them to the right approach.

*Facilitator Note: Unless a group's plan is technically unsound, continue with the report-outs. When you review the standard approach (which is found in the Workbook),*

*acknowledge points that differ in a group's plan, and identify the sound reasoning they used to come to that point, and the note the better approach (and explain why it is better) in the standard. In some cases, the group may have come up with a valid alternative*

7. After all groups have reported out, ACKNOWLEDGE the good thinking they have all done.
8. REFER participants to pages 19 and 20 in the Workbook. REVIEW the materials and process as explained in the above Facilitator Note.
9. TELL participants that they will each receive a container of larvae to raise as part of this class.
10. INVITE participants to go to the part of the classroom or other location in the building where the insectary has been set up.

### **REARING MOSQUITO LARVAE – PRACTICAL (20 MIN)**

1. Upon arrival at the insectary area, FAMILIARIZE participants to the materials and lay out.
2. PROVIDE each participant with a container of larvae.
3. GUIDE each participant in setting up the larvae correctly in rearing bowls or trays, ensuring there is the correct depth of water and quantity of food.
4. EXPLAIN that as the larvae grow, participants may find what look like dead larvae in the tray. In such a situation, they should count their larvae. It could be that what they are seeing is a skin of a larva that shed as it entered the next stage of growth.
5. After all larvae have been situated, RELEASE participants for the day.

### **END OF DAY ONE**

# DAY TWO: REVIEW OF DAY ONE

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<b>SESSION TIME</b>	40 minutes
<b>LEARNING OBJECTIVES</b>	By the end of this session, participants will be able to: <ul style="list-style-type: none"><li>• Review key points from Day One</li></ul>
<b>MATERIALS</b>	<ul style="list-style-type: none"><li>• Flipcharts and markers</li></ul>
<b>ADVANCE PREPARATION</b>	<ul style="list-style-type: none"><li>• Prepare the following flipcharts for this session:<ul style="list-style-type: none"><li>○ Controlling Malaria</li><li>○ Mosquito Lifecycle</li><li>○ Adult Mosquito Anatomy</li><li>○ Identifying Adult Mosquitoes</li><li>○ Rearing Larvae to Adult Mosquitoes</li></ul></li><li>• Summary of pre-assessment results</li></ul>

## **WELCOME AND SUMMARY OF PRE-ASSESSMENT RESULTS (5 MIN)**

1. WELCOME participants back to class. BEGIN by providing a brief summary of the pre-assessments results you scored the night before. Note how much of what was on the pre-assessment that they have already learned during the first day of class.

## **REVIEW OF DAY 1 (35 MIN)**

1. REFER to the titled flipcharts posted around the room.
2. TELL participants to use markers to go around the room and write the key points they remember about each topic covered the day before.
3. After finishing providing input on each topic, participants are to sit back down.
4. After 15 minutes (or after all participants are seated), REVIEW the key learning identified on the flipchart sheets. CLARIFY any erroneous or incomplete information and ADD any key content that wasn't included by participants.
5. ANSWER any remaining questions and move forward to Session 5.

# SESSION 5: IDENTIFICATION OF MALARIA-CARRYING MOSQUITOES

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<b>SESSION TIME</b>	45 minutes
<b>LEARNING OBJECTIVES</b>	<p>By the end of this session, participants will be able to:</p> <ul style="list-style-type: none"><li>• Describe the major external features of <i>Anopheles</i> used for species identification</li><li>• Explain how to use pictorial guides to differentiate between <i>Anopheles gambiae</i> s.l. and <i>Anopheles funestus</i> s.l. from other <i>Anopheles</i> species</li></ul>
<b>MATERIALS</b>	<ul style="list-style-type: none"><li>• Laptop, projector, and screen</li><li>• Flipcharts and markers</li></ul>
<b>ADVANCE PREPARATION</b>	<ul style="list-style-type: none"><li>• Review and queue the slide set:<ul style="list-style-type: none"><li>○ <i>Day 2 District FP</i></li></ul></li></ul>

## IDENTIFICATION OF MALARIA-CARRYING MOSQUITOES (25 MIN)

1. SHOW SLIDES 1 and 2: INTRODUCE the session and its objectives.
  - Remind them that not all *Anopheles* mosquito species transmit malaria. In order to make sure that the mosquito control activities are focused on the right mosquitoes in the right areas and valuable time and materials aren't wasted needlessly, they need to determine which mosquitoes in their collections are the species that carry the disease.
2. EXPLAIN: After Community Mosquito Collectors collect adult mosquitoes, they will need to:
  - Identify and separate the *Anopheles* mosquitoes from the others.
  - After separating *Anopheles* from the other mosquitoes, they will consolidate the non-*Anopheles* mosquitoes in labeled vials to send to the district with their other samples.

- Examine the *Anopheles* mosquitoes they have collected to identify which species they belong .
  - To be able to identify the species, they will need to look at certain features on an *Anopheles* mosquito. Yesterday's video provided a good demonstration of this.
3. SHOW SLIDE 3 and REVIEW the parts of a mosquito to refresh their minds on the parts of a mosquito.
  4. SHOW SLIDE 4 and POINT OUT as you IDENTIFY details of an *Anopheles* mosquito's wing and where scales on the wing and abdomen can be found. These scales, along with other features, can be used to identify the species.
    - A mosquito has a pair of wings and a pair of halteres on the upper surface and three pairs of legs on the lower or upper part of the surface of the thorax.
    - Wings have several veins; each vein is given a number and/or a name.
    - The vein along the front edge of the wing is called the costa and the short vein behind it is called the subcostal.
    - There are six other veins numbered 1–6; veins 2, 4 and 5 are forked.
    - These veins are covered with scales.
    - The scales are usually a brown, black, white or cream color.
    - The back edge of the wing has fine scales.
    - Many *Anopheles* have wings spotted with dark and pale areas which are used to help identify the species.
  5. SHOW SLIDE 5 and NOTE the scales on the abdomen that can also help to identify the species.
  6. SHOW SLIDE 6 and POINT OUT the different sections of a mosquito leg. The legs are long and made up of a short coxa joined to the body, followed by a short trochanter, then a long femur, a long tibia, and long tarsus.
  7. SHOW SLIDE 7 and NOTE that these are the legs of an *Anopheles*
    - As in the previous drawing, you can see that the tarsus is further divided into five subunits, called tarsomeres.
    - The five parts are numbered 1–5 with segment 1 being closest to the body and segment 5 ending in a claw.
    - The legs are also covered with scales which may be of different colors and are used in identifying the species.
  8. SHOW SLIDE 8 and EXPLAIN that *Anopheles* has a pair of palps below the antennae that is composed of five parts. Three of the parts are covered with scales which may be of different colors and used in species identification.

9. To help participants make these differentiations, there is a pictorial guide in their Workbooks on pages 24-26 for them to use.
10. ASK participants to turn to those Workbook pages and EXPLAIN how to use the pictorial guide.
  - Participants will need to look closely at each mosquito's wings, legs, and other body parts to use this guide.
  - The guide focuses on differentiating between the *Anopheles funestus* s.l. and *Anopheles gambiae* s.l.
  - As District Malaria Focal Points, they will be supporting Community Mosquito Collectors with this task. Community Mosquito Collectors should contact if they find characteristics that are not noted on the guide, or have questions.
11. TELL participants that we will practice using the pictorial guide to identify the *Anopheles* species after their break.

### **USING PICTORIAL GUIDE ACTIVITY (20 MIN)**

1. WELCOME participants back from break.
2. TELL them that we will now practice using the pictorial guide we learned about before the break.
3. SHOW SLIDE 9 of an *Anopheles* mosquito. As a large group, INVITE participant to use their pictorial guide to identify the species. [*Anopheles gambiae* s.l.]
4. SHOW SLIDE 10 of another *Anopheles* mosquito. GUIDE participants in using their pictorial guide to identify the *Anopheles funestus* s.l.
5. ANSWER any remaining questions and INVITE participants to take a 30-minute break.

# SESSION 6: PRACTICAL – IDENTIFYING ADULT MOSQUITOES

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<b>SESSION TIME</b>	180 minutes (3 hours)
<b>LEARNING OBJECTIVES</b>	<p>By the end of this session, participants will be able to:</p> <ul style="list-style-type: none"> <li>• Distinguish between <i>Anopheles</i> and other Culicine mosquitoes as well as males and females</li> <li>• Describe the external features of <i>Anopheles gambiae</i> s.l. used for species identification</li> <li>• Describe the external features of <i>Anopheles funestus</i> s.l. used for species identification</li> <li>• Distinguish between <i>Anopheles gambiae</i> and <i>Anopheles funestus</i> from other <i>Anopheles</i> species</li> </ul>
<b>MATERIALS</b>	<ul style="list-style-type: none"> <li>• Mosquito specimens</li> <li>• Microscope or magnifying glass for each participant</li> </ul>
<b>ADVANCE PREPARATION</b>	<ul style="list-style-type: none"> <li>• Prepare insectary, setting up stations with microscopes and/or magnifying glasses, as available</li> <li>• Set up first set of sample specimens at each station</li> <li>• Prepare second set of sample specimens to be set up while participants are on a 15-minute break</li> </ul>

*Facilitator Note: You may want to have participants take a lunch break before the end of this session or wait until the session is over and take a late lunch.*

## PRACTICAL INSTRUCTIONS – FIRST ROUND (90 MIN)

1. WELCOME participants back.

2. ASK: What is the key thing that you learned during this morning's activities? INVITE participants to call out their responses. ADD any points you'd like to emphasize if not already discussed.
3. TRANSITION:
  - Participants will now have two opportunities to practice identifying adult mosquitoes.
  - To review what we learned on Day Two, we will begin by looking at specimens already prepared for them.
  - We will begin by identifying whether a mosquito sample is a male or female mosquito and whether it is *Anopheles* or *Culex/Aedes* mosquito.

*Facilitator Note: Depending on the number of participants and the number of microscopes and/or magnifying glasses available, you may need participants to form groups of two or three. If so, allow more time for this activity to enable each participant to view each specimen.*

4. INVITE groups to use pictures on pages 15 and notes on pages 16 and 17 in the Workbook to examine their specimen and identify the mosquito and its sex. After identification, they are to record their selection on Workbook page 27 and noting how they arrived at this determination.
5. Each participant (or small group) will rotate through all the stations, spending no more than 5 minutes per station.
6. Facilitators should walk from group to group to ensure everyone is able to properly use the equipment and guiding them as they examine their samples if they are having challenges in identifying features.
7. After groups have finished, DEBRIEF the session, highlighting the correct response and clarifying any identification problems that participants encountered. What did they think of this experience?
8. EMPHASIZE that making errors is normal. It will take practice to be able to successfully make these identifications.
9. INVITE the participants to take a 15-minute break as you set up the next set of specimens.

## **PRACTICAL INSTRUCTIONS – SECOND ROUND (90 MIN)**

1. EXPLAIN that we will now be going to practicing identifying the species of an *Anopheles* mosquito.
2. (If applicable) ASK participants to form groups of two or three.
3. INVITE groups to use their pictorial resources in the Workbook to examine their specimen and identify the species of *Anopheles* mosquito, writing down their selection on Workbook page 21 and noting how they arrived at this determination.



- This time, each participant/group will stay at one station. Groups will have 10-15 minutes to identify the species of their specimen using Coetzee's 2020 morphological identification key.
4. Facilitators should walk from group to group to assist. As each group completes their identification, the facilitator should approach the group, determine if their identification is correct, and guide them in determining what they may not have considered, misinterpreted, or otherwise strayed from the correct identification.
  5. After all groups have completed their identification, ASK them to describe their experiences. What tips did they discover that helped them with this activity? What challenged them in their identification process?
  6. After this discussion, GUIDE the groups to switch to a specimen of a species they had not seen before. Although by now they know which species it is, ASK them to use the pictorial guide to go through all the steps to ensure they are able to identify the features of that specimen as outlined in the guide.

# SESSION 7: COLLECTING ADULT MOSQUITOES

<b>SESSION TIME</b>	130 minutes (2 hours 10 minutes)
<b>LEARNING OBJECTIVES</b>	<p>By the end of this session, participants will be able to:</p> <ul style="list-style-type: none"><li>• Describe three common sampling methods for collecting adult mosquitoes:<ul style="list-style-type: none"><li>○ CDC Light Traps</li><li>○ Prokopack aspirators</li><li>○ Pyrethrum spray catches</li></ul></li><li>• Explain techniques for using each of these methods in the field</li></ul>
<b>MATERIALS</b>	<ul style="list-style-type: none"><li>• Laptop, projector, and screen</li><li>• Mosquito Data Collection forms and instructions</li></ul>
<b>ADVANCE PREPARATION</b>	<ul style="list-style-type: none"><li>• Queue the video clip: <a href="https://www.youtube.com/watch?v=b3_4bg95mOs">https://www.youtube.com/watch?v=b3_4bg95mOs</a></li><li>• Review and queue the slide deck:<ul style="list-style-type: none"><li>○ <i>Day 2 District FP</i></li></ul></li></ul>

## ADULT MOSQUITO SAMPLING (90 MIN)

*Facilitator Note: Although three sampling methods are discussed in these materials, you will likely need to adjust this to conform with the methods used in your country.*

1. WELCOME participants back from lunch break, if applicable.
2. TRANSITION:
  - Up until now we learned how to find the differences between *Anopheles* and Culicine adult mosquitoes and to identify the species of an *Anopheles* mosquito.
  - Now we are going to learn techniques for capturing adult mosquitoes.

