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U.S. President's Malaria Initiative

GUIDING VECTOR CONTROL THROUGH COMMUNITY ENTOMOLOGICAL SURVEILLANCE

A WORKSHOP FOR COMMUNITY MOSQUITO COLLECTORS

FACILITATOR'S GUIDE

SEPTEMBER 2020



Recommended Citation: 2020. *Guiding Vector Control Through Community Entomological Surveillance: Facilitator's Guide*. Developed for the United States Agency for International Development (USAID)/President's Malaria Initiative (PMI) under the PMI VectorLink Project by Abt Associates Inc. and EnCompass LLC.

Contract: AID-OAA-I-17-00008

Task Order: Vector Control Task Order 49283

Submitted to: United States Agency for International Development/President's Malaria Initiative

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ACRONYMS

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

GOAL AND OBJECTIVES

Course Length

5 days

Course Goal

This workshop is designed to prepare Community Mosquito Collectors to successfully complete the essential functions of their positions.

Course Objectives

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

- Explain the importance of entomological surveillance in malaria vector control
- Identify and differentiate the main malaria-carrying mosquitoes (*An. gambiae* s.l. and *An. funestus* s.l.) from other *Anopheles* mosquitoes¹
- Explain how to collect indoor resting mosquitoes using pyrethrum spray catch (PSC) and/or Prokopack aspirator
- Demonstrate the use of the CDC Light Trap to collect adult mosquitoes
- Demonstrate the use of dippers and pipettes to collect mosquito larvae
- Explain how to rear larvae to adult mosquitoes
- Explain how to correctly fill out required data collection forms for larvae and adult mosquitoes
- Describe how to label and preserve adult mosquitoes for further species identification or laboratory analysis

¹ NOTE that the language of this bullet is simplified in the materials for participants, as they will not have a science or entomological background.

DESCRIPTION OF PARTICIPANTS AND TRAINERS

Participants

- Participants in this training should generally have completed their secondary school education. They are not expected to have any science or entomology training or experience.
- Recommended number of participants for this course: 10-20

Trainers

- Trainers should have, at the minimum, completed secondary school with science subjects and worked for at least three years in the field of malaria related entomology. Trainers will be VectorLink entomologists.
- Recommended number of trainers for this course: At least 2

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. If scores are low (e.g. <70%) it will be necessary for VectorLink technicians to provide further training on areas of weakness while conducting close supervision during initial data collection. Alternatively it may be desirable to train 2 community-based collectors per site and employ the best performer during training, with the second person being a back-up in case of illness or covering during vacation.

Time Allocated for Assessment

20 minutes

PROPOSED WORKSHOP AGENDA (TO BE TAILORED TO LOCATION)

GUIDING VECTOR CONTROL THROUGH COMMUNITY ENTOMOLOGICAL SURVEILLANCE: A WORKSHOP FOR COMMUNITY MOSQUITO COLLECTORS

	DAY ONE	DAY TWO	DAY THREE	DAY FOUR	DAY FIVE
AM	<p>Opening Session</p> <p>Pre- Workshop Assessment</p> <p>Session 1: Malaria & Your Role</p>	<p>Review of Day One</p> <p>Session 5: Identification of Malaria-carrying Mosquitoes</p> <p>Session 6: Practical – Identifying adult Mosquitoes</p>	<p>(Field) Collection of Adult Mosquitoes (continued)</p>	<p>(Field) Collection of Adult Mosquitoes (continued)</p>	<p>(Field) Session 12: Practical – Collecting <i>Anopheles</i> Larvae</p> <p>Session 13: Practical – Sorting <i>Anopheles</i> Larvae</p> <p>Session 14: Workshop Review & Post-Workshop Assessment</p>
LUNCH					
PM	<p>Session 2: Mosquito Lifecycle</p> <p>Session 3: Adult Mosquitoes</p> <p>Session 4: Rearing Mosquitoes from Larvae to Adult</p>	<p>Session 7: Adult Mosquito Collection</p> <p>(Field) Session 8: Practical - Setting up CDC Miniature Light Traps</p>	<p>Session 9: Practical - Identifying Adult Mosquitoes</p> <p>(Field) Session 10: Second Practical – Setting up CDC Miniature Light Traps</p>	<p>Session 11: Second Practical – Identifying Adult Mosquitoes</p>	<p>Post- Workshop assessment (continued)</p> <p>Closing</p>

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

COURSE PREPARATION

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 (3-8 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

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
- 30cm³ 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

