Smithsonian | SCIENCE *for Global Goals*

MOSQUITO!

COMMUNITY RESEARCH GUIDE

HOW CAN WE
ENSURE HEALTH FOR ALL
FROM MOSQUITO-BORNE DISEASES?

developed by
Smithsonian
Science Education Center

in collaboration with
iap SCIENCE RESEARCH HEALTH
the interacademy partnership

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Mosquito!
How Can We Ensure Health for All from Mosquito-borne Diseases?

Community Research Guide

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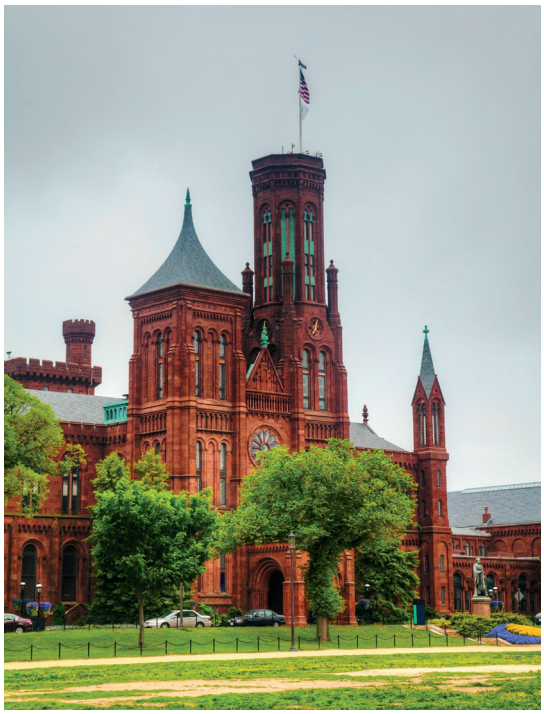
Smithsonian Science Education Center

The Smithsonian Science Education Center (SSEC) is operated by the Smithsonian Institution to improve the teaching and learning of science for students in the United States and throughout the world. The SSEC disseminates information about exemplary teaching resources, develops curriculum materials, supports the professional growth of science teachers and school leaders, and conducts outreach programs of leadership development and technical assistance to help school districts implement inquiry-centered science programs. Its mission is to transform the teaching and learning of science in a world of unprecedented scientific and technological change.

Smithsonian Institution

The Smithsonian Institution was created by an Act of Congress in 1846 " for the increase and diffusion of knowledge…" This independent federal establishment is the world's largest museum, education, and research complex and is responsible for public and scholarly activities, exhibitions, and research projects nationwide and overseas. Among the objectives of the Smithsonian is the application of its unique resources to enhance elementary and secondary education.



Smithsonian Science for Global Goals (SSfGG) is a freely available curriculum developed by the Smithsonian Science Education Center (SSEC) in collaboration with the InterAcademy Partnership. It uses the United Nations Sustainable Development Goals (SDGs) as a framework to focus on sustainable actions that are student-defined and implemented.

Attempting to empower the next generation of decision makers capable of making the right choices about the complex socio-scientific issues facing human society, **SSfGG** blends together previous practices in Inquiry-Based Science Education (IBSE), Social Studies Education (SSE), Global Citizenship Education (GCE), Social Emotional Learning (SEL), and Education for Sustainable Development (ESD).

Thank You to our Curriculum Development Team

Smithsonian Tropical Research Institute

Smithsonian *Learning Lab*

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the interacademy partnership

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WRBU
Walter Reed Biosystematics Unit
Know the vector, know the threat

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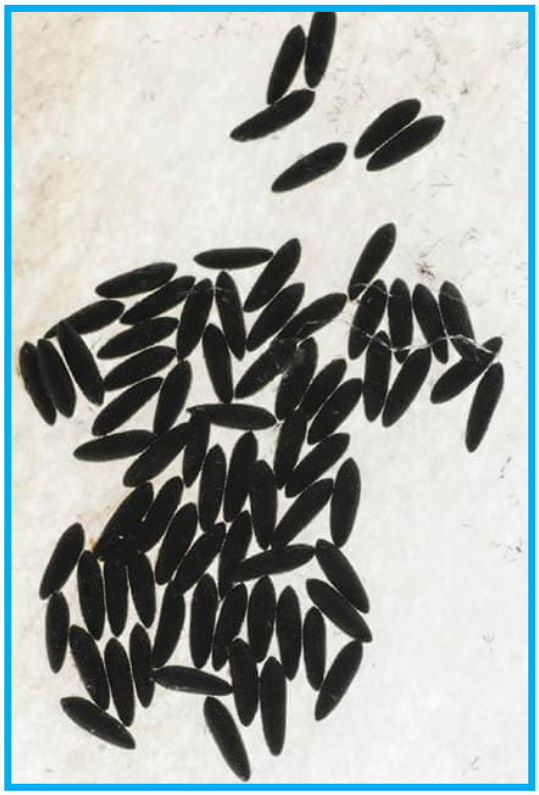