- At the end of today, we will be traveling to the field to set up mosquito traps called CDC Light Traps.
  - Tomorrow morning, we will need to travel back to the field very early in the morning so that so we can collect the mosquitoes from that trap and also set up and collect mosquitoes using other methods. So, let's begin.
3. SHOW SLIDE 12 and REVIEW the objectives of this session.
  4. DEFINE the term "sampling." Community Mosquito Collectors will be required to collect both adult mosquitoes and mosquito larvae. We will start with adult mosquitoes.
  5. There are a number of traps for catching adult mosquitoes. We will learn about three of them in this workshop: the CDC-Light Trap, Prokopack aspirators, and Pyrethrum spray catch.
  6. We will begin with the CDC-Light Trap. ASK if anyone in the room has ever seen (or personally used) this trap used. If so, ASK if they would be willing to share their experience.
  7. SHOW the following video that demonstrates how to use the CDC-Light Trap:  
[https://www.youtube.com/watch?v=b3\\_4bg95mOs](https://www.youtube.com/watch?v=b3_4bg95mOs)
  8. REFER participants to pages 28-30 in the Workbook for a list of the materials and the standard operating procedures (SOP) on how to use the CDC-Light Trap.
  9. DEMONSTRATE how to use this trap, describing what you are doing at each step of the process at the time you are doing it.
  10. ANSWER any questions participants may have about this trap.
  11. DEMONSTRATE how to use this trap again, this time asking participants to guide you by telling you each step before you do it.
  12. INTRODUCE the pyrethrum spray catch (PSC), also known as the spray sheet collection method. The PSC collects indoor resting mosquitoes. It allows entomologists to determine how many of each species is in an area, whether they regularly return during certain times of the year, and what proportion have taken a blood meal.
  13. REFER participants to pages 31-34 in the Workbook with the list of materials and SOP for conducting this type of collection.
  14. Carefully REVIEW the steps for collecting mosquitoes using this method.
  15. DEMONSTRATE how to use this method, describing what you are doing at each step of the process at the time you are doing it.
  16. DEMONSTRATE the process again, this time asking participants to tell you what to do at each step (using both their memories and the instructions in the Workbook).
  17. INTRODUCE the next trap we will learn about – the Prokopack aspirator. The Prokopack is an aspirator, which means it is a suction device.

18. REFER participants to pages 35-37 in the Workbook for the SOP for using the Prokopack.
19. Using the Prokopack aspirator, STAND in front of the room and DEMONSTRATE how to use it, describing what you are doing at each step of the process at the time that you are doing it.
20. DEMONSTRATE the process again, this time asking participants to tell you what to do at each step (using both their memories and the instructions in the Workbook).

*Facilitator Note: If a Prokopack is not available for us in the classroom, carefully review each step of the instructions found in the Workbook. You will need to demonstrate how to use the aspirator, as described above, when you get to the field location.*

21. END by FACILITATING a discussion on the difference among the three types of traps. Their District Malaria Focal Point will tell them where to go to collect their samples.
  - CDC-Light Traps are hung either inside people's houses next to the bed or outside next to a person sleeping under the mosquito net to estimate the number of *Anopheles* mosquitoes that attempt to bite each night.
  - The PSC allows for collections to be made of indoor-resting mosquitoes. The best houses for PSC have a single sleeping room for sampling, either a hut with 1 room, or a larger house that has separated sealed rooms. Pyrethrum spray catch should start early in the morning (the earliest time acceptable by the community) at approximately 05:00 to 07:00am. No PSC collections should be conducted after 9:00am (the earlier the better).
  - Prokopack aspiration is done in the early morning to collect adult mosquitoes that are resting inside houses.

## **RECORDING MOSQUITO COLLECTION DATA (20 MIN)**

1. WELCOME participants back from break.
2. TELL them we will talk about one more important task they need to complete while collecting mosquitoes – ensure they keep accurate and up-to-date records of the data they are collecting.
3. ASK: Why is it so important to record the data from mosquito collections? [Ability to monitor same location over time, track location and distribution of species, target and track vector control efforts, etc.]
4. DISTRIBUTE the Mosquito Data Collection form instruction sheets and the Mosquito Data Collection Identification forms participants will be using during this Workshop.
5. REFER participants to the instruction sheet that explains each section of the form, to include those sections that need to be completed by Community Mosquito Collectors and those sections that are to be completed by the District Malaria Focal Point.
6. REVIEW those fields that participants would need to complete for the adult mosquito collection activity (country, region, site or village, GPS coordinates, household name, collection method, etc.).

7. EMPHASIZE the importance of data quality. Data that is recorded on the data forms must be accurate and complete. It is important to fill out all of the required sections and to not leave elements blank.
8. TELL them they will practice filling out these forms in the field.

### **CHECKING LARVAE IN INSECTARY (20 MIN)**

1. Before departing to the field location, allow participants time to check on their larvae and:
  - Feed with fish food.
  - Ensure water is clean and doesn't need changing.
  - Pick out any pupae with a pipette and move them to a mosquito cage.
2. INVITE participants to take a lunch-break before traveling to the field to practice using the different methods they just learned about.
3. ENSURE you tell them where and when to meet to start the trip.

### **TRAVEL TO FIELD LOCATION (UP TO 1 HOUR)**

# SESSION 8: PRACTICAL – USING ADULT TRAPS

<b>SESSION TIME</b>	60 minutes
<b>LEARNING OBJECTIVES</b>	<p>By the end of this session, participants will be able to:</p> <ul style="list-style-type: none"><li>• Demonstrate how to set up CDC-Light Trap</li><li>• Demonstrate how to use a Prokopack aspirator (dependent on location)</li><li>• Demonstrate how to use the Pyrethrum spray catch method of collecting mosquitoes (dependent on location)</li></ul>
<b>MATERIALS</b>	<ul style="list-style-type: none"><li>• CDC Light Trap (one per participant, if possible)</li><li>• Prokopack aspirator materials</li><li>• PSC materials</li><li>• Cooler for transporting samples</li></ul>
<b>ADVANCE PREPARATION</b>	<ul style="list-style-type: none"><li>• Determine field location</li><li>• Make transportation arrangements</li><li>• Make next day lunch arrangements</li></ul>

## SETTING UP THE CDC LIGHT TRAP (60 MIN)

1. After arriving at field location, REVIEW instructions for setting up the CDC Light Trap by asking participants to guide you. Participants should call out each step, one at a time, before you complete that step. The pause and wait for the next step.
2. ANSWER any remaining questions and TELL participants to set up their traps. If there are not enough traps for each participant, divide them into small groups. The individuals not setting up the trap will have an opportunity to do so tomorrow.

*Facilitator Note: There should be at least two facilitators available to monitor and assist with this activity.*

3. After trap(s) are set up, ASK participants to share any impressions, surprises, or challenges in using this equipment. FACILITATE this discussion from the perspective of the volunteer(s) and the guides watching the activity.
4. DISMISS group for the day. ENSURE you provide them with the time and transportation instructions for the early arrival at the field location the next morning.

## **END OF DAY TWO**

# DAY THREE - SESSION 8: CONTINUED

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## RETRIEVING THE CDC LIGHT TRAP (60 MINUTES)

*This morning's activities will need to be adapted to the location and conditions. If possible, give participants a break in between activities.*

1. WELCOME participants to Day Three of the class
2. TELL them that we are now going to retrieve the trap(s) we set up yesterday.
3. ENSURE that participants have pencils and data collection forms.
4. GUIDE participants to the CDC Light Trap(s) set yesterday.
5. Before examining each trap, REVIEW how each trap works and note its location.
6. EXAMINE each trap. NOTE:
  - Is it still intact and is the fan and light still working properly?
  - Was it disturbed in any way?
  - If there were any problems, what was the likely cause? How could the trap have been set up to avoid this problem?
7. DEMONSTRATE how to remove and secure the collection bag. Label the collection bag using masking tape with the household code and date. (The household number will be painted on the door of all houses used for monthly trapping.)
8. NOTE:
  - Did the trap work as expected? Identify ways to troubleshoot common malfunctions.
  - Was it set up correctly?
  - Was it set up in a good location?
  - Is there were any problems, what was the likely cause?
9. ENSURE that all relevant information is captured on the data collection forms.
10. PLACE bags into vehicle for transport.
11. TRANSITION to next activity:
  - DIVIDE participants into two groups.
  - ASSIGN a facilitator to each group. One facilitator leads a group to the next community house designated for mosquito collection to practice using the Prokopack aspirator, while the other leads a group to practice the PSC.



## **USING THE PROKOPACK ASPIRATOR (90 MIN)**

1. WALK participants to the next community house designated for mosquito collection. This is where participants will practice using the Prokopack aspirator for mosquito collection.
2. REVIEW the process with participants by asking them to walk you through the steps.
3. GUIDE participants in the process of collecting mosquitoes and preparing them for transportation.
4. ENSURE that proper labeling and data recording is done.
5. DEBRIEF activity by ASKING participants to share any impressions, surprises, or challenges in using this method.
6. TRANSITION: When each group completes its collection, facilitators lead participants to a designated house to practice using the other collection method.

## **USING THE PYRETHRUM SPRAY CATCH (PSC) (90 MIN)**

1. WALK participants to the next community house designated for mosquito collection.
2. REVIEW the process with participants by asking them to walk through the steps.
3. GUIDE participants in the process of collecting mosquitoes and preparing them for transportation.
4. ENSURE that proper labeling and recording of data is accurate and complete.
5. DEBRIEF activity by ASKING participants to share any impressions, surprises, or challenges in using this method.
6. GUIDE participants in placing specimen containers into vehicle for transport to the building where the insectary is located.

## **TRAVEL TO INSECTARY OR TRAINING LOCATION (UP TO 1 HOUR)**

### **INSECTARY TASKS (30 MIN)**

1. Upon arrival, TELL participants to bring their specimen containers to the insectary area or the training room.
2. GUIDE participants in killing alive mosquito specimens collected using Prokopack or CDC LT either with a freezer, chloroform or ethyl acetate.
3. ALLOW time for participants to feed and check on the status of their larvae that were provided on day one. The larvae will either be collected locally prior to the training by VectorLink staff or from an insectary colony. Any pupae should be removed and placed in the adult mosquito cage.
4. INVITE participants to take a one-hour lunch (if appropriate, depending on travel time).

# SESSION 9: PRACTICAL – IDENTIFYING COLLECTED MOSQUITOES

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## PRACTICAL INSTRUCTIONS (120 MIN)

1. ASK participants to select one of the containers of adult mosquitoes they had collected this morning. We will now be sorting and practicing identifying those mosquitoes.
2. REMIND participants to use the Mosquito Data Collection forms that were used to record the collection site.
3. Using forceps, first ask participants to separate the male mosquitoes from the female mosquitoes. ASK them to record this information on the data collection form.
4. ASK participants to separate the female *Anopheles* mosquitoes from the others. ENCOURAGE them to ask for assistance if they are uncertain or encounter something we haven't covered in the class. ENSURE they record this information on the data collection form.
5. As each participant completes this sorting, a facilitator should review their work to see if any mosquitoes were misidentified and ask them what led to their conclusions to see what aspect they may need more practice with. If any participant needs more practice, INVITE them to retrieve another container of specimens to continue to practice.
6. Participants should then identify the *Aedes* mosquitoes and put them in their own tube.
7. After mosquitoes have been sorted, TELL participants to put all the other mosquitoes in a tube labeled "Culicine" along with the location, household code, and date.
8. TELL participants to now determine the species of the female *Anopheles* adult mosquitoes using their pictorial guides. After each identification, ASK them to call over a facilitator to check their identification.
9. ENSURE participants store each *Anopheles* in an individual tube, label the tube appropriately, and complete the data collection form. As they walk among participants to assist and check identifications, facilitators also need to check data collection form entries to ensure they are being completed correctly.

*Facilitator Note: Participants will be continuing to practice identifying mosquitoes until approximately 1.5 hours before the end of the day. This will allow time to travel to field location and again practice setting up CDC light traps.*

## **TRAVEL TO FIELD LOCATION (UP TO 1 HOUR)**

# SESSION 10: SECOND PRACTICAL – USING ADULT TRAPS

<b>SESSION TIME</b>	60 minutes
<b>LEARNING OBJECTIVES</b>	<p>By the end of this session, participants will be able to:</p> <ul style="list-style-type: none"><li>• Demonstrate how to set up CDC-Light Trap</li><li>• Demonstrate how to use a Prokopack aspirator (dependent on location)</li><li>• Demonstrate how to use the Pyrethrum spray catch method of collecting mosquitoes (dependent on location)</li></ul>
<b>MATERIALS</b>	<ul style="list-style-type: none"><li>• CDC Light Trap (one per participant, if possible)</li><li>• Prokopack aspirator materials</li><li>• PSC materials</li><li>• Cooler for transporting samples</li></ul>
<b>ADVANCE PREPARATION</b>	<ul style="list-style-type: none"><li>• Determine field location</li><li>• Make transportation arrangements</li><li>• Make next day lunch arrangements</li></ul>

## SETTING UP THE CDC LIGHT TRAP (60 MIN)

1. After arriving at field location, ANSWER any questions on setting up the CDC light traps
2. TELL participants to set up their traps. If there were not enough traps for each participant the day before, divide them into the same small groups. The individuals who did not have an opportunity to set up the trap yesterday should set up the trap today.

*Facilitator Note: There should be at least two facilitators available to monitor and assist with this activity.*

3. After trap(s) are set up, ANSWER any questions.

### **TRAVEL TO CLASSROOM LOCATION (UP TO 1 HOUR)**

1. DISMISS group for the day. ENSURE you provide them with the time and instructions for the early arrival at the field location the next morning.