PRINTING INSTRUCTIONS

Print 1 Copy for Each Facilitator

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

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

- Participant Workbook
- Course agenda (to be tailored to location)
- Pre- and post- workshop assessments (1 each per participant)
- Mosquito Data Collection Instructions form
- Mosquito Data Collection forms (up to 7 copies for each participant, depending on number of collection methods used at location)
- Household Characteristics Examples (to be tailored to each country)

DAY ONE: OPENING SESSION

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

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.
2. INTRODUCE the guest speaker. The guest speaker opens the training, emphasizing the importance of entomology for malaria prevention and providing encouragement for participants. The guest speaker should be someone in a position of local leadership within the health or political system.
3. After the guest speaker completes the opening remarks, WELCOME participants to the workshop. INTRODUCE yourself and briefly give your background in entomology and malaria.
4. THANK participants for their willingness to perform their new role as Community Mosquito Collectors. They will serve an important part of a larger program to control mosquitoes who transmit malaria to humans. Monitoring the mosquito population in their local areas and giving this information to the district-level entomologists will

make sure that they will use the most effective ways to control the malaria-carrying mosquito population.

5. HAND OUT the course agenda and briefly explain the plan for the week and logistical information appropriate to that location (details about lunch, toilets, etc.).
6. EXPLAIN the purpose of their Participant Workbook, as a resource guide, a workbook for workshop activities, and a place to take notes.
7. 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.
 - Name
 - Village or community (if some participants travelled from other places to attend this workshop)
 - Why you decided to work as a Community Mosquito Collector
 - One interesting fact about you that others don't know
8. 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 perspective on their areas of expertise on relevant topics.
9. SHOW SLIDES 3 and 4 and REVIEW the workshop goal and objectives.
10. REASSURE participants that do not need to have any previous knowledge of entomology – the study of insects. We will teach them everything they will need 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.
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 20 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 go for their 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

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

SESSION OBJECTIVES (5 MIN)

1. WELCOME participants back from break.
2. SHOW SLIDE 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 93% of cases and 94% of all deaths caused by malaria. TRUE: As reported in the World Malaria Report 2019.
 - 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 Panadol 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.
- INVITE participants to return to their seats.

CONTROLLING MALARIA (45 MIN)

1. SHOW SLIDE 7 and explain 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 the 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.
2. 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?
3. 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.
4. SUM up by saying that, as they can see, there are many different ways to control the transmission of malaria. However, in their role as Community Mosquito Collectors, they will be focusing their work on the malaria-carrying mosquitoes.
5. ASK if anyone knows what "entomology" is. SHOW SLIDE 8 with the definition of "entomology" and an "entomologist."
6. 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
7. SAY: Most entomologists focus on a particular type of insect. ASK: What information do they think an entomologist focusing on mosquitoes would they need in order to accomplish what we just discussed?
 8. CAPTURE responses on a flipchart. Answers to include where mosquitoes live, identifying the different types of mosquitoes, when mosquitoes are active, etc.
 9. 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 and eliminate these insect populations.
 10. REFER participants to page 5 in the Workbook to take notes.
 11. ASK: When the district conducts activities to control 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.
 12. EXPLAIN:
 - It is critical to monitor the local mosquito populations to inform selection of the right ways to control malaria-carrying mosquitoes and also to see if those activities, when conducted, 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 information to entomologists so that they have the information they need to design effective vector control interventions
 13. 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.
 14. REFER participants to page 6 in the Workbook with a job description for a Community Mosquito Collector.

15. EMPHASIZE that they will be working closely with the district malaria focal person and that this person will be supporting them.
16. SHOW SLIDE 10 and GO OVER the ways the district focal person will be supporting Community Mosquito Collectors as part of community-based entomological surveillance.
17. INVITE participants to take a one-hour lunch. When we return, we will be talking about mosquito lifecycles.

SESSION 2:

MOSQUITO LIFECYCLE

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

CLASSIFICATION OF MOSQUITOES (10 MIN)

1. SHOW SLIDES 11 and 12: INTRODUCE the session and its objectives.
2. SAY: In your job as a Community Mosquito Collector, you will need to identify an adult mosquito down to its species level.
3. ASK: Does anyone know what this means? PAUSE to see if there are any (correct) responses. If so, integrate them in your explanation. If not, continue by saying: To

better understand what this means, let's discuss how scientists organize all animals into groups.

4. SHOW SLIDE 13: EXPLAIN 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.
5. USE the example of human beings as an introduction to the groups.
6. EXPLAIN that, as Community Mosquito Collectors, 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.
7. 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 pages 8 to 9 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.

- 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 4 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.