Look at these pictures. What do you See? Share!

Welcome to the Team

Read this together as a team.

Look into the face of the mosquito. What do you see? You might be familiar with this insect. Have you ever seen one this close? Raise your hand if you know about mosquitoes. Quickly share something you know about mosquitoes. You will have more time later to share what you know about mosquitoes.

This tiny insect is making some big problems around the world. It may be making problems with people where you live. Or it may be making problems far from your home. Or the problem might be coming to you in the future. Does anyone know about some problems caused by mosquitoes? Do not worry if you are not familiar with any problems. We will have more time to talk about those later.

Many of these problems are not easy to understand. There are many things we do not know about mosquitoes and people. There is also not a single solution to solve the problems they create. There are many possible solutions we must consider. Since there are many solutions, there are many decisions to be made. Sometimes, making decisions about what to do is difficult. What do you do when you have to make a difficult decision? Quickly share some ideas as a team.

This is why we are asking you to join a research team. We need your team to help your local community make some decisions. We need your creativity and strength as a team. Your team has a leader who will help guide the research team. Your team leader is here to help, but does not have all the answers or solutions. The team leader also does not know all the decisions that need to be made. You will have to work as a team to figure these out together.

This may be confusing. But do not worry. The team is here to help. First we must understand some basics of this community research guide. Go over the research storyline as a team on the following pages.

Notes:

Mosquito! Community Research Guide Storyline

The community research guide has seven customizable parts.

Part 1: Problem
In this part, the team will begin defining the research problem and setting up your local research plans. To do this the team will need to learn more about the team members, different perspectives, and questions you will work to answer during your research.

Part 2: Community
In this part, the team will focus on collecting evidence about what the local community thinks and knows about mosquitoes. The team will also establish their research sites and begin identifying local partners they could potentially work with throughout their research.

Part 3: Life
In this part, the team will focus on learning about the life of the mosquito. Research will include collecting and comparing mosquitoes within research sites while studying the life cycle and global distribution of different mosquitoes.

Part 4: Transmission
In this part, the team will focus on understanding factors that affect how mosquito-borne diseases are transmitted. Research includes identifying potential host animals, local histories, and changes in the local environment that could affect how diseases may be transmitted through your research site now and in the future.

Part 5: Habitats
In this part, the team will focus on researching where mosquitoes live and breed in the community. Research of man-made and natural habitats will be conducted.

Part 6: Management
In this part, the team will focus on exploring a diversity of ways to manage mosquitoes. The team will then begin to develop integrated management plans for the local community concerning mosquitoes and mosquito-borne diseases.

Part 7: Action Plan
In this part, the team will focus on developing a local community action plan. This plan will outline the research that was conducted, the actions the team thinks people need to take in the community, and a communication plan to share the plan with local community members.

Notes:

Understanding this Community Research Guide

Read this together as a team.

Each of the seven parts has a list of TASKS to be completed. Some tasks have two options: Mosquito A or Mosquito B. Choose the version of the task that works best for your team. Mosquito A versions are generally easier. If you are unable to complete a task for any reason, do not worry. Talk as a team, try again, or try the Mosquito A version of the task, if it's available. It is okay to change your mind. The tasks in this guide will tell you what to do. Remember, it is okay to change between the Mosquito A and B tasks at any time.

During each task, you will need to look at task resources in the research guide task folder. The task folder will be labeled with the task number. This task folder will contain additional task resources for that task.

It will also contain the two versions (Mosquito A and B) of the task, if available. Not all tasks have two versions. These task resources will tell you what to do. The team leader will help read them if you do not understand. Just follow the guide and do not worry.