### **END OF DAY THREE**

# DAY FOUR - SESSION 10: CONTINUED

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## RETRIEVING THE CDC LIGHT TRAP (60 MIN)

*This morning's activities will need to be adapted to the location and conditions. If possible, give participants a break in between activities.*

2. WELCOME participants to Day Four of the class.
3. TELL them that we are now going to retrieve the trap(s) we set up yesterday.
4. ENSURE that participants have pencils and record keeping forms.
5. GUIDE participants to the CDC Light Trap(s) set yesterday.
6. Before examining each trap, REVIEW how each trap works and note its location.
7. EXAMINE each trap. NOTE:
  - Is it still intact and is the fan and light still working properly?
  - Was it disturbed in any way?
  - If there were any problems, what was the likely cause? How could the trap have been set up to avoid this problem?
8. DEMONSTRATE how to remove and secure the collection bag. Label the collection bag using masking tape with the household code and date. (The household number will be painted on the door of all houses used for monthly trapping.)
9. NOTE:
  - Did the trap work as expected?
  - Was it set up correctly?
  - Was it set up in a good location?
  - Is there were any problems, what was the likely cause?
10. ENSURE that all relevant information is captured on the Mosquito Data Collection forms.
11. PLACE bags into vehicle for transport.
12. TRANSITION to next activity:
  - DIVIDE participants into two groups.
  - ASSIGN a facilitator to each group. One facilitator leads a group to the next community house designated for mosquito collection to practice using the Prokopack aspirator, while the other leads a group to practice the PSC.

## **USING THE PROKOPACK ASPIRATOR (90 MIN)**

1. WALK participants to the next community house designated for mosquito collection. This is where participants will practice using the Prokopack aspirator for mosquito collection.
2. REVIEW the process with participants by asking them to walk you through the steps.
3. GUIDE participants in the process of collecting mosquitoes and preparing them for transportation.
4. ENSURE proper labeling and that the data collection form is accurate and complete.
5. DEBRIEF activity by ASKING participants to share any impressions, surprises, or challenges in using this method.
6. TRANSITION: When each group completes its collection, facilitators lead participants to a designated house to practice using the other collection method.

## **USING THE PYRETHRUM SPRAY CATCH (PSC) (90 MIN)**

1. WALK participants to the next community house designated for mosquito collection.
2. REVIEW the process with participants by asking them to walk through the steps.
3. GUIDE participants in the process of collecting mosquitoes and preparing them for transportation.
4. ENSURE that proper labeling and record-keeping is done.
5. DEBRIEF activity by ASKING participants to share any impressions, surprises, or challenges in using this method.
6. GUIDE participants in placing specimen containers into vehicle for transport to the building where the insectary is located.

## **TRAVEL TO INSECTARY OR TRAINING LOCATION (UP TO 1 HOUR)**

### **INSECTARY TASKS (30 MIN)**

1. Upon arrival, TELL participants to bring their specimen containers to the insectary area or training room.
2. GUIDE participants in killing alive mosquito specimens collected using Prokopack or CDC LT either with a freezer, chloroform or ethyl acetate.
3. ALLOW time for participants to feed and check on the status of their larvae provided on day one. The larvae will either be collected locally prior to the training by VectorLink staff or from an insectary colony. Have any turned into pupae? Are all still alive? Have they noted any other changes?
4. INSTRUCT them to pick out the pupae with a pipette and place in the adult mosquito cage.
5. INVITE participants to take a one-hour lunch.

# SESSION 11: SECOND PRACTICAL – IDENTIFYING COLLECTED MOSQUITOES

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<b>SESSION TIME</b>	Remainder of the Day
<b>LEARNING OBJECTIVES</b>	<p>By the end of this session, participants will be able to:</p> <ul style="list-style-type: none"> <li>• Distinguish between <i>Anopheles</i> and other Culicine mosquitoes as well as males and females</li> <li>• Describe the external features of <i>Anopheles gambiae</i> used for species identification</li> <li>• Describe the external features of <i>Anopheles funestus</i> used for species identification</li> <li>• Distinguish between <i>Anopheles gambiae</i> and <i>Anopheles funestus</i> from other <i>Anopheles</i> species</li> </ul>
<b>MATERIALS</b>	<ul style="list-style-type: none"> <li>• Mosquito specimens</li> <li>• Microscope or magnifying glass for each participant</li> <li>• Data collection forms for each participant</li> </ul>
<b>ADVANCE PREPARATION</b>	<ul style="list-style-type: none"> <li>• Prepare insectary, setting up stations with microscopes and/or magnifying glasses, as available</li> </ul>

## PRACTICAL INSTRUCTIONS – IDENTIFYING ADULT MOSQUITOES (REMAINDER OF THE DAY)

1. ASK participants to select one of the containers of adult mosquitoes they had collected this morning. We will now be sorting and practicing identifying those mosquitoes.
2. Using forceps, first ask participants to separate the male mosquitoes from the female mosquitoes. ASK them to record this information on the data collection form.
3. ASK participants to separate the *Anopheles* mosquitoes from the others. ENCOURAGE them to ask for assistance if they are uncertain or encounter



something we haven't covered in the class. ENSURE they all make a record of their results.

4. As each participant completes this sorting, a facilitator should review their work to see if any mosquitoes were misidentified and ask them what led to their conclusions to see what aspect they may need more practice with. If any participant needs more practice, INVITE them to retrieve another container of specimens to continue to practice.
5. After mosquitoes have been sorted, TELL participants to put all the other mosquitoes in a tube labeled "Culicine" along with the location, household code, and date.
6. TELL participants to now determine the species of the *Anopheles* adult mosquitoes using their pictorial guides. After each identification, ASK them to call over a facilitator to check their identification.
7. ENSURE participants store each *Anopheles* in an individual tube, label the tube appropriately, and complete the data form.
8. Participants will be continuing to practice identifying mosquitoes until the end of the day. At the end of the day, DISMISS participants with instructions for meeting in the classroom the next morning.

## **END OF DAY FOUR**

# DAY FIVE – REVIEW OF DAYS TWO TO FOUR

<b>SESSION TIME</b>	60 minutes
<b>LEARNING OBJECTIVES</b>	By the end of this session, participants will be able to: <ul style="list-style-type: none"><li>• Review key points from Days Two to Four</li></ul>
<b>MATERIALS</b>	<ul style="list-style-type: none"><li>• Flipcharts and markers</li></ul>
<b>ADVANCE PREPARATION</b>	<ul style="list-style-type: none"><li>• Prepare the following flipcharts for this session:<ul style="list-style-type: none"><li>○ Identification of Malaria-carrying Mosquitoes</li><li>○ Identifying adult Mosquitoes</li><li>○ Adult Mosquito Collection</li><li>○ Setting up CDC Miniature Light Traps</li></ul></li></ul>

## REVIEW OF DAYS TWO TO FOUR (60 MIN)

1. WELCOME participants back to class.
2. REFER to the titled flipcharts posted around the room.
3. ASSIGN and break up participants into 4 groups.
4. ASSIGN each group a flipchart.
5. TELL group to discuss and to use markers to write the key points they remember about the topic on their flipchart.
6. After 30 minutes (or after all groups are done and seated), have a group member from each group REVIEW the key learning identified on the flipchart sheets. CLARIFY any erroneous or incomplete information and ADD any key content that wasn't included by participants.
7. ANSWER any remaining questions and move forward to Session 12.

# SESSION 12: PRACTICAL – COLLECTING *ANOPHELES* LARVAE

<b>SESSION TIME</b>	75 minutes
<b>LEARNING OBJECTIVES</b>	By the end of this session, participants will be able to: <ul style="list-style-type: none"><li>• Identify <i>Anopheles</i> larvae in the field</li><li>• Demonstrate correct techniques for collecting larvae</li></ul>
<b>MATERIALS</b>	<ul style="list-style-type: none"><li>• Enough dippers for participants to practice with</li><li>• Forms for recording data</li><li>• Bottles/vials with labels for transporting larvae and pupae</li><li>• Cooler for transporting samples</li><li>• Mosquito Data Collection forms</li></ul>
<b>ADVANCE PREPARATION</b>	<ul style="list-style-type: none"><li>• Transportation arrangements</li><li>• Identify locations where <i>Anopheles</i> larvae can be collected</li></ul>

*Facilitator Note: if it is not warm enough in the morning to collect larvae, you may choose to conduct the review activity first and then the larvae collection activity.*

## **ANOPHELES LARVAE REVIEW (15 MIN)**

1. WELCOME participants to Day Five of the workshop.
2. EXPLAIN that our last activity will be collecting and sorting *Anopheles* larvae.
3. REVIEW the features of *Anopheles* larvae by asking participants to turn to page 12 in the Workbook.
  - Participants will need to be able to identify *Anopheles* by sight in the field and only collect the *Anopheles* larvae to transport back to the insectary. They should avoid collecting eggs, other types of larvae, or debris.

## **PRACTICAL INSTRUCTIONS: COLLECTING *ANOPHELES* LARVAE (60 MIN)**

1. TRAVEL to designated location(s) for collecting *Anopheles* larvae. (This location will likely be very close to the classroom building.)
2. BEGIN by showing participants the bottles/vials that they will use to transport the samples and reporting forms. All the specimens from a specific breeding site should be put in one vial.
3. EMPHASIZE the need to label the bottle or vial for transport to the lab. The label must be written in pencil on a piece of paper and dropped into the vial. Do not use a ballpoint pen as the ink dissolves in water. Make sure there is about 1-2 cm of air at the top so that the specimens can breathe for a few hours. If a larger air space is left then the water will become agitated during the trip and the specimens may be damaged. The cap on each vial should be put on tightly so the water doesn't spill. Make sure the bottles are packed carefully so they are not jostled during the trip.
4. ASK participants to assess the location and identify appropriate places and methods to collect samples using a dipper.
5. DISTRIBUTE dippers to the participants.
6. DEMONSTRATE and GUIDE participants in collecting a sample using a dipper, using the forms to record the requisite data about that collection, and ready the specimens for transport to the insectary.
7. After both groups have completed their collection activities, DEBRIEF by ASKING participants to share any impressions, surprises, or challenges in using this method.

# SESSION 13: PRACTICAL – SORTING *ANOPHELES* LARVAE

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<b>SESSION TIME</b>	30 minutes
<b>LEARNING OBJECTIVES</b>	By the end of this session, participants will be able to: <ul style="list-style-type: none"><li>• Separate collected <i>Anopheles</i> larvae from other specimens and debris</li></ul>
<b>MATERIALS</b>	<ul style="list-style-type: none"><li>• Collected larvae</li></ul>
<b>ADVANCE PREPARATION</b>	<ul style="list-style-type: none"><li>• Prepare insectary</li></ul>

## **SORTING COLLECTED *ANOPHELES* LARVAE (30 MIN)**

1. WELCOME participants back to the insectary.
2. GUIDE participants in opening their containers and transferring larvae to larval trays or cups, sorting through their specimens to separate any pupae from *Anopheles* larvae.
3. By the time they have completed their sorting, only *Anopheles* larvae should remain. ASK participants to call over a facilitator to check their work after they have completed their sorting. ENSURE they record the information on the data collection form.
4. As participants have successfully complete their sorting, INVITE them to check the status of the larvae they received on the first day and return to the group.
5. DEBRIEF:
  - What changes have they noticed during the week?
  - How many are still alive? How many have matured to pupae?
  - What did they think about this experience? How confident are they that they will be able to raise larvae to adult mosquitoes on their own?
6. REMIND them that the purpose of rearing larvae to adult mosquitoes is that they will be able to then identify the adult mosquitoes and determine whether they are

malaria-carrying *Anopheles* mosquitoes or other species. The records on when and where they collected the larvae will provide the information needed for targeted vector control activities.

7. INVITE participants to take a 30-minute break and return to the classroom.

# SESSION 14: YOUR ROLE IN COMMUNITY ENTOMOLOGICAL SURVEILLANCE

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<b>SESSION TIME</b>	85 minutes
<b>LEARNING OBJECTIVES</b>	<p>By the end of this session, participants will be able to:</p> <ul style="list-style-type: none"> <li>• Identify the ways District Malaria Focal Points support Community Mosquito Collectors in successfully performing their jobs</li> <li>• Describe additional tasks District Malaria Focal Points need to perform to support vector control</li> </ul>
<b>MATERIALS</b>	<ul style="list-style-type: none"> <li>• Flipcharts and markers</li> <li>• Laptop, projector, and screen</li> </ul>
<b>ADVANCE PREPARATION</b>	<ul style="list-style-type: none"> <li>• Create flipcharts titled:             <ul style="list-style-type: none"> <li>○ Supporting Community Mosquito Collectors</li> <li>○ Resources and Training Needs</li> </ul> </li> <li>• Review and queue up slides to be projected:             <ul style="list-style-type: none"> <li>○ <i>Day 5 Your Role and Community Comms</i></li> </ul> </li> </ul>

## **SESSION OBJECTIVES (5 MIN)**

1. WELCOME participants back to from break.
2. SHOW SLIDE 1 and 2: INTRODUCE the session and its objectives.

## **COMMUNITY MOSQUITO COLLECTOR JOB DESCRIPTION (30 MIN)**

1. SHOW SLIDE 3. REMIND participants that on the first day of this course, we reviewed the relationship between the Community Mosquito Collectors and District Malaria Focal Points.

- We are now going to go into more detail about the tasks the District Malaria Focal Point will need to perform in supervising, training, and supporting the mosquito collectors.
2. DIVIDE participants into groups of three to five.
  3. REFER participants to page 7 in the Workbook with a job description for a Community Mosquito Collector.
  4. REVIEW the Community Mosquito Collector job description with participants and ANSWER any questions.
  5. PROVIDE instructions for the activity:
    - Up until this session, all the content participant learned in this course is also covered in the Community Mosquito Collector workshop.
    - ASK participants to reflect on those tasks that a Community Mosquito Collector needs to perform as according to their job description and what was covered in this course.
    - REFER participants to page 44 in the Workbook to take notes.
    - INVITE the groups to discuss the following:
      - What do District Malaria Focal Points need to do as supervisors and trainers to ensure the Community Mosquito Collectors are successfully performing their role?
    - After 20 minutes or when participants are done, INVITE each group to select one group member to share their findings with the rest of the class.
  6. CAPTURE responses on “Supporting Community Mosquito Collectors” flipchart.
  7. COMMENT on and ADD to their findings, as needed. EMPHASIZE:
    - District Malaria Focal Points need to be expert in all the tasks Community Mosquito Collectors perform.