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 other *Culex* mosquitoes during these phases.
2. ADD that Community Mosquito Collectors will need to identify, collect, and rear *Anopheles* larvae to adult mosquitoes.
3. 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 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*.
4. SAY: Earlier, we mentioned that different types of mosquitoes prefer different types of water to lay their eggs. Let's take look at these differences in how *Anopheles*, *Aedes*, and *Culex* mosquitoes lay their eggs.
5. SHOW SLIDE 17 of typical *Aedes* breeding locations. ASK: Based on these photos, how would you describe the breeding locations that the *Aedes* mosquitoes prefer? Answer is small containers of water (such as small cans, car tires, flower pots and tree holes).
6. 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.
7. SHOW SLIDE 19 of typical *Anopheles gambiae* breeding locations. ASK: Based on these photos, how would you describe the breeding locations that this *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.
8. ADD: Unfortunately for those looking for a specific type of mosquito, mosquitoes can change their behavior and all genus genera can be found in any type of water, sometimes even in the same place at the same time.
9. SHOW SLIDE 20 and ask participants what characteristics do they notice about *Anopheles* eggs. Answer is: laid singly, with floats, on top of water.

10. 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.
11. 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.
12. 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.
13. 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

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

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.
 - 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* the palpi are as long as proboscis, while in the other (female) *Mansonia* mosquito the palpi are very short.
 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 when they collect mosquito samples is only useful if the mosquitoes are correctly identified to see if they are actually those mosquitoes that transmit malaria or not.
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 15 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*.
 - Most obviously, common *Aedes* mosquitoes are the easiest to identify. They are black and have white patches.

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

1. TRANSITION: The last thing that Community Mosquito Collector will need to know 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

SESSION TIME	80 minutes (1 hour 10 minutes)
LEARNING OBJECTIVES	By the end of this session, participants will be able to: <ul style="list-style-type: none"> List the materials you need to raise larvae to adult mosquitoes Explain how to raise larvae to adult mosquitoes
MATERIALS	<ul style="list-style-type: none"> Flipcharts and markers
ADVANCE PREPARATION	<ul style="list-style-type: none"> Set up an insectary in the classroom or another part of the building where the class is held

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 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 16 and 17 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

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

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

SESSION TIME	45 minutes
LEARNING OBJECTIVES	<p>By the end of this session, participants will be able to:</p> <ul style="list-style-type: none"> • Describe the major external features of <i>Anopheles</i> used for species identification • 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
MATERIALS	<ul style="list-style-type: none"> • Laptop, projector, and screen • Flipcharts and markers
ADVANCE PREPARATION	<ul style="list-style-type: none"> • Review and queue the slide set: <ul style="list-style-type: none"> ○ <i>Day 2 Comm Mosq Collector</i>

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 lapsable 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: As Community Mosquito Collectors, after they 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.
 - 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 Anophelines 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 25-26 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.
 - The District Malaria Focal Point is there to support them. If they find characteristics that are not noted on the guide, or have questions, they can contact them for help.
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

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

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. ANSWER any questions participants may have from their experiences in the field.

3. 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.
4. 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.

5. INVITE groups to use pictures on pages 11 and notes on page 14 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 15 and noting how they arrived at this determination.
6. Each participant (or small group) will rotate through all the stations, spending no more than 5 minutes per station.
7. 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.
8. 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?
9. EMPHASIZE that making errors is normal. It will take practice to be able to successfully make these identifications.
10. 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.
4. This time, each participant/group will stay at one station. Groups will have 10-15 minutes to identify the species of their specimen.

5. 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.
6. 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?
7. 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

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

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” and how this is part of the role of the Community Mosquito Collector. Their role will require them 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
 8. REFER participants to pages 27-29 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 30-33 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 34-36 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. The traps will be left out for participants to look at during the break.
 - 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 9am (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 person.
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

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

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

4. 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.
5. 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

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.

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?
 - 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 light trap 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. 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

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. 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.
7. 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.
8. 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

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

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)

4. 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

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.

5. WELCOME participants to Day Four of the class
6. TELL them that we are now going to retrieve the trap(s) we set up yesterday.
7. ENSURE that participants have pencils and record keeping forms.
8. GUIDE participants to the CDC Light Trap(s) set yesterday.
9. Before examining each trap, REVIEW how each trap works and note its location.
10. 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?
11. 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.)
12. 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?
13. ENSURE that all relevant information is captured on the Mosquito Data Collection forms.
14. PLACE bags into vehicle for transport.
15. 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 that were provided on day one. 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

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

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 - SESSION 12: PRACTICAL – COLLECTING *ANOPHELES* LARVAE

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

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 ideally be very close to the classroom building.)
1. 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.
2. 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.
3. ASK participants to assess the location and identify appropriate places and methods to collect samples using a dipper.
4. DISTRIBUTE dippers to the participants.
5. 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.
6. 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