If you get stuck, talk as a team, try again, or change to the Mosquito A version of the task. Getting stuck and trying again is part of doing research. Changing your mind is okay and normal.

When conducting research, there are many unknowns. There are also many things to figure out as a team. You will need to be creative. There will not always be a clear right and wrong answer. Sometimes the team might not agree. This is okay. Just make sure to respect your teammates. Sometimes you might not be sure what decisions you should make. This is normal. The goal of research is to help us talk and think about how to make decisions as a team.

It is normal to be confused. It is normal to get frustrated. It is normal to fail and need to try again. It is normal to change your mind as you learn more. But do not worry. This is all part of doing research. Your team leader and team are here to help one another.

So let's begin!

Part one of your research will be focused on getting the team ready. The first step in all good team research is to understand your team better and the problem you are going to explore.

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PART ONE. PROBLEM TASK LIST

This is the list of tasks for Part One. Problem

Check them off as you complete them.

TASKS

- 1-1 ☐ Mapping Your Identity
- 1-2 ☐ Thinking About Decisions
- 1-3 ☐ Pre-Surveying Team
- 1-4 ☐ Introducing Mosquitoes
- 1-5 ☐ Building Team Identity
- 1-6 ☐ Defining the Research Problem
- 1-7 ☐ Understanding Community Action Plan
- 1-8 ☐ Exploring Research Perspectives
- 1-9 ☐ Building Claims from Evidence
- 1-10 ☐ Mapping Questions

In this part, the team will begin defining the research problem and setting up your local research plans. To do this the team will need to learn more about the team members, different perspectives, and questions you will work to answer during your research.




1-1 Mapping Your Identity

Welcome to the team and Task 1-1. As you heard, you will be making many decisions as a team during your research about mosquitoes. Many of the decisions you will make in your research may be influenced by your identity. Since your team will be making many decisions together, it is good to learn more about the different identities of your team. In future tasks, you will use this identity map to see if parts of your identity are causing you to think in one way or the other. So keep your identity map in a safe place.

Objective

In this task, each team member will make an identity map about themself.

1. Go to the Task 1-1 folder to get the identity map instructions, Think, Pair, Share instructions, and discussion questions. This task has only one version for everyone.
2. Discuss using Think, Pair, Share instructions to develop categories for the question, "Who am I?" or, "What different things about me make up me?"
3. Add your list of extra identity map categories to the Task 1-1 folder.
4. Look at the identity map example in the instructions to see how they look.
5. Use this list of categories; plus the ones you added, to create an identity map for yourself.
   - Team members should keep their identity maps safe for future tasks.
6. Pick one thing from your identity map you can share with the team. Circle it!

Research Tip

The Task 1-1 folder can be found on Learning Lab. When you see this blue arrow you should go there. Try it now!

learninglab.si.edu/profile/ScienceForGlobalGoals

Hooray! You completed Task 1-1. Check it off the task list. *Go to Task 1-2!*

1-2 Thinking About Decisions

Welcome to the team and Task 1-2. As you heard, you will be making many decisions as a team during your research about mosquitoes. Before you begin your research, the team must think about how each team member makes decisions. You will also need to use your identity map from Task 1-1 to see if any parts of your identity are affecting the decisions you make.

Objective

In this task, the team will learn how to work and talk together about decision-making and how it may be influenced by the identity map you made in Task 1-1. This will be especially important when we all do not agree.

1. Go over these team norms together:
   - Recognize the benefit of listening to different ideas from people on your team.
   - Be open to new ideas and perspectives that challenge your own.
2. Go to the Task 1-2 folder and get the Thinking About Decisions activity and discussion questions.
3. Choose the Mosquito A or Mosquito B activity from the task folder. You can also do both versions of the task if you want. Or half of the team can do Mosquito A and half can do Mosquito B. You decide!
4. Do the activity according to the instructions in the folder and discuss the questions.

Remember, when engaging in meaningful discussion as a team, we must respect our team. For example, use these sentence starters:

- I agree with _____because …
- I disagree with _____because …
- I'd like to go back to what _____said about …
- I'd like to add _____

Hooray! You completed Task 1-2. Check it off the task list. *Go to Task 1-3!*

1-3 Pre-Surveying Team

As you discussed in Task 1-2, the team will be making many decisions during your research. Before your research on mosquitoes begins, the team must document what people on your team currently think about mosquitoes.