### **DISTRICT MALARIA FOCAL POINT JOB DESCRIPTION (30 MIN)**

8. TRANSITION: In their role as District Malaria Focal Points, they are responsible for more than just supervising and supporting the Community Mosquito Collectors.
9. REFER participants to page 45 in the Workbook, where they will find the job description for a District Malaria Focal Point.
10. REVIEW the job description with the participants and ANSWER any questions they have.
11. INVITE participants to return to their groups of three to five.
12. EXPLAIN the next activity:



- Given what is written in their job description and what we have already learned in this course, what additional knowledge, skills, or resources do you think you will need in order to successfully perform your jobs?
  - REFER participants to page 47 in the Workbook to take notes.
13. After 20 minutes or when participants are done, INVITE each group to select one group member to share their key points with the rest of the participants.
  14. CAPTURE responses on “Resource and Training Needs” flipchart.
  15. Provide FEEDBACK on the responses for Resource and Training Needs, noting similarities and differences.
  16. SHOW SLIDE 4: District Malaria Focal Point Workshop Agenda.
  17. NOTE where their training and resource needs will be addressed in the coming days. If there are training needs identified that will not be covered, consider adding those to the agenda or direct participants to where to find the information.
  18. ANSWER any pending questions or concerns.

# SESSION 15: COMMUNICATING WITH THE COMMUNITY

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<b>SESSION TIME</b>	60 minutes
<b>LEARNING OBJECTIVES</b>	<p>By the end of this session, participants will be able to:</p> <ul style="list-style-type: none"><li>• Identify ways to build trust with community stakeholders through conversations</li><li>• Demonstrate how to interact with community stakeholders when obtaining consent to sample</li></ul>
<b>MATERIALS</b>	<ul style="list-style-type: none"><li>• Sticky notes</li><li>• Flipcharts and markers</li><li>• Laptop, projector, and screen</li></ul>
<b>ADVANCE PREPARATION</b>	<ul style="list-style-type: none"><li>• Distribute sticky notes to participants</li><li>• Prepare a flipchart titled “Qualities of Good Communicators”</li><li>• Prepare a flipchart titled “Questions or Concerns”</li><li>• Large index cards or pieces of paper with role play scenarios</li></ul>

## **BUILDING TRUST THROUGH CONVERSATIONS (15 MIN)**

1. SHOW SLIDES 5 and 6. INTRODUCE the topic by making these points:
2. District Malaria Focal Points will need to first obtain consent from the community leader, give them time to disseminate the message to the community, and then approach and obtain consent from the individual households for the Community Mosquito Collectors to enter their homes to collect mosquitoes.
3. This consent is generally obtained verbally although there may be some countries or districts that require written consent.

4. ASK participants to divide into pairs and discuss: What are the qualities of a good communicator? TELL participants to write the qualities on sticky notes (one quality per note). GIVE them five minutes to discuss.
5. After five minutes, ASK one participant from each pair to bring their sticky notes to the front of the room and post on the flipchart titled “Qualities of Good Communicators.”
6. After participants have completed this task, GROUP the sticky notes into categories with duplicate or similar qualities together.
7. REVIEW the qualities identified with the group. ENSURE the following qualities are mentioned:
  - Careful
  - Good listener
  - Knows what to communicate
  - Respectful
8. EMPHASIZE that the most effective communicators find a way to build trust with others. Remember that we are asking the community to invite mosquito collectors into people’s homes. If we want them to accept, we need to start building trust from the very first communication.

## **CONVEYING KEY MESSAGES (45 MIN)**

1. SAY: Now that we’ve identified the qualities of a good communicator, let’s talk about what we want to convey.
2. ASK: What questions might community leaders or households have regarding mosquito collections? CAPTURE the responses on the “Questions or Concerns” flipchart. Answers should include the purpose for conducting the sampling, frequency of collection, and times of collection.
3. SAY: Generally, there are very few community objections about mosquito collectors entering households to collect mosquitoes. The most common reason a household may decline would be if someone in the house were ill.
4. SUGGEST that the best way to be prepared with a message that conveys the purpose of entering people’s homes to collect mosquitoes is to practice. This will ensure that the message and responses are consistent, clear, and respectful.
5. INTRODUCE the activity. The most common way to teach communication skills is by using role play. A good role play presents a scenario and allows trainees to think carefully about what they will say.
6. REFER participants to page 48 in the Workbook.
7. ASSIGN each pair of participants one of the role play scenarios on the page.

- Pairs will have 10 minutes to discuss their scenario and decide how they will play it out. One participant in each pair will be a community member and the other participant will be the District Malaria Focal Point.
8. After 10 minutes, ASK each pair to come to the front of the room and role play their scenario.
  9. After each role play is completed (no more than five minutes each), INVITE the rest of the participants to provide feedback on how they conducted their scenario.
    - What did they do well during this activity?
    - What aspects could be strengthened?
  10. SUMMARIZE the key points that were identified in this activity.
  11. THANK participants for their thoughtful participation and DISMISS them for the day.

## **END OF DAY FIVE**

# DAY SIX: REVIEW OF DAY FIVE

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<b>SESSION TIME</b>	40 minutes
<b>LEARNING OBJECTIVES</b>	By the end of this session, participants will be able to: <ul style="list-style-type: none"><li>• Identify key points from Day Five</li><li>• Describe how the remaining workshop topics tie in with their role as District Malaria Focal Points</li></ul>
<b>MATERIALS</b>	<ul style="list-style-type: none"><li>• Flipcharts and markers</li></ul>
<b>ADVANCE PREPARATION</b>	<ul style="list-style-type: none"><li>• Prepare the following flipcharts for this session titled:<ul style="list-style-type: none"><li>○ Day Five Key Points</li><li>○ Workshop Topic Ties to DFP Roles</li></ul></li></ul>

## WELCOME (5 MIN)

1. WELCOME participants back to class.

## REVIEW OF DAY FIVE (35 MIN)

1. REFER participants to page 49 in the Workbook to take notes.
2. TELL participants to take five minutes to write down the key points they remember about each topic covered the day before: collecting *Anopheles* larvae, sorting *Anopheles* larvae, their role in community entomological surveillance, and communicating with the community.
3. After five minutes, have participants verbally share their key points and CAPTURE on the “Day Five Key Points” flipchart.
4. PROVIDE feedback on each key points thematically. CLARIFY any erroneous or incomplete information and ADD any key content that wasn’t included by participants.
5. TELL participants to take another five minutes to write on page 49 in the Workbook: “How do the remaining workshop topics tie in with their role as District Malaria Focal Points?”

6. After five minutes, have participants verbally share their key points and CAPTURE to the Workshop Topic Ties to DFP Roles flipchart.
7. Provide FEEDBACK on each key points thematically. CLARIFY any erroneous or incomplete information and ADD any key content that wasn't included by participants.
8. ANSWER any remaining questions.

# SESSION 16: FACILITATING TRAINING SESSIONS USING ADULT LEARNING PRINCIPLES

<b>SESSION TIME</b>	105 minutes (1 hour 45 minutes)
<b>LEARNING OBJECTIVES</b>	<p>By the end of this session, participants will be able to:</p> <ul style="list-style-type: none"> <li>• Articulate the importance of the facilitator-participant relationship</li> <li>• Describe methods for understanding participants' needs</li> <li>• Apply adult learning principles to training sessions you facilitate</li> <li>• Identify training methods for the Community Mosquito Collector workshop package</li> </ul>
<b>MATERIALS</b>	<ul style="list-style-type: none"> <li>• Laptop, projector, and screen</li> <li>• Flipchart paper, stand, and markers</li> </ul>
<b>ADVANCE PREPARATION</b>	<ul style="list-style-type: none"> <li>• Prepare flipcharts titled:             <ul style="list-style-type: none"> <li>○ Best Learning Experience</li> <li>○ Finding Out What Trainees Need</li> <li>○ Learning as Children vs as Adults</li> <li>○ Approaches to Honor Adult Learning</li> <li>○ What Motivates Learners?</li> </ul> </li> <li>• Queue up slides to be projected:             <ul style="list-style-type: none"> <li>○ <i>Day 6 Training Adults</i></li> </ul> </li> </ul>

## QUALITIES OF A GOOD FACILITATOR (20 MIN)

1. SHOW SLIDES 1 and 2. INTRODUCE the session and objectives.

2. ASK participants to reflect on the best learning experience they can remember. This can be a formal or informal experience. It could be an experience from their schooling or university, a workshop, or a moment spent with supervisors, peers, parents, colleagues, or community members—even a time when they learned something from a stranger.
3. ASK: What made this the best learning experience? How did you feel during that learning experience? CAPTURE the adjectives that describe the feelings on the flipchart. As needed, ASK questions to clarify participants' responses.
4. SUMMARIZE key points from the flipchart. INCLUDE or ADD these points:
  - How a learner feels affects how well they remember the content presented.
  - As facilitators, we sometimes forget this, focusing too strongly on the content we are teaching and not strongly enough on the people we are training.
5. ASK participants whether they have ever experienced a facilitator or teacher who was an expert on a subject but was not good at teaching that subject to others.
  - Participants should not mention names or specific people—just focus on the general context and why the situation may have occurred.
6. SHOW SLIDE 3: HIGHLIGHT the qualities of outstanding teachers. NOTE how someone's having much or little knowledge of the subject plays a role.
  - Adequate knowledge of the subject is required, but that is not sufficient to make someone an effective trainer.
  - Note that "knowledge of subject" is ninth on the list of "Outstanding Teacher" qualities. What do the first eight have in common? (Hint: They relate to showing respect for the learner.)
7. REVIEW the qualities of "Worst Teachers."
  - What do these qualities have in common?
  - Which qualities contribute to creating/increasing the distance between the teachers and learners?
  - Which qualities could learners interpret as a lack of respect for the learners?
8. EMPHASIZE that "inadequate knowledge of subject" is not even on this list. HIGHLIGHT how many qualities relate to the relationship with learners—to the ability to make learners feel comfortable.
9. SHOW SLIDE 4 and NOTE:
  - Relationship-building skills are important to enable a trainer to create an environment conducive to learning.



- The facilitator and participant must work together to create a meaningful learning experience.
10. SHOW SLIDE 5 (animated): EXPLAIN that in order to have a successful training session, facilitators have significant preparation responsibilities that go beyond delivering the training.
- (click) Inexperienced facilitators often don't realize all they should be doing before training begins. They spend a lot of effort during training to ensure that some learning takes place, but by the end, they are trying to manage crises that have overtaken their sessions.
  - (click) Experienced facilitators invest more time in planning, but not enough. During training, they still have to manage a significant number of problems.
  - (click) Expert facilitators spend the majority of their time planning and preparing. Because they invest this time in advance, they already know who their participants are and understand how to meet their needs. As training begins, they adjust the content to meet needs, but there are few surprises. By the end, they are relaxed and easily close the session on time, having achieved all the goals of the course.

## **KNOW YOUR LEARNER (20 MIN)**

1. SHOW SLIDE 6. ASK participants to think of a formal learning experience in which participants learned little or nothing. Why do they think this happened?
2. GIVE participants a minute to think of an experience. TAKE several responses, highlighting the disconnect between what was taught and what should have been learned.
3. ASK: What could the facilitator have done differently? FACILITATE discussion.
4. EMPHASIZE that when the learner and facilitator have significantly different expectations, learning might not occur.
  - As a facilitator, it is your responsibility to understand what the learners need and ensure their time is used well.
5. ASK: How can we find out what trainees need? CAPTURE responses on a flipchart. ENSURE that the following are covered:
  - Talk to trainees directly as they come in and during breaks to get to know their background and experiences.
  - Start the training with informative introductions, in which trainees share a bit about their experience.
  - Give a pre-test to learn what participants already know.
6. ASK participants to reflect on the first activity we had them do during this workshop "Malaria Facts and Myths." FACILITATE discussion on the following:

- What were the facilitation skills used during this activity?
- Why do you think we conducted the “Facts and Myths” activity in this way?
- How does it help participants learn?

7. MAKE SURE the following points are covered:

- Asking participants to first decide if the statement is a fact or a myth helps them understand the issues. They need to think about what they know and what they need to learn. This creates the right mindset for learning.
- Seeing how others vote helps participants understand how their opinions fit with others. They may see that a large group shares a mistaken belief or that others’ reasons differ from their own. The discussion around facts and myths also helps promote peer-to-peer learning.
- It is important for a facilitator to find out what participants already know about a topic before beginning training. This helps you see where more learning is needed and where participants already have good knowledge, allowing you to move more quickly through some material.
- Facilitators should avoid making judgments about participants’ *ability to learn* based on this activity. Our goal is to help every participant succeed.
- Having participants move around the room adds some physical activity to learning. This can help many learners focus on the topic, especially if they are normally active in their jobs (such as spray operators).
- It also keeps everyone focused and paying attention, which helps everyone remember the information they have learned.

## UNDERSTANDING ADULT LEARNERS (15 MIN)

1. EXPLAIN that although memory works in much the same way in adults and children, the methods for helping adults learn are very different from those that help children learn
2. ASK participants to consider the ways in which they learned things as children, compared with today, as an adult. RECORD responses on the “Learning as Children vs as Adults” flipchart.
3. ASK participants to summarize what they see are the differences.
4. SHOW SLIDE 7: REVIEW the principles of adult learning.
5. ASK what approaches can be used in the training room to honor these adult learning principles.
  - GIVE an example to get the group started: To recognize that adults bring a great deal of experience and knowledge to the course (adult learning principle 2), we can create opportunities for participants to share those experiences through discussion.