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

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: WORKSHOP REVIEW

SESSION & POST-COURSE ASSESSMENT

SESSION TIME	<ul style="list-style-type: none">• 60 minutes (review) + 30 minutes (post-test)
LEARNING OBJECTIVES	<ul style="list-style-type: none">• None
MATERIALS	<ul style="list-style-type: none">• Laptop, projector, and screen (if applicable)• Printed post-course assessment
ADVANCE PREPARATION	<ul style="list-style-type: none">• Queue up PowerPoint slide deck:<ul style="list-style-type: none">○ <i>Workshop Review</i>

REVIEW ACTIVITY (60 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. ASKS participants to remain in the room until all complete the assessment.

CLOSING

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

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.

ANNEX 1. COMMUNITY MOSQUITO COLLECTORS JOB DESCRIPTION

Position:	Community-based mosquito collector
Location:	Community
Contract:	PMI VectorLink Project
Supervisor:	District Malaria Focal Point

Under the supervision of the District Malaria Focal Point, the Community-based Mosquito Collector will be responsible for implementation of community-based data collection for the VectorLink Project. The Community-Based Mosquito Collector does not need to have prior mosquito knowledge and will be provided with basic entomology training and necessary equipment.

Specific duties and responsibilities include the following:

- Create and maintain positive relationships with community members and leaders.
- Conduct timely mosquito data collection from houses in the local community.
- Identify morphologically all mosquitoes collected to species level.
- Record data for every collection on data collection forms.
- Store mosquitoes in individual tubes and accurately label each tube.
- Conduct daily charging of light trap batteries and ensure equipment is well maintained and cleaned.
- Transfer all data forms and mosquito samples periodically to the District Entomology Supervisor or VectorLink Entomology Technician.
- Liaise with the District Entomology Supervisor and VectorLink Entomology Technician to ensure data quality.
- Conduct periodic larval collections and rear larvae to adult stage ready for susceptibility testing.
- Provide assistance to the District Entomology Supervisor and VectorLink Entomology Technicians to conduct insecticide susceptibility tests.

Qualification requirements include the following:

- Secondary School passes (desirable).

- Must be able to read and write.
- Should be employed within the local Government Health Network, for example as a Community Health Worker or similar.
- Satisfactory completion of basic entomology training (to be provided by VectorLink).

ANNEX 2. DISTRICT MALARIA FOCAL POINT JOB DESCRIPTION

Position:	District Malaria Focal Point
Location:	Community
Contract:	PMI VectorLink Project

Under the supervision of the district health department, National Malaria Control Program, and the President's Malaria Initiative (PMI) VectorLink (VL) project entomologist, the District Malaria Focal Point will support and oversee the implementation of the entomology community-based data collection and the Community Mosquito Collectors of the VectorLink Project. The District Malaria Focal Point will be provided with a basic entomology training and necessary equipment.

Specific duties and responsibilities, in collaboration with the district health department, National Malaria Control Program, and VectorLink project entomologist, include the following:

- Identify villages through GPS and communicate with village leadership for community-based entomology surveillance, Community Mosquito Collectors and houses for adult mosquito collection.
- Conduct initial and on-the job training of Community Mosquito Collectors.
- Prepare lists of entomology equipment and supplies needed for the field data collection, VL will procure supplies request for procurement on time and distribute the materials and supplies to Community Mosquito Collectors when received.
- Supervise field entomological data collection by the Community Mosquito Collectors.
- Check the completeness and accuracy of completed data collection forms submitted by the Community Mosquito Collectors to ensure quality control.
- Verify morphological mosquito identification *An. gambiae* s.l. and *An. funestus* s.l. conducted by the Community Mosquito Collectors. When misidentification of mosquitoes is observed, provide on the job training and feedback to improve the skills of the Community Mosquito Collectors continuously.
- Conduct morphological identifications of all female *Anopheles* mosquitoes classified as other *Anopheles* by the Community Mosquito Collectors using standard mosquito identification key and stereoscopic microscope.

- Complete community mosquito data identification form with a high percentage of accuracy.
- Conduct WHO susceptibility bioassay tests with project entomologist.
- Package, accurately label and submit mosquito samples to the VVL project.
- Share data with VL entomologist for entry into the project database.
- Assess the linkage of entomological and epidemiological data

Qualification requirements include:

- Secondary School (minimum),
- 2 years of relevant experience in participating to local public health activities (Vaccination, ITN distribution, community health education, etc....)
- Basic knowledge in GPS measurement data collection and using of mobile phone
- Experience in mosquito collection through the different PMI projects (desired) or being the malaria focal point of the district