Objective

In this task, you will survey the team to document what they currently think. In later tasks you will look at your answers from this survey to see if your thoughts have changed over time. Do not worry if you are not sure about mosquitoes. This is normal. This is not a test.

1. Go to the Task 1-2 folder and get the survey questions and methods.
   - Choose the Mosquito A or Mosquito B survey from the task folder.
2. Talk as a team about the difference between a survey and a test. Talk about why it is important to be honest when taking a survey.
3. Decide which survey option works best for the team. If you have a better option, do that.
   - The team leader will help the team make the decision.
   - Do not worry if you do not understand the questions. Simply mark "Not Sure."
4. Do the survey and save the team results in a safe place.
   - The team will look at the survey results later in our research, during Task 2-2, so keep them safe.

Research Tip

The team will use these survey results in future tasks. Keep the results in a safe place so everyone can easily access them later.

Hooray! You completed Task 1-3. Check it off the task list. *Go to Task 1-4!*

1-4 Introducing Mosquitoes

Before we start our research, we need to learn more about what the team already knows about mosquitoes.

Objective

In this task, the team will uncover what they already know about mosquitoes and add this to their identity maps created in Task 1-1.

1. In the Task 1-4 folder, get the images related to mosquitoes.
   - You will also see a document of other mosquito resources (videos), if someone on the team has the resources or technology to view them.
   - You will also see instructions for collecting live samples to observe. Go outside and complete the collection and observation, if you have the resources. See what you can find!
2. As a team, view the images and other resources (video + live samples), if you can.
3. Quietly think about anything you know about mosquitoes.
4. On your identity map from Task 1-1, mark an area around your identity categories called "What I know about mosquitoes." Write or draw in that area all the things you thought about mosquitoes.
5. See the example in the Task 1-4 folder for guidance.
6. Pick one mosquito thought, story, or drawing from your identity map that you can share with the team. Circle it!

Research Tip

The team will use the identity maps in future tasks. Keep them in a safe place so everyone can easily access them later.

Hooray! You completed Task 1-4. Check it off the task list. *Go to Task 1-5!*

1-5 Building Team Identity

In Task 1-1 and Task 1-4, you mapped what you know about mosquitoes. This is your personal identity when it comes to mosquitoes. As a team, you also have a team identity and know things as a group. This is your team's identity. Each person might have similarities and differences between their personal and team identities. This is okay and normal. It is important to understand how these similarities and differences between your personal and team identities may affect the decisions you or the team make during your research.

Objective

In this task, we will share our work from Tasks 1-1 and 1-4 to help build a team identity map. This map can then be used during your research to see if any part of your identities may be affecting your personal or team decisions.

1. Go to the Task 1-5 folder to get the Building Team Identity instructions, examples, and questions.
2. Follow the instructions to play Round One- Team Identity.
3. Look at the Team Identity example in the Task 1-5 folder for guidance during both rounds.
4. As a team, discuss the Round One Discussion Questions.
5. Follow the instructions to play Round Two- Team Mosquito Knowledge.
6. After everyone has shared, stand up as a team. Continue to hold onto the string.
7. As a team, discuss the Round Two Discussion Questions.
8. Talk about the goal of creating an identity map as a team to help build relationships and break down stereotypes, before we begin our research.
9. Talk about how identity maps are helpful for having discussions and for effective team community-building.
10. Why is it important to let everyone share their ideas?

Research Tip

The team will use this team identity map in future tasks. Keep it in a safe place so the team can easily access it later.

Hooray! You completed Task 1-5. Check it off the task list. *Go to Task 1-6!*

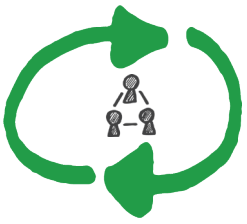
1-6 Defining the Research Problem

You now have a better understanding of your personal and team's identity and knowledge about mosquitoes. That information will be useful as you begin to define the mosquito problem in your local community. So keep those identity maps safe for later use.

Objective

In this task, the team will meet some researchers who study the mosquito problem to learn more about different parts of the problem. These researchers will give the team some ideas about the things you should consider when doing research in your local community.