- CAPTURE responses on the “Approaches to Honor Adult Learning” flipchart.
6. As approaches are added to the flipchart, ASK if participants have specific examples from their lives: How have they seen a facilitator use the strategy?
  7. ASK participants what they think the difference is between facilitation and presentation. Take a few answers and EXPLAIN:
    - Presenting is communicating information to a group using mostly one-way communication. The presenter is considered the source of information. The people in the group should mostly just receive the information.
    - Facilitating is helping a group of participants or colleagues discuss a topic and exchange points of view, often with the objective of reaching a conclusion or a common knowledge or understanding. Rather than using one-way presentation, the facilitator guides discussion and exchange of information. In a sense, the facilitator does not offer a point of view, but helps the group produce a product, such as a decision, an agreement, or a plan.
  8. ASK: Which method do you think is best suited for adult learners? Answer is facilitation, which is why we call those who train adult learners “facilitators.”
  9. INVITE participants to take a 30-minute break.

## **STRATEGIES TO SUPPORT LEARNERS (20 MIN)**

1. WELCOME participants back from their break.
2. SHOW SLIDE 8: EXPLAIN that we all try new things sometimes, but then later decide it just isn’t working. This is part of the learning process. As facilitators, we see some trainees struggle, and they might give up before fully learning the task. Learning a new task can sometimes feel like climbing a mountain—especially if one feels pressured to succeed.
  - GIVE AN EXAMPLE from your own experience of a time when you started to learn something, but stopped. Why did you stop?
  - INVITE participants to reflect on time when they started to learn something and then stopped. Why did they stop?
  - REVIEW the common reasons for stopping on the slide.
3. SHOW SLIDE 9. EXPLAIN that as facilitators, we need to be aware of difficulties trainees can face in learning a new skill. There are specific things we can do to help them through the most challenging parts.
  - REVIEW the four strategies on the slide. EMPHASIZE that in a training session, these approaches can increase trainees’ chances of success.
  - We cannot make everyone succeed or learn, but we can and should create the right conditions for learning.

## MOTIVATION (20 MIN)

1. SHOW SLIDE 10: EXPLAIN that for adults, motivation must be addressed directly.
2. ASK participants to reflect on the learners in training sessions they have attended or taught? What motivated them?
3. Take several minutes to discuss. RECORD responses on the “What Motivates Learners?” flipchart.
4. EMPHASIZE that although some participants might be motivated by fear, failure, or other negative emotions, these should NEVER be used by the facilitator to create a motivating environment.
5. To explain this, ASK participants to consider what could happen if they tell a trainee, “You aren’t performing well. You have until the end of the day to improve or we will give this job to someone else?”
  - To illustrate the impact of such a statement, we need to examine the factors that help us remember things.
6. SHOW SLIDE 11 on factors that improve memory. EXPLAIN:
  - A person’s memory of what is covered in a training is affected by their level of attentiveness, interest and motivation, emotional state, and context.
  - Level of attentiveness: When a person feels awake and focused on the subject, it is easier to remember. We can improve our ability to focus and pay attention by taking breaks.
  - Interest and motivation: A person who is curious about the material or has a good reason for learning will remember more than someone who does not.
  - Emotional state: Our mood and intensity of emotions have a lot to do with what we remember. We vividly remember things that touch us deeply. When we feel relaxed and comfortable, we are better able to process complex information.
  - Context: We remember not just the new information we want to remember, but also everything around it—the weather, lighting, other people involved, colors, sounds, smells, and so on.
7. CONCLUDE that, if they did tell a trainee – “You aren’t performing well. You have until the end of the day to improve or we will give this job to someone else?” – the trainee’s stress would increase and their interest would decrease.
  - Although using fear could increase attentiveness, it will likely reduce interest and create a negative emotional state, thus making it more difficult to remember the important things from the training session.
  - Additionally, when trainees think about the learning context, they will have negative memories instead of positive ones, possibly creating hard

feelings about the work as a whole. And who is more likely to perform better on the job—a happy employee or an unhappy one?

## COMMUNITY MOSQUITO COLLECTOR WORKSHOP MATERIALS (10 MIN)

1. REMIND participants that one of their tasks will be to co-facilitate the Community Mosquito Collector workshop.
2. REFER participants to the Community Mosquito Collector training materials.
3. SHOW SLIDE 12: EXPLAIN that the course was designed to ensure a standard learning experience for every group of participants attending the workshop.
  - The course has a Facilitator’s Guide and a Participant Workbook.
  - Some sessions have PowerPoint slides and/or handouts.
4. Having standard materials helps ensure:
  - Consistent guidance is given to all learners.
  - Hands-on practice is included to build the needed skills.
  - Participants are actively engaged in learning and challenged to achieve more.
  - Content can be covered efficiently in the fewest number of days needed.
  - Key ideas, techniques, and concepts are covered thoroughly, ensuring consistently high-quality performance by the collectors in every country.
5. SHOW SLIDE 13: EXPLAIN that the Facilitator’s Guide contains detailed instructions for what should happen during the training course, including discussion questions, activities, and review questions.
6. ASK participants to open the Community Mosquito Collector Workshop Facilitator’s Guide. The first few pages provide key information about the course. HIGHLIGHT the following:
  - *Contents*: This detailed table of contents gives an overview of the entire course at a glance. Here, you can see the session titles and major sub-headings. The time needed for each segment is noted in parenthesis.
  - *Acronyms*: A definition of all abbreviations used in the document.
  - *About This Workshop*: This section breaks down the training goal and overall objectives for the course. There is also a description of the targeted participants and the qualifications of the trainers.
  - *Proposed Agenda*: This chart shows the what topics should be covered during the morning and afternoon of each day. Because each location will have different facilities and different locations for collecting samples in the field, the facilitators will need to finalize the times scheduled for each session to align with local conditions.

- *Workshop Preparation*: This section summarizes what the facilitator needs to prepare in advance. It lists equipment and materials needed for the entire course so everything can be purchased or booked in advance. Printing instructions and pre-training preparation guidelines are also included. Finally, there is a description of any pre- and post- training assessments.
  - *Session-by-Session Guide*: Each session is separated by a main heading and a summary table. The summary table includes the session time, learning objectives, required materials, and advance preparation (including handouts to print and flipcharts to prepare).
7. EXPLAIN that the Facilitator's Guide outlines a suggested approach for each course. It will explain how and when to use the other materials in the training package.
- The facilitator should feel free to adjust to materials for the specific participants attending the training. However, all participants must end the course being able to meet all course objectives.

# SESSION 17: TRAINING TECHNIQUES

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<b>SESSION TIME</b>	140 minutes (2 hours 20 minutes)
<b>LEARNING OBJECTIVES</b>	<p>By the end of this session, participants will be able to:</p> <ul style="list-style-type: none"><li>• Articulate advantages and disadvantages of using demonstrations</li><li>• Perform a demonstration using the five-step process</li><li>• Explain the important of effectively answering participant questions</li><li>• Describe the difference between closed-ended and open-ended questions</li><li>• Define paraphrasing and why it is important technique for trainers to use</li></ul>
<b>MATERIALS</b>	<ul style="list-style-type: none"><li>• Laptop, projector, and screen</li><li>• Flipchart paper, stand, and markers</li></ul>
<b>ADVANCE PREPARATION</b>	<ul style="list-style-type: none"><li>• Prepare flipcharts titled:<ul style="list-style-type: none"><li>○ Advantages of Demonstrations</li><li>○ Demonstration Challenges</li><li>○ VOICE, EARS</li><li>○ EYES, HEART</li></ul></li><li>• Review and queue up slides to be projected:<ul style="list-style-type: none"><li>○ <i>Day 6 Training Adults</i></li></ul></li></ul>

## USING DEMONSTRATION (15 MIN)

1. SHOW SLIDES 14 and 15 to introduce the session and objectives.
2. TRANSITION: Now that we have learned about adult learning principles, the importance of the relationship between course facilitators and participants, and some strategies to support learners, we are going to examine the different training techniques you can use both in a formal course or on-the-job training.

3. SHOW SLIDE 16: EXPLAIN that a demonstration is a structured performance of an activity, designed to show, rather than simply explain, how a skill or process is performed.
  - Demonstrations allow participants to see skills in action.
  - A demonstration is used to teach a specific skill or technique by modeling a step-by-step approach.
4. ASK: How should a facilitator conduct a demonstration to make it successful? Take a few comments and explain that good demonstrations require significant preparation.
5. SHOW SLIDE 18 and EXPLAIN that to ensure a successful demonstration, the facilitator must:
  - Plan: Take time to think through how to explain the process, one step at a time. A good demonstration requires careful planning to ensure the small steps are not forgotten during instruction.
  - Organize materials: Have all equipment organized and positioned near the demonstration site.
  - Ensure everyone can see and hear: Decide where to perform the demonstration. Find a location where all participants can see it clearly. If there is a large group, you might need to raise the demonstration to ensure a good line of sight or create smaller groups with several demonstrations.
6. EXPLAIN that it is a good idea to practice the demonstration before using it with a group of trainees to ensure the description is clear for beginners.
  - Before demonstrating a technique, make sure you have considered potential questions and concerns that may arise.
7. EXPLAIN that if you have several people who can perform the skill, you can conduct the demonstration in small groups.
  - This could help individuals learn from each other and discuss questions and concerns in a safe environment.
  - Smaller groups could allow individuals to see and hear the demonstration better.

## **UNDERSTANDING THE DEMONSTRATION PROCESS (10 MIN)**

1. SHOW SLIDE 18. EXPLAIN that when people are learning a new skill for the first time, they might need to see and hear it explained two or three times before they can perform it independently. There are five steps for a successful demonstration:
  - Hear: Give an overview of the skill and how it is used.
  - See: Show the group how the skill is performed, without commentary.



- Hear and see: Repeat the procedure, describing each step as it is performed.
  - Perform with support: Ask participants to “talk through the skill,” explaining each step as the facilitator performs the task.
  - Perform independently: Observe participants performing the task and give them feedback. In this case, ask one participant to perform the task and give feedback.
2. EXPLAIN that we will use an example from our first week in this workshop: how to use the simplified pictorial guide to identify an *Anopheles* mosquito.
- ASK for one volunteer to conduct this demonstration, following the five steps.
  - Guide the volunteer through the process, ensuring the participant follows the five-step process for conducting demonstrations.
  - ASK the volunteer: What were all the things you were considering as you were going through this process?

## **ADVANTAGES AND DISADVANTAGES (15 MIN)**

1. TELL participants that for every method we choose, it is important to know when and how to use it.
- Demonstration is good for showing some skills and processes, but it is not ideal for others. For example, it would be easy to teach how to ride a bicycle using demonstration, because each step and the process can be explained and clearly seen.
  - However, demonstrating how to repair a watch would be difficult, because it would be challenging for participants to see clearly. A demonstration that is not performed well could confuse learners more than it helped.
2. ASK: What are the advantages of demonstration as a method? CAPTURE responses on the “Advantages of Demonstrations: flipchart. ENSURE the following are mentioned:
- Helps focus the learner’s attention.
  - Shows practical applications of a method.
  - Involves learners when they try the method themselves.
  - Engages participants in a sensory way: They can see, hear, and practice as they learn.
3. ASK: What are challenges to using demonstration as a facilitation method?
- Requires planning and practice ahead of time.
  - Complicated or long processes need to be broken down into smaller parts that are more easily explained.

- Room setup is important. The facilitator must make sure everyone can see clearly.
- The demonstrator must have enough materials for everyone to try the method.
- Some types of demonstrations are difficult to practice in large groups.

## **PLANNING A DEMONSTRATION: SETTING UP A CDC LIGHT TRAP (45 MIN)**

1. SHOW SLIDE 19: ASK participants to form pairs for the next activity. EXPLAIN that we will plan our method for demonstrating how to set up a CDC Light Trap to a group of new Community Mosquito Collectors.
  - In pairs, make a list of all materials the collector must use.
  - Identify the order in which you will conduct the demonstration—which piece will be put on first, second, and so on.
  - Write down any key points participants should note. What are the most common mistakes mosquito collectors might make in setting up the trap?
  - How would you conduct a demonstration of setting up a CDC Light Trap in this room? Where would you conduct the demonstration? Can everyone see and hear?
  - Groups will have 20 minutes to work.

*Facilitator Note: If you do not have enough CDC Light Traps for every pair of participants, create groups of 3 or 4. Keep the groups as small as possible as each participant needs to be prepared to use this method to adequately supervise and guide Community Mosquito Collectors.*

2. INFORM participants when their planning time is finished.
3. EXPLAIN that we will ask one team to volunteer to present their demonstration to the group. As we watch this demonstration, note the decisions the team has made.
4. DEBRIEF the activity by asking participants:
  - What did they do well?
  - What would you add to this presentation? Were some materials or steps missed? Were there some common mistakes that should be highlighted?
  - Is there anything that might be confusing to a new mosquito collector?
5. ASK what questions they have before we close the session.
6. SUMMARIZE the session by stating the following key points:
  - Effective demonstrations must be planned in advance. Remember that experts can sometimes make mistakes when explaining ideas to

beginners, since they might not remember what it was like to learn the skill for the first time.

- Consider the room, environment, and number of participants. How can you make sure everyone will be able to see and hear?

7. INVITE participants to take a one-hour lunch break.

## **VERBAL AND NONVERBAL COMMUNICATION SKILLS (20 MIN)**

1. WELCOME participants back from lunch.

2. SAY: In this session, we will focus on skills needed to lead training.

- You've all seen them—trainers with excellent skills and those with not-so-excellent skills.
- Take a moment to visualize an excellent trainer you have seen. Picture in your mind: What did the excellent facilitator/trainer do and say? How do they interact with participants?

3. EMPHASIZE that strong trainers communicate with their whole body, using voice, ears, eyes, and heart.

4. ASK: Can someone give an example of how an excellent facilitator uses the voice? Ensure the following points are mentioned:

- Speaks loudly and clearly, with confidence.
- Sets a friendly and supportive tone, showing enthusiasm and encouraging participation.
- Provides positive reinforcement.
- Helps draw focus on key points.

5. ASK: Can someone give an example of how an excellent facilitator uses the ears? Ensure the following points are mentioned:

- Listens and waits for participants to finish speaking before commenting.
- Listens to the question being asked and the feelings behind the question.
- Uses pauses to encourage participants to respond.
- Is aware of outside noise that could interfere with the session.

6. ASK: Can someone give us an example of how an excellent facilitator uses the eyes? Ensure the following points are mentioned:

- Maintains eye contact with the person speaking.
- Observes participants' behavior to determine whether they understand the content and are interested in the material. Behavior can give clues that they might be distracted, uninterested, too hot, ready for a break, and so on.

7. ASK: Can someone give us an example of how an excellent facilitator uses the heart? Ensure the following points are mentioned:
  - Shows respect. Participants come from many backgrounds and it is important to show respect for all individuals. Even if the facilitator does not agree with them, the facilitator needs to respect their points of view. If you set the tone of showing respect for all participants, it will help them do so with each other.
  - Recognizes that everyone has their own style. Not everyone does things the same way or at the same pace. As a facilitator, it is important to show acceptance for different ways of doing things.
  - Shows support when people make mistakes. As adults, we get embarrassed when we make mistakes. By showing support in these situations, you help create a positive and safe learning environment.
  - Shows compassion. We all have problems and experience difficult situations, so it is important to demonstrate understanding for participants.
  - Cares about the course and is proud when participants enjoy it. Training can be fun or boring; it is up to you, the facilitator, to bring it to life. Think of new and participatory ways to teach the content. If problems arise, adapt and try to achieve the best results possible.
8. REMIND participants that as facilitators, we need to use our whole body to bring the training to life—our voices, our ears, our eyes, and our hearts. Training is not an easy job, but the rewards are significant.

## **ASKING AND ANSWERING QUESTIONS (20 MIN)**

1. TRANSITION: A key facilitation skill is to be able to ask and answer questions effectively, clearly, and fairly.
  - We mentioned earlier that one key method facilitators use to keep participants involved is to regularly ask for their input. Sometimes, though, your questions are met with silence—absolute silence.
2. ASK participants whether they have experienced this.
3. ASK them how it felt. Why do they think the question was met with silence?
4. SUGGEST that part of the problem is the way the question was asked. If participants are unsure whether they understood the question, they might hesitate to respond.
5. There are two types of questions. ASK: What are they? (Participants should respond that there are “open-ended” and “closed-ended” questions.)
6. ASK what “open-ended questions” are. Take a few comments.
7. SAY: “Open-ended questions” allow responders to give more information. They invite explanation and conversation.
8. ASK for examples from the participants. Most of the questions a facilitator asks should be open-ended.

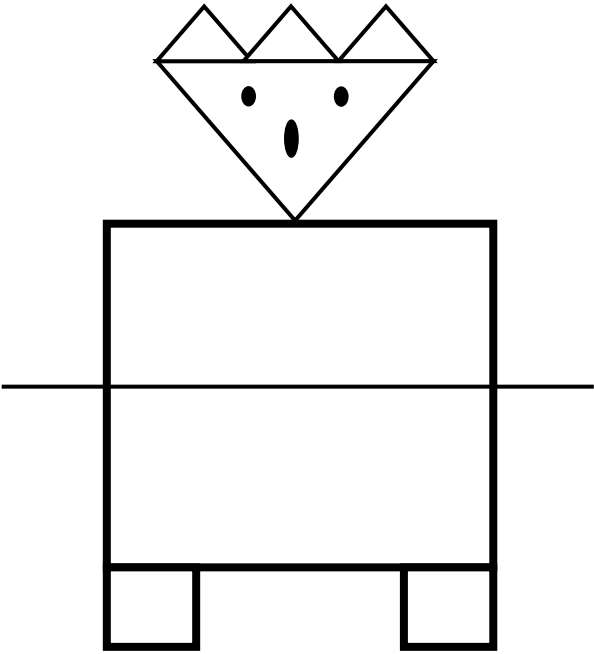
9. ASK what “closed-ended questions” are. Take a few answers. EXPLAIN that “closed-ended questions” limit people’s responses. They usually require one-word answer, such as “yes” or “no.” Mention that these are not particularly good facilitation questions, especially if you want to solicit information from the participants.
10. ASK for examples. A facilitator may ask closed-ended questions, such as when checking for specific knowledge, like “What type of light trap do Community Mosquito Collectors use?”
11. ASK participants to think about today’s sessions. Do they think the facilitators used a lot of questions? ASK what types of questions they heard.
12. ASK them how else facilitators can use question-and-answer effectively. If answers are not forthcoming, explain the following:
  - Strive for open-ended questions that generate discussion.
  - Ask probing questions to get more information.
  - Do not embarrass participants with difficult questions they cannot answer.
  - Repeat or rephrase the question to ensure everyone has heard.
  - Use silence—allow time for participants to formulate a response.

## **PARAPHRASING (25 MIN)**

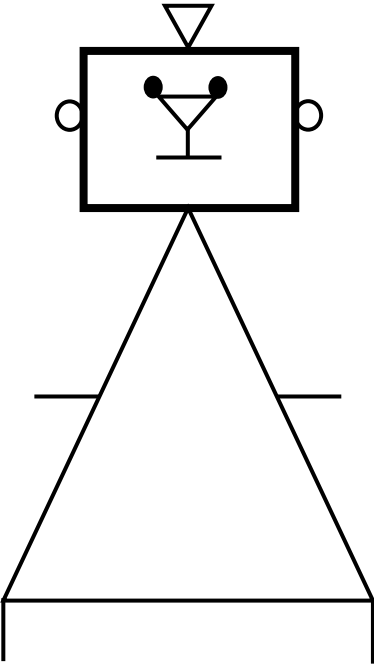
1. EXPLAIN that paraphrasing and summarizing are the other key facilitation skills a trainer needs.
2. ASK participants what “paraphrasing” means and how it is used. Take a few answers.
3. SHOW SLIDE 20. EXPLAIN that paraphrasing means restating what someone has said, using different words. It confirms that the speaker and listener have the same understanding of what was said and lets the speaker know the listener has been paying close attention.
4. TELL participants that to begin paraphrasing, the following phrases may be used:
  - In other words, ...
  - What I’m hearing you say is ...
  - Do you mean ...?
5. Allow participants to experience the usefulness of paraphrasing by trying to follow directions with and without it.
  - ASK for two volunteers to come to the front of the room.
  - Take one volunteer (Volunteer B) to the front of the room and ask the person to stand with their back to the projected image. Volunteer B should not be able to see the screen.
  - SHOW SLIDE 21: EXPLAIN that this is Diagram A.

- SHOW the diagram to the rest of the class.
  - TELL Volunteer A they will instruct Volunteer B to draw the diagram on a flipchart. The rule is that instructions are given only once at each step.
  - Volunteer B is not allowed to ask or paraphrase the instructions for any clarification.
  - Have Volunteer A dictate to Volunteer B instructions for replicating the drawing on the flipchart.
  - The observers (other participants) need to make sure Volunteer B does not ask any questions. Post the completed replication on the wall.
  - ASK the volunteers how they felt during each part of the exercise. ASK the observers for additional ideas.
  - ASK for two new volunteers to repeat the exercise with Diagram B. Again, ask one volunteer to stand with their back to the screen.
  - SHOW SLIDE 22: EXPLAIN that this is Diagram B. Like before, Volunteer A will describe the diagram to Volunteer B. However, this time:
  - Volunteer B must paraphrase everything Volunteer A says to check understanding.
  - If Volunteer B has misunderstood, Volunteer A may give the instructions again.
  - Observers need to make sure Volunteer B does not ask any questions, but only uses paraphrasing. Post the second replication.
6. LEAD A DISCUSSION about how paraphrasing can be used during training by both the facilitator and by the participants.
  7. REFER participants to page 52 in *Workshop: Facilitation Skills for Trainers*.
  8. ASK participants to read through the list and consider which facilitation skills are the most difficult (which will require the most practice to do really well), which they think they already do, and which they think would be beneficial to do better or more often.

**Diagram A**



**Diagram B**



# SESSION 18: GIVING FEEDBACK

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<b>SESSION TIME</b>	85 minutes
<b>LEARNING OBJECTIVES</b>	By the end of this session, participants will be able to: <ul style="list-style-type: none"><li>• Explain the importance of giving feedback to trainees and those you supervise</li><li>• Demonstrate giving focused and specific positive feedback</li><li>• Demonstrate giving clear constructive feedback</li></ul>
<b>MATERIALS</b>	<ul style="list-style-type: none"><li>• Laptop, projector, and screen</li></ul>
<b>ADVANCE PREPARATION</b>	<ul style="list-style-type: none"><li>• Review and queue up slides to be projected:<ul style="list-style-type: none"><li>○ <i>Day 6 Giving Feedback</i></li></ul></li></ul>

## IMPORTANCE OF GIVING FEEDBACK TO TRAINEES AND THOSE YOU SUPERVISE (20 MIN)

1. SHOW SLIDES 1 and 2. EXPLAIN that as trainers and supervisors, we need to develop certain essential skills to help participants learn and improve their performance. For many people, one of the most challenging skill to master is the ability to give good feedback.
  - The purpose of feedback is to help a person to look more objectively at their own skills, knowledge or attitudes and modify their behavior or actions to improve performance.
  - Receiving feedback is an opportunity for people to ask questions; and receive support.
  - In the case of positive feedback, the purpose is to reinforce the behavior or actions so that people continue to perform in that manner.
  - As facilitators and supervisors, our goal is to give feedback that is supportive and specific. Good feedback should be motivating and help the trainees grow.



- If we don't provide feedback, our trainees and the people we supervise will not know if they are doing something well or if what they are doing needs to be changed.
2. ASK: Why are experienced supervisors—and people in general—reluctant to give feedback? What do people fear about the process?
    - Everyone should learn from feedback, but some find it difficult to hear. Some fear a negative response from the receiver, including a counterattack, over-sensitivity to the feedback, or dismissal because of they don't perceive the feedback is valid.
  3. REFER participants to page 55 in the Workbook on “Giving and Receiving High-Quality Feedback.”
  4. ALLOW five to ten minutes for the group to read the Workbook content.
  5. ANSWER any questions.
    - If needed, use examples to illustrate the feedback principles, but only if participants do not come up with good examples and you (the facilitator) believe there are points that are not clear.
  6. INTRODUCE activity:
    - We will take a few minutes to conduct an opinion poll.
    - TELL participants you will read some statements and they should decide whether the statements are true or false, based on what they have just heard.
      - If you believe the answer is true, please stand up (or remain standing).
      - If you believe the answer is false, sit down (or remain sitting).
      - Nobody may kneel or partly stand. You must either stand up or sit down.
  7. ASK everyone to rise as we begin the exercise.
  8. ASK the questions below. After each question, ask one or two people to explain why they chose their answers.

### TRUE/FALSE QUESTIONS

- High-quality feedback should be given as soon as possible after a performance.
  - **TRUE**
- When giving high-quality feedback, you should identify all possible areas to improve.
  - **FALSE:** Feedback should focus on the most actionable changes, not every possible problem.

- High-quality feedback should focus on the important feedback the receiver can use.
  - **TRUE**
- High-quality feedback should focus on the opinions and views of the person giving it.
  - **FALSE:** Feedback should focus on observations, not opinions.
- High-quality feedback focuses on points a person can actually use and should outline actions the receiver can take to improve.
  - **TRUE**
- High-quality feedback should include concrete examples of what you mean.
  - **TRUE**
- High-quality feedback may include statements about the receiver’s personality or personal traits.
  - **FALSE:** Feedback should focus on actions and behaviors, not personality.

## **APPROACHES TO GIVING FEEDBACK (20 MIN)**

1. SHOW SLIDE 3. EXPLAIN that giving high-quality feedback is not an accident; it requires thought and planning. These principles are important to remember when giving feedback.
2. SHOW SLIDES 4 to 6. SHARE some good practices in giving feedback:
  - Use the first person (“I think ...”; “I saw ...”; “I observed...”) and address specific actions that were observed.
  - Avoid words like “inappropriate,” “lazy,” and “terrible” because they are judgmental. When giving feedback, we also avoid words like “should” or “must.”
  - You are providing options or better choices to someone who can make the decision to take your advice or not. The more effectively the feedback is presented, the more likely it is that the receiver will value it.
  - Avoid using “but” or “however”; for example, “You correctly identified the mosquito, but ...” This tends to minimize the positive things you have mentioned.
3. SHOW SLIDE 7. MENTION that timing is also important for feedback. As we talked about earlier, feedback is effective when given as soon as possible after the event.
4. SHOW SLIDE 8. NOTE that in providing feedback, you are communicating a message to the other person. In order to effectively hear what the person is trying to communicate to you, it is important to use active listening techniques. Otherwise, you may not truly understand what the other person is asking or explaining and your response may not address the concern.

## ROLE PLAY: GIVING FEEDBACK (45 MIN)

1. SHOW SLIDE 9. TELL participants they will be working in pairs to conduct two role plays. REFER them to the Feedback Scenarios on page 54 of the Workbook.
2. ASK one person from each pair to raise their hand and INSTRUCT them that they will start in the role of the person giving feedback. Their partner will be the receiver of the feedback. Every pair will start with Scenario 1.
  - Give the group about 5 minutes to conduct the role play.
  - When the time has finished, the pair should discuss what went well.
3. SHOW SLIDE 10. ASK them to switch roles of giver/receiver.
  - Explain that every pair will now use Scenario 2.
  - Give pairs 5 minutes to conduct the second role play.
  - When the time has finished, the pair should discuss what went well.