1. Go to the Task 1-6 folder to get the instructions and readings.
2. Watch the videos if you can. Do not worry if you are not able to.
3. As a team, read the Problem Introduction together.
   - During the reading, circle or underline all the words you do not understand.
   - Do not worry, there are many big words in science.
4. As a team, make a list of all the words people circled or underlined so we can start to help each other better understand them all.
5. Make a plan for how we could learn more about what these words mean.
   - Where could we search or whom could we ask to learn more about these words?
6. Go back and identify a Very Important Part (VIP) from the reading.
7. Share these VIP's as a team.
8. Follow the instructions for the Meet the Team - Jigsaw Part One.
9. Have each group present their researcher to the team, including:
   - Name, job title, organization
   - Most interesting thing from their identity map



1-6

- One VIP from each of the three questions
- Make a list of the VIPs from all groups

Follow the instructions for the Meet the Team - Jigsaw Part Two.

10. Have each group present their researcher to the team, including:
    - VIP for each perspective (ethical, economic, social, environmental)
    - VIP for why it is important to consider perspectives when making decisions about this problem
    - Make a list of the VIPs from all groups

To help your local community, we will need your team to create a research site and develop a variety of suggestions for solutions to this question:

How can we ensure health for all from mosquito-borne diseases?

Just remember, research is not always easy. There is not one right answer.

There are many possible solutions. So, you might get confused.

You might get frustrated. Things might not always work out the way you thought.

This is normal. All you can do is try again, start over, ask a different question, talk to a different person, or create a new pathway.

Just remember, there are many questions to consider. There are many decisions to make. There are many possible solutions.

Hooray! You completed Task 1-6. Check it off the task list. *Go to Task 1-7!*

1-7 Understanding Community Action Plan

As you learned in Task 1-6, the team will be focused on creating solutions to the problem question: How can we ensure health for all from mosquito-borne diseases?

There are many possible solutions to this question. This is why we must conduct research to learn more about the problem in our community. Then we can suggest decisions and actions we think people should take. At the end of your research, the team will need to create and communicate a community action plan. All of the team research will help you create the community action plan.

Objective

In this task, the team will learn more about the community action plan you will make in the future.

1. Go to the Task 1-7 folder to read the details of the community action plan.
2. There is only one version of the community action plan.
3. Read through the details of the action plan as a team. Ask questions about any parts that are not clear. Remember not to worry. Research is not easy. Sometimes things might not work out the way you planned. Learning how to work through the problem is part of the challenge and fun.
4. Read the Meet the Team Reading, with stories about when things did not work out during research projects and action plans. Think about how your team can work together when things do not work out as planned to reach your research and action plan goals.

Research Tip

Part Seven of the Community Research Guide is all about creating your community action plan. Remember that all of your research is leading to the creation of this plan.

Hooray! You completed Task 1-7. Check it off the task list. *Go to Task 1-8!*

1-8 Exploring Research Perspectives

As you learned in Task 1-6 and 1-7, the team will be presented with various perspectives of the problem throughout your research: social, ethical, environmental, and economic.

Objective

In this task, the team will explore these perspectives to understand them better.

This task only requires space for a continuous line (real or imagined) from one side of the room to the other.

1. Post one sign stating STRONGLY AGREE and one sign stating STRONGLY DISAGREE on opposite walls or corners of the room. The space between these two signs is the continuum. Put a sign in the middle of these two signs that states NOT SURE.
2. The team will hear a variety of statements.
3. After each statement, each team member should place themselves along the continuum based on how much they agree or disagree.
4. Go to the Task 1-8 folder to get the statements, further instructions, discussion questions and Meet the Team Reading. Choose the Mosquito A or Mosquito B version of this task.
5. Go over the team norms together in the task folder.
6. Follow the instructions to play the warm-up round.
7. As a team, discuss the Warm-Up Discussion Questions.
8. Follow the instructions to play four Perspectives rounds and questions.
9. As a team, discuss the Task 1-8 Discussion Questions.
10. Read the Meet the Team Reading on what to do when the team does not agree?. Learn about and discuss the ways their teams work through disagreements. Think about how your team can best work together to respect everyone's ideas.

Research Tip

Display a set of talking norms team members can use during discussions. These norms are helpful to have respectful conversations, especially when you don't agree.

Hooray! You completed Task 1-8. Check it off the task list. *Go to Task 1-9!*

1-9 Building Claims from Evidence

Throughout your research you will be collecting and working with many different types of evidence. You will be using this evidence to make claims based on scientific arguments. A claim is a suggested answer to a scientific question. Evidence is the information we use to build claims. In our research, the team will use many different types of evidence to build claims concerning the parts of the problem question: How can we ensure health for all from mosquito-borne diseases?