## FEEDBACK SCENARIOS

**Scenario 1:** You are checking the mosquito specimens you have received from one of the communities. You notice that the vials are labeled inconsistently. In some cases, the label does not include the mosquito species; in other cases, the label is missing the date or the location of the collection. As the supervisor, you need to give this Community Mosquito Collector feedback on the importance of consistently accurately labeling each vial. How would you do this?

**Scenario 2:** You have discovered that a Community Mosquito Collector isn't always completely charging the CDC Light Trap battery before setting it up in a house. As the supervisor, you need to give this mosquito collector feedback on the importance of fully charging the battery so that the power doesn't run it during the night. How would you do this?

4. Briefly PROCESS the experience they just had. USE the following discussion questions:
  - What was the hardest part of giving feedback in these scenarios?
  - Which parts do you think are most applicable to your work? Are there some you would hesitate to use?
  - What is the impact of poorly given feedback on the receiver? On the giver?
5. REMIND participants that feedback is meant to build confidence, not destroy motivation or punish the individual. Giving feedback should include two-way communication. Remember to be positive and supportive, while giving feedback that is balanced.

6. NOTE that if we want to have a positive influence on our teams, we should be delivering more positives than negatives. In fact, it generally takes nine positive comments to balance out one negative comment.

# SESSION 19: PRACTICAL – IDENTIFYING HOUSES & COLLECTION OF ADULT MOSQUITOES

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<b>SESSION TIME</b>	60 minutes
<b>LEARNING OBJECTIVES</b>	<p>By the end of this session, participants will be able to:</p> <ul style="list-style-type: none"> <li>• List the consent and GPS activities to be completed before a house can be used for sampling</li> <li>• Collect adult mosquitoes using: <ul style="list-style-type: none"> <li>○ A CDC Light Trap</li> <li>○ Prokopack aspirator</li> <li>○ PSC method</li> </ul> </li> </ul>
<b>MATERIALS</b>	<ul style="list-style-type: none"> <li>• GPS units or software installed on smartphones</li> <li>• Consent forms (if needed in location)</li> <li>• Mosquito Collection forms</li> </ul>
<b>ADVANCE PREPARATION</b>	<ul style="list-style-type: none"> <li>• Consent received from community leader for approaching households</li> </ul>

## **DISTRICT FOCAL POINT’S ROLE IN IDENTIFYING HOUSES (20 MIN)**

1. **INTRODUCE** the session by **REMINDING** participants that part of the District Malaria Focal Point’s job description included: “Identify villages through GPS and communicate with village leadership for community-based entomology surveillance, Community Mosquito Collectors and houses for adult mosquito collection.”
2. **EXPLAIN**:
  - Before Community Mosquito Collectors can begin their work, the District Malaria Focal Point must talk with the community leader(s) to inform them

about the purpose of community entomology surveillance and obtain consent for sampling in the community.

- After consenting (usually done orally), community leaders will alert the rest of the community to ensure residents are aware that their house may be selected for this activity. District Malaria Focal Points should allow a day for this communication to be done.
  - The community leaders will also assist in selecting the community mosquito collector to support this initiative.
  - District Malaria Focal Points are responsible for:
    - Selecting the houses to be used for mosquito collection.
    - Obtaining consent from the head of the household to collect mosquitoes in the home.
    - Using a GPS unit or software on a smartphone to capture the GPS coordinator for each house.
    - Marking the door frame or door of the house with the house number using paint or a marker pen.
    - Creating a master list of all the houses in the community to be used for the sampling activity with their GPS coordinates and house numbers.
    - Communicating this information to the Community Mosquito Collector.
3. EXPLAIN that it is important to have this master list so that the mosquito collection can be done in the same houses throughout the year. This way it will be possible for them to data records can be used to track the mosquito activity in the same locations before and after vector control activities are implemented.
4. Although ideally mosquitoes will be collected from each house once per month, NOTE that this may differ depending on the location. Some locations may only have the budget for sampling during the peak transmission season.
- Generally, each Community Mosquito Collector will collect mosquitoes from:
    - Three houses a night
    - 10-20 nights per month (depending on location)
  - Therefore, collection will be done in 30-60 houses in the community every month

## **(FIELD) IDENTIFYING HOUSES/SETTING UP THE CDC LIGHT TRAP – PRACTICAL (120 MIN + TRAVEL TIME)**

1. PROVIDE instructions for the next practical:

- We will be traveling back to the field location to practice collecting adult mosquitoes. This will provide participants additional practice so that they become expert in this task.
  - Before they can perform any mosquito collection, they will need to identify the houses, obtain consent from the heads of the household, measure and record the GPS coordinates, and mark the door of each house with the house number.
  - Since they will be setting up three CDC Light Traps this evening and then collecting mosquitoes from the trap and also collecting using a Prokopack aspirator or PSC method tomorrow morning, they should complete the identification, consent, and recording process for six homes before beginning to set up the traps.
2. Upon arrival to the field location, GUIDE participants, as needed, in completing the activities associated with obtaining GPS coordinates, obtaining consent from households, and marking doors for six houses.
  3. SUPPORT participants, as needed, in setting up the CDC Light Traps.
  4. After providing logistical details for the next morning, dismiss participants for the day.

## **END OF DAY SIX**

# DAY SEVEN - COLLECTION OF ADULT MOSQUITOES (CONTINUED)

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<b>SESSION TIME</b>	90 minutes + travel
<b>LEARNING OBJECTIVES</b>	By the end of this session, participants will be able to: <ul style="list-style-type: none"><li>• Collect mosquitoes using the CDC Light Trap, Prokopack aspirator or PSC method</li></ul>
<b>MATERIALS</b>	<ul style="list-style-type: none"><li>• Mosquito collection materials</li></ul>
<b>ADVANCE PREPARATION</b>	<ul style="list-style-type: none"><li>• (Completed)</li></ul>

## COLLECTION OF ADULT MOSQUITOES (90 MIN)

1. GUIDE participants to the CDC Light Trap(s) set yesterday.
2. EXAMINE each trap. NOTE:
  - Is it still intact and is the fan and light still working properly?
  - Was it disturbed in any way?
  - If there were any problems, what was the likely cause? How could the trap have been set up to avoid this problem?
3. ASSIST participants, as needed, in removing and securing the collection bag, labelling the collection bag using masking tape with the household code and date, and recording the information on their data recording forms.
4. WALK with participants to the house identified the night before for collection of adult mosquitoes collecting using the PSC or Prokopack aspirator method.

## TRAVEL BACK TO THE INSECTARY

1. After arriving back at the insectary and moving specimens inside, INVITE participants to take a 30-minute break.



# SESSION 20: IDENTIFYING *ANOPHELES* MOSQUITOES TO SPECIES LEVEL

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<b>SESSION TIME</b>	6 hours (remainder of the day)
<b>LEARNING OBJECTIVES</b>	By the end of this session, participants will be able to: <ul style="list-style-type: none"> <li>• Demonstrate use of Coetzee pictorial key to correctly identify <i>Anopheles</i> adult mosquitoes to species level</li> </ul>
<b>MATERIALS</b>	<ul style="list-style-type: none"> <li>• Coetzee pictorial keys, one for each participant</li> <li>• Mosquito Data Collection forms</li> </ul>
<b>ADVANCE PREPARATION</b>	<ul style="list-style-type: none"> <li>• Prepared insectary</li> </ul>

## IDENTIFYING *ANOPHELES* MOSQUITOES TO SPECIES LEVEL (REMAINDER OF THE DAY)

### 1. INTRODUCE session.

- One of a District Malaria Focal Point's duties is to check and verify the morphological mosquito identification *An. gambiae* s.l. and *An. funestus* s.l. conducted by the Community Mosquito Collectors.
- Until you are comfortable with their mosquito identification skills, you should also spot-check the mosquitoes designated as *Aedes* and *Culex* that the Community Mosquito Collector includes as part of their specimen package.
- If there are any errors in either the mosquito identification, labelling of the vial, or data recording, you are to provide feedback to mosquito collectors so that they can specimens continue to learn and improve.
- However, it is your responsibility to open the vials labelled as "Other *Anopheles*" and identify them to the species level.
- To do so, you will need to use the Coetzee pictorial key for the morphological identification of adult female mosquitoes, which is the standard used by VectorLink entomologists.

2. NOTE that the pictorial key used last week to identify *An. gambiae* s.l. and *An. funestus* s.l. is a simplified key developed for Community Mosquito Collector with little or no background in science.
3. DISTRIBUTE the Coetzee pictorial keys.
4. NOTE that, unlike the simplified key, the Coetzee pictorial key contains illustrations rather than photos.
  - The key leads the user through a series of couplets, each giving two choices of mosquito body characteristics, until eventually reaching a species name.
  - The key you will be using is of the known *Anopheles* mosquito species in the Afrotropical Region.
  - It will take a while to become expert in using this key to make mosquito identifications, so you will be given lots of time to practice in this course.
5. INVITE participants to open up their specimens and begin the task of sorting through and distinguishing between the *Anopheles*, *Aedes*, and *Culex*, and then male and female mosquitoes, as they did during the first week.
6. After their sorting leaves just the *Anopheles* female mosquitoes, ASK participants to start using the Coetzee 2020 key to identify them to species level.
7. INSTRUCT participants that once they believe they have identified their specimen, they are to call over a facilitator to confirm their identification. They are then to record this information on their Mosquito Data Collection form.
8. REMIND participants when it is time for a lunch and afternoon break. They have the rest of the day to practice identifying mosquitoes.
9. DISMISS participants at the end of the day.

*Throughout this activity, facilitators should be moving among the participants, answering questions and providing guidance, as needed.*

## **END OF DAY SEVEN**

# DAY EIGHT/SESSION 21: PRACTICAL – IDENTIFICATION OF *ANOPHELES* MOSQUITOES

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<b>SESSION TIME</b>	All day
<b>LEARNING OBJECTIVES</b>	By the end of this session, participants will be able to: <ul style="list-style-type: none"><li>• Demonstrate use of Coetzee pictorial key in correct identification of Anopheles adult mosquitoes</li></ul>
<b>MATERIALS</b>	<ul style="list-style-type: none"><li>• Laptop, projector, and screen</li></ul>
<b>ADVANCE PREPARATION</b>	<ul style="list-style-type: none"><li>• Prepare insectary</li></ul>

## **PRACTICAL – IDENTIFICATION OF *ANOPHELES* MOSQUITOES (ALL DAY)**

1. WELCOME participants to Day Eight.
2. EXPLAIN that they will have the entire day to practice identifying mosquitoes.
  - You will alert them when it is time for a break or lunch.
  - Facilitators will be here to assist them and answer questions, as needed.
3. At the end of the day, DISMISS participants for the day.

## **END OF DAY EIGHT**

# DAY NINE/SESSION 22: RESISTANCE MONITORING AND PRACTICAL

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<b>SESSION TIME</b>	150 minutes (2.5 hours) – including exposure times
<b>LEARNING OBJECTIVES</b>	By the end of this session, participants will be able to: <ul style="list-style-type: none"><li>• Describe insecticide resistance and why it occurs</li><li>• Explain how WHO susceptibility bioassays are used</li></ul>
<b>MATERIALS</b>	<ul style="list-style-type: none"><li>• Laptop, projector, and screen</li><li>• WHO Tube Test Record forms</li></ul>
<b>ADVANCE PREPARATION</b>	<ul style="list-style-type: none"><li>• Review and queue up slides to be projected<ul style="list-style-type: none"><li>○ <i>Day 9 WHO Bioassay</i></li></ul></li><li>• Set up insectary for bioassay:<ul style="list-style-type: none"><li>○ Temperature is <math>25 \pm 2^{\circ}\text{C}</math></li><li>○ Relative Humidity is <math>80 \pm 10\%</math></li></ul></li></ul>

## RESISTANCE MONITORING (10 MIN)

1. SHOW SLIDES 1 and 2 to introduce the topic and REVIEW the objectives.
2. EXPLAIN that one of an entomologist's tasks is to monitor the mosquito population to determine the effectiveness of a mosquito control initiatives and if the mosquitoes are developing a resistance to the insecticides being used.
  - Usually, the first option selected by a control program is a cost-effective insecticide with high effectiveness against the mosquito populations, which also has a low-risk to human beings.
  - As resistance develops, more expensive or toxic options may need to be used.
3. REFER participants to page 59 in the Workbook for taking notes.
4. SHOW SLIDE 3 and DISCUSS how mosquito insecticide resistance develops.

- Insecticide resistance is a reduction in the ability of an insecticide product to kill mosquitoes.
- Primary resistance mechanisms are metabolic resistance, target-site resistance, and behavioral resistance.
- Metabolic resistance arises because of changes in a mosquito's enzyme systems that result in a more rapid detoxification of the insecticide than normal. The detoxification prevents the insecticide from reaching the intended site of action within the mosquito.
- Target-site resistance occurs when the protein receptor that the insecticide is designed to attack is altered by a mutation. When this happens, the insecticide can no longer bind to the intended target site of the receptor; thus, the insect is either unaffected or is less affected by the insecticide.
- Behavioral resistance occurs when mosquitoes start avoiding a certain location where they been previously. For example, an insecticide that causes irritability and increased activity can cause other mosquitoes to leave a sprayed surface proportion of insects acquiring a lethal dose.
- You know when a population is becoming resistant when a product – or class or products – no longer works, or only partially works.
- Entomologists need to test adult mosquitos to get baseline data before a vector control program is implemented, detect resistance at the earliest stage possible, and monitor the mosquito population throughout the vector control program.