Objective

In this task, we are going to learn how to use evidence to support claims. This will help the team explain how we know what we know.

1. Go to the Task 1-9 folder to get the Building Claims from Evidence activity.
2. Choose the Mosquito A or Mosquito B version from the task folder, or do both.
3. This task involves making a claim about a bite from an unknown animal.
4. The scientific question the team must consider is: What kind of animal bit me?
5. Follow the directions in the task to support the claims about this question.
6. Use the data sheet to document your results.
7. As a team, discuss the questions in the task.
8. Why is it important to always support your claims with evidence?
9. Why is it important to support decisions you make in your life with evidence?
10. Why is it important to listen to people, even when you do not agree?
11. Why is it important to respect people, even when you do not agree?

Remember, in your research, the team will use many different types of evidence to build claims concerning the parts of the problem question: How can we ensure health for all from mosquito-borne diseases?

Hooray! You completed Task 1-9. Check it off the task list. *Go to Task 1-10!*

1-10 Mapping Questions

In Part two, you will start your local research. Before you start, it is good to know all of the team's questions. This will help you organize your research.

Objective

In this task, we will learn about and organize our questions for research in later parts.

1. Each team member should think about what more they would like to know about mosquitoes and mosquito-borne diseases.
2. Make a list of all the questions you have or would like to explore about mosquitoes and mosquito-borne diseases. Remember, they should be written as questions.
3. Think, Pair, Share the questions you developed.
4. As a team, make a list of these questions.
5. Go to the Task 1-8 folder to get the question map.
6. Look at the question map.
7. This map already has some boxes filled with questions.
8. The top question in the dark blue box is the problem question around which we are trying to create solutions: How can we ensure health for all from mosquito-borne diseases?
9. The five greeen boxes under the problem question create five columns.
10. These columns are the four perspectives we will be exploring, plus one where we can put questions that don't seem to fit under any of the perspectives right now.
11. The light blue boxes are some different questions we will need to explore to help us develop our solutions to the main problem question.
12. As a team, using this question map, take the list of questions created by the entire team and start placing them under one of the five columns.
13. Discuss as a team where you think each question best belongs.
14. Remember, you can always move the questions later in your research. So, put them in column five for now if you are not sure.
15. Remove any repeat questions. Each question only needs to be on the map once.
16. Combine any questions that go together.
17. This question map will help guide your research in the following parts.
18. So whenever you are discussing questions at the bottom of the map, think about how they might help us answer the problem question at the top: How can we ensure health for all from mosquito-borne diseases?

Research Tip

The question map will help guide the team research. Your team will work to research, investigate, and explore as many of these questions as you can. You will need to come back to this question map many times. So, keep it somewhere safe and easy to access as a team.

Part One Debrief

Congratulations!

You have completed Part One of your research.

Give yourself a pat on the back.

The team should now have a better understanding of the team and the mosquito problem.

But, do not worry if you are confused or not sure about anything.

Things will become clearer as we research more.

As you see in your question map from Task 1-10, there are many questions we still need to explore.

These questions will guide our exploration of our local community.

This exploration will help us understand the problem better in our local community.

This will also help us develop solutions we think are the best for our community.

Just remember, every community is different.

The answer is not always the same for every place in the world.

But remember, all of this work is focused around our problem question:

How can we ensure health for all from mosquito-borne diseases?

The next part of your research will focus on mapping the team research site(s).

Then you will survey people in your research site to see what they know.

Then you will use this information to start developing ideas for solutions.

This may be confusing.

But do not worry.

It will all make sense as you complete the tasks. Just remember, the team is here to help.

Continue to Part 2: Community

Notes:

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PART TWO. COMMUNITY TASK LIST

This is the list of tasks for Part Two. Community

Check them off as you complete them.

TASKS

- [ ] 2-1 Mapping Research Sites
- [ ] 2-2 Analyzing Team Surveys
- [ ] 2-3 Surveying Community
- [ ] 2-4 Analyzing Community Surveys
- [ ] 2-5 Identifying Community Partners
- [ ] 2-6 Debriefing Community

In this part, the team will focus on collecting evidence about what the local community thinks and knows about mosquitoes. The team will also establish their research sites and begin identifying local partners they could potentially work with throughout their research.




2-1 Mapping Research Sites

Welcome to Part Two. Community and Task 2-1. The team will now begin researching mosquitoes in your local community. To do this, the team will first need to identify the areas you would like to research about mosquitoes. This will be the area where you will conduct experiments, make observations, and collect information. So think about a place you would like to know more about. The research areas could be as small as the area outside and around your house or where the team meets, such as at school. It must include one outside area. It can also include inside areas. It could also be larger and include a neighborhood or all of the homes of the team members. It could even be very large and include your entire town, village, or city. Your team will have to make these decisions together. You will also have to decide if you want more than one research site. These decisions are all up to you.

Objective

In this task, the team will determine their research sites and start creating a map of these sites.

1. Go to the Task 2-1 folder and get the Mapping Research Sites instructions and examples. This task has only one version.
2. As a team, determine the following:
   - How many research sites do we want?
   - Where are good locations for our research sites to study mosquitoes?
   - Will the research sites include both indoor and outdoor areas?
   - If we have more than one research site, which team members will be responsible for each site?
3. When the team has determined the locations of your research sites, follow the instructions in the task instructions to start making your map. Look at the examples.
4. Include maps of both outdoor and indoor areas, if you're researching both.
5. Mark the boundaries of your research site on your map. If you can (it's not required), place markers in the actual research site to mark the corners or edges. Measure and calculate the area of your research sites. Use your math skills to help!

Research Tip

This map will be used throughout your research, so keep it in a safe place. Other information will be added to this map as you learn more about the sites. So keep it safe!

Hooray! You completed Task 2-1. Check it off the task list. *Go to Task 2-2!*

2-2 Analyzing Team Surveys

In Task 1-3, the team took a survey about what they think about mosquitoes and mosquito-borne diseases. Since the team is part of the research site you mapped in Task 2-1, the team should begin their research of their local community by analyzing parts of the compiled team surveys. So you will need to find and take out these surveys for this task.

Objective

In this task, the team will be focusing on the following questions from the question map you made in Task 1-10: What do people in our local community think and know about mosquitoes and mosquito-borne diseases?

What are effective ways to share and communicate mosquito-borne disease evidence with the community?

1. Go to the Task 2-2 folder and get the Survey Analysis instructions and questions.
   - Choose the Mosquito A or Mosquito B task from the task folder.
2. Each team member should locate and look over only parts one and two, Background Information and Community, on their completed survey from Task 1-3.
3. As a team, determine how to compile the answers for parts one and two for all team members. You will want to analyze the compiled data from the entire team. Develop your own method for compiling the data for parts one and two, or use one of the methods in the instructions.
4. Create some graphs about this compiled data. Use the instructions and examples in the task folder to help you. Be creative!
5. Use the graphs and data to answer these questions:

A. What interesting patterns do you see in the data from parts one and two questions of the team survey?

Research Tip

As you may have noticed, the survey is broken into the same parts as this research guide. Analyze only the results from that part of the survey while working on that Part of the guide to make the analysis more manageable.

2-2

B. Which questions did most people on the team agree about?

C. Which questions did people on the team have different responses for?

D. Discuss how this survey evidence could be useful when thinking about the question: What do people in our local community think about mosquitoes and mosquito-borne diseases?

E. Discuss how this survey evidence could be useful when thinking about the question: How can we effectively share and communicate mosquito-borne disease evidence with the community?

F. Discuss how this survey evidence could be useful when thinking about the problem question: How can we ensure health for all from mosquito-borne diseases?

6. Select two or three questions from these survey questions, write a claim, and provide the supporting evidence for the claim based on the question and data evidence collected.

Examples:

- People on our team are not concerned at all about mosquitoes and mosquito-borne diseases.
- Social media is a useful way to communicate to our team.

7. What evidence supports your claims?

8. As a team, share some claims you created and the evidence that supports each claim.

Hooray! You completed Task 2-2. Check it off the task list. *Go to Task 2-3!*

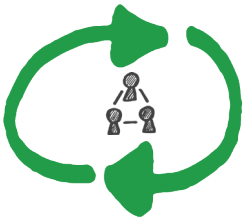
2-3 Surveying Community

In Task 2-2, you learned more about what the team thinks about mosquitoes. Now it is time to survey other people in your community to see what they know. This will help the team understand what people think about these various parts of the mosquito problem. This survey will also provide evidence that will be useful to understand what things people might not understand about mosquitoes.