## **WHO SUSCEPTIBILITY BIOASSAYS AND PRACTICAL (140 MIN)**

1. TRANSITION: One of your tasks will be to conduct World Health Organization (WHO) susceptibility bioassays tests with a VectorLink project entomologist.
2. SHOW SLIDE 4 and SAY. WHO tube test kits can be used to examine resistance from a number of different perspectives:
  - To detect the presence of insecticide resistant individuals in a mosquito population in terms of knockdown (KD) and mortality of mosquitoes
  - To assess the level of the resistance when confirmed (resistance intensity assay)
  - To gain insight into possible metabolic resistance mechanisms (synergist assay)
3. SAY: We will be learning how to conduct three WHO susceptibility bioassays.
4. SHOW SLIDES 5 and 6 and DEFINE: bioassay, synergist, PBO, knockdown, mortality, and exposure time.
5. EXPLAIN how PBO works:
  - PBO does not kill insects by itself.
  - Insects have enzymes in their bodies that break down some insecticides.
  - PBO inhibits some of these enzymes and allows insecticides more time to work.

- Insecticide reaches target and mosquito dies.
6. REFER participants to pages 60 to 68 in the Workbook for the SOP for the WHO susceptibility bioassay, intensity assay, and synergist assay.
  7. REVIEW the process with participants.
  8. INVITE participants to walk to the insectary.
  9. IDENTIFY the materials already prepared for the practical and DEMONSTRATE the procedures for the tests.
  10. GUIDE participants in conducting the assays. NOTE that the tests require exposing the mosquitoes to the synergist or insecticide for one hour and then waiting 24 hours for the results.
  11. After participants complete the test, DESCRIBE procedures for storing the tubes for 24 hours. Participants will analyze results tomorrow at this time.
  12. TELL participants to clean up the insectary from the bioassays and set up the insectary for more practice in identifying *Anopheles* mosquitoes.

# SESSION 23: PRACTICAL – IDENTIFICATION OF *ANOPHELES* MOSQUITOES

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<b>SESSION TIME</b>	All day
<b>LEARNING OBJECTIVES</b>	By the end of this session, participants will be able to: <ul style="list-style-type: none"><li>• Demonstrate use of Coetzee pictorial key in correct identification of Anopheles adult mosquitoes</li></ul>
<b>MATERIALS</b>	<ul style="list-style-type: none"><li>• Laptop, projector, and screen</li></ul>
<b>ADVANCE PREPARATION</b>	<ul style="list-style-type: none"><li>• Set up insectary</li></ul>

## **PRACTICAL – IDENTIFICATION OF *ANOPHELES* MOSQUITOES (ALL DAY)**

1. EXPLAIN that participants will have the remainder of the day to practice identifying mosquitoes.
  - You will alert them when it is time for a break or lunch.
  - Facilitators will be here to assist them and answer questions, as needed.
2. At the end of the day, DISMISS participants for the day.

**END OF DAY NINE**

# DAY TEN/SESSION 24: WHO INSECTICIDE SUSCEPTIBILITY BIOASSAY RESULTS

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<b>SESSION TIME</b>	60 minutes
<b>LEARNING OBJECTIVES</b>	By the end of this session, participants will be able to: <ul style="list-style-type: none"><li>• Interpret the data from the assay</li></ul>
<b>MATERIALS</b>	<ul style="list-style-type: none"><li>• See list of materials in front of this Facilitator Guide</li></ul>
<b>ADVANCE PREPARATION</b>	<ul style="list-style-type: none"><li>• Set up insectary</li></ul>

## **WHO INSECTICIDE SUSCEPTIBILITY BIOASSAY – PRACTICAL (60 MIN)**

1. REFER participants to their Workbook pages 60 to 68 and their WHO Tube Test Record forms to continue with bioassays.



# SESSION 25: SUPERVISING COMMUNITY MOSQUITO COLLECTORS

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<b>SESSION TIME</b>	60 minutes
<b>LEARNING OBJECTIVES</b>	By the end of this session, participants will be able to: <ul style="list-style-type: none"><li>• Describe the characteristics of a good supervisors</li><li>• Explain good practices in leadership</li><li>• Define harassment</li><li>• Describe how to respond to harassment</li></ul>
<b>MATERIALS</b>	<ul style="list-style-type: none"><li>• Flipchart paper, stand, and markers</li><li>• Laptop, projector, and screen</li></ul>
<b>ADVANCE PREPARATION</b>	<ul style="list-style-type: none"><li>• Review and queue up slides to be projected:<ul style="list-style-type: none"><li>○ <i>Day 10 Supervision</i></li></ul></li></ul>

## MY BEST BOSS (25 MIN)

1. SHOW SLIDES 1 and 2. INTRODUCE the session and REVIEW session objectives.
2. NOTE that we have already gone over the various ways that you will be supervising, training, and supporting your team of Community Mosquito Collectors. What we will be discussing now will be the way you perform your responsibilities – your behaviors as a supervisor.
3. BREAK participants into small teams of two or three.
4. GIVE each team a piece of flipchart paper and some markers.
5. ASK participants to close their eyes and picture in their minds the best boss they have ever had.
  - What characteristics did that individual have?
  - What did they say or do that made them such a great supervisor?
  - GIVE participants a minute to think and then ASK them to open their eyes.

6. TELL participants to briefly share their positive experiences in their teams. Then DEVELOP a list on the flipchart of the characteristics they have observed in their excellent supervisors.
7. GIVE the groups about 10 minutes to work.
8. DEBRIEF as a group, having each team share two or three key characteristics of their favorite bosses.
9. ASK participants if they have ever had a bad experience with a supervisor. ALLOW one or two people to share, REMINDING them not to use names.
10. ASK the group if any characteristics that came out of these stories that reflect poor supervisory skills.
11. POST the list of positive supervisor attributes in the room and TELL the group that as we supervise, we should be aware of both the positive attributes and the negative characteristics of bosses and adjust how we function accordingly.
12. NOTE that their role as supervisor will be a little more nuanced as they will not be in the same location as the Community Mosquito Collectors within their district.

## **YOUR ROLE AS SUPERVISOR (30 MIN)**

1. ASK: What do you know about the role as supervisor of the Community Mosquito Collectors? What are some of the things you already know you will be responsible for? RECORD responses on a flipchart and CORRECT any misconceptions about the role as you go. Answers should include:
  - Striving for continuous quality improvement
  - Creating a culture where giving and receiving feedback is welcome
  - Answering questions about work
  - Traveling to field locations to observe/assist work on a biweekly or monthly basis (depending on location).
  - Verifying that forms are completed correctly, labels are done correctly, mosquitoes' identifications are accurate
  - Ensuring a safe work environment for all
2. ASK: What are your expectations of the people who you supervise? Consider how often/how you will communicate, timeliness in collecting samples from assigned houses, quality of work, etc.
3. ASK participants to reflect on this question and REFER participants to page 67 to write down their expectations.
  - People will not know what you expect of them unless you tell them.
  - Ask the people you supervise what they expect of you and how you can support them.
4. SHOW SLIDE 3 and INTRODUCE good practices in leadership:

- Articulate your expectations (as discussed above)
  - Lead by example
5. ASK: What do you think we mean by “lead by example”? ALLOW a few responses, then EXPLAIN that anything they ask their employees to do they should also do. This builds confidence in their knowledge and leadership, and builds trust.
    - Give credit to your employees
  6. ASK: What do you think this means? And why is it important? ALLOW a few responses, then EXPLAIN that sincere public praising of your team’s work and giving credit to individuals and the team for good work increases motivation and trust. Your employees will work harder and better for you when they receive credit and appreciation for their efforts.
    - Be available and provide support
  7. ASK: What do we mean by this? EXPLAIN that when Community Mosquito Collectors feel they can ask questions and ask for help without reprimand or feeling like they will “get in trouble,” this also builds confidence and trust. This will encourage your collectors to come to you for help before small problems become big problems.
    - Hold the Community Mosquito Collectors accountable
  8. ASK: What do we mean by holding them accountable? EXPLAIN that the target collections are your responsibility and Community Mosquito Collectors should complete them.
    - Be gender aware
  9. ASK: What do we mean by “be gender aware”? EXPLAIN that being gender aware is having the ability to view society from the perspective of gender roles and understating how this has affected women’s needs in comparison to the needs of men.
  10. CONTINUE: Women can also be Community Mosquito Collectors. In some situations, this may be a benefit.
  1. ASK: What benefits can there be to having female Community Mosquito Collectors? ENSURE the following points are mentioned:
    - Some households may find it more acceptable to have a female mosquito collector enter the house.
    - Women provide different perspectives that can yield more solutions.
    - Women in the community could feel more comfortable speaking directly with another woman about the process.

## RESPONDING TO HARASSMENT (25 MIN)

1. **TRANSITION:** Since Community Mosquito Collectors can be either male or female, it is a supervisor's role to ensure there is a harassment-free workplace. Supervisors should be prepared to respond to harassment when they see it happening.
  - Harassment can be verbal or physical. It could be sexual in nature, or focus on race, religion, origin, or other differences.
  - Harassment is unwelcome and could involve sexual jokes, touching, threats to employment, or bribery.
  - Everyone has the right to be respected at work.
2. **HIGHLIGHT** that, as supervisors, we have a responsibility to set a positive example with our own behavior and address potential problems before members of our team are harmed.
  - Let your team know you will not tolerate harassment of any kind.
  - Encourage everyone to report harassment they see or experience. They can report it to you, the gender focal person, or anyone else in a leadership role.
  - When harassment is ignored, it damages everyone's productivity.
3. **HIGHLIGHT** some situations where harassment can happen:
  - Harassment can happen anywhere, with anyone.
  - Men can harass women. Women can also harass men. A person can harass someone of the same gender.
  - A supervisor could harass a team member.
  - In communities and in households, individuals could harass or threaten the Community Mosquito Collectors.
4. **SHOW SLIDE 4. INVITE** the team to imagine the scenario. **DISCUSS** how you should respond.
5. **EXPLAIN** the following key points, if they are not mentioned in the discussion.
  - If you are in a leadership position and someone reports harassment, you must act. Doing nothing legitimizes the harassment and allows it to continue.
  - First, ask the person reporting harassment for details: What behavior did they actually observe? How often has it happened? Who else might have witnessed it? Has anyone asked the harasser to stop?
  - Capture the details in writing, so you have them for reference later.

The District Malaria Focal Point should inform their VectorLink focal person so that the program is aware of the situation and can prepare the appropriate paperwork for formal reporting.

- If the Community Mosquito Collector is a community member, which is likely, alert the village elder.

# SESSION 26: WORKSHOP REVIEW

## SESSION & POST-COURSE ASSESSMENT

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<b>SESSION TIME</b>	<ul style="list-style-type: none"><li>• 90 minutes (review) + 30 minutes (post-test)</li></ul>
<b>LEARNING OBJECTIVES</b>	<ul style="list-style-type: none"><li>• None</li></ul>
<b>MATERIALS</b>	<ul style="list-style-type: none"><li>• Laptop, projector, and screen (if applicable)</li><li>• Post-course assessment?</li></ul>
<b>ADVANCE PREPARATION</b>	<ul style="list-style-type: none"><li>• Prepare questions for review activity (either on paper, cards, or on slides)</li></ul>

### REVIEW ACTIVITY (90 MIN)

1. TELL participants we will now have an interactive review activity of the key content covered in the class.
2. The rules for this review are as follows:
  - Participants will put away their Participant Workbooks for this activity.
  - Participants are divided into 3 groups. Those will be considered the “teams” for this activity.
  - Designate one team to be Team 1, another Team 2, and another Team 3. This will be the order in which we proceed.
  - You will ask Team 1 question. They have 15 seconds to answer that question. If they are correct, they get a point. If they are incorrect, the question is open to the rest of the class. The table that has a participant raise his/her hand first has the opportunity to answer the question. If that Team is correct, they get a point. If not, the question is open to the remaining table. If they are correct, they get a point.
  - Regardless of which team answered the last question correctly, continue the standard order and ask Team 2 a question.

- Continue until all questions are exhausted.
  - The team with the most points wins
3. INVITE participants to take a one-hour lunch break.

### **POST- COURSE ASSESSMENT (30 MIN)**

1. TELL participants that it is now time for the post- course assessment.
2. DISTRIBUTE the assessment to participants. ENSURE you explain to them that this is not a test for passing the class, it is simply for course owners to assess the level of knowledge gained by taking this course. This information will be used to adjust the content and methodology, as needed, so that the class can be continuously improved for future groups.
3. ASK participants to use the same number as they used on the pre-assessment.
4. COLLECT the assessment as each participant completes it.
5. ASK participants to remain in the room until all complete the assessment.

# CLOSING

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<b>SESSION TIME</b>	<ul style="list-style-type: none"><li>• 30 minutes</li></ul>
<b>LEARNING OBJECTIVES</b>	<ul style="list-style-type: none"><li>• None</li></ul>
<b>MATERIALS</b>	<ul style="list-style-type: none"><li>• Certificates</li></ul>
<b>ADVANCE PREPARATION</b>	<ul style="list-style-type: none"><li>• Prepare certificates with the course name and names of each participant</li><li>• (If applicable) Invite a dignitary or program representative to give brief closing remarks</li></ul>

## **CLOSING THE WORKSHOP (30 MIN)**

1. **THANK** participants for their efforts throughout the workshop.
2. **OFFER** any insights or feedback about on the group as a whole. Try to make it personal, encouraging, and insightful. For example, did this group stand out in some way? Were they particularly energetic or did they work very hard? Did they embrace a certain part of the training program with enthusiasm? Did they show patience through challenges?
3. **INVITE** a dignitary or program representative to give closing remarks.
4. **PRESENT** certificates to participants.