Objective

In this task, the team will be focusing on the following questions from the question map in Task 1-10: What do people in our local community think and know about mosquitoes and mosquito-borne diseases? How can we effectively share and communicate mosquito-borne disease evidence with the community?

Go to the Task 2-3 folder and get the Survey and Meet the Team reading. Use the same version (A or B) of the survey the team used for the team survey in Task 1-3.



1. Read the Meet the Team reading on Mosquito Misconceptions. These are things people around the world commonly do not understand about mosquitoes.

- Watch the Mosquito Hunter video in the Task 2-3 folder on the Smithsonian Learning Lab.

2. Determine who the team will survey in the community. The survey will help you understand any misconceptions in your community.

   a. If you're surveying your family, friends, or people at school, decide who you will survey and why.

Research Tip

Use the field safety tips in the safety documents on Learning Lab before going out into the community to survey or interview people. Be polite, never go alone, and always be aware of your surroundings.

2-3

b. You can survey more than one person if you want.

c. If you're surveying someone in your community, decide who this person is and set up a way to conduct or provide them with the survey.

d. Whenever you're surveying people in your community, get permission from your team leader before contacting these people. Read through the safety documents concerning surveying or interviewing people in the Task 2-3 folder.

3. Determine how team members would like to conduct the survey.

   a. Oral interview: You ask the questions and document the responses.

   b. Provide each person a paper version of the survey and have them complete the survey on their own.

   c. If you have access to digital survey tools, figure out how you could use them. Tools such as SurveyMonkey and Google Forms/ Docs can be used, if available.

   d. If you have another strategy that works best for your team, do that!

4. Before you start surveying people, complete the following based on your team claims from Task 2-2.

   Write a hypothesis about which form of communication you think will be most available to your community.

   Example: Television is the most useful way to communicate to the community.

5. Conduct the survey and bring the results back to the next team meeting. In Task 2-4, the team will compile and analyze the results of parts one and two of these surveys.

Hooray! You completed Task 2-3. Check it off the task list. *Go to Task 2-4!*

2-4 Analyzing Community Surveys

In Task 2-2, the team learned how to analyze the team survey results for parts one and two. In task 2-3, you then surveyed people in your local community. In this task, you will do the same kind of analysis you did during Task 2-3. Now you will focus on the community survey results only for parts one and two, Background and Community, of the survey. The team will use this analysis to think about the social perspecitve of the problem. The team will analyze the other parts of the survey in future tasks. So keep the survey results in a safe place.

Objective

In this task, the team will be focusing on the following questions from the question map in Task 1-10: What do people in our local community think and know about mosquitoes and mosquito-borne diseases? How can we effectively share and communicate mosquito-borne disease evidence with the community?

1. Go to the Task 2-4 folder and get the survey analysis instructions and questions.
   - Choose Mosquito A or Mosquito B task from the task folder.
2. As a team, determine how to compile the community survey results for parts one and two for all team members. You will want to analyze the compiled data from the entire team. Develop your own method for compiling the data for parts one and two, or use one of the methods in the instructions.
3. Create some graphs about this compiled community survey data. Use the instructions and examples in the task folder.
4. Use your graphs and data to answer these questions:

- What interesting patterns do you see in the data from part one or two questions of the survey.

Research Tip

As you may have noticed, the survey is broken into the same parts as this research guide. Analyze only the results from that part of the survey while working on that Part of the guide to make the analysis more manageable.

2-4

- Which questions did most people in the community agree on?
- Which questions did people in the community have different responses for?
- Discuss how this survey evidence could be useful when thinking about the question: What do people in our local community think about mosquitoes and mosquito-borne diseases?
- Discuss how this survey evidence could be useful when thinking about the question: How can we effectively share and communicate mosquito-borne disease evidence with the community?
- Discuss how this survey evidence could be useful when thinking about the problem question: How can we ensure health for all from mosquito-borne diseases?

5. In Task 2-3, you wrote a hypothesis about which form of communication would be most available to the community.

- Example: Television is the most useful way to communicate to the community.

6. Using your team and community survey results, analyze the data from the question about availability of communication media to determine whether or not your hypothesis was supported by the evidence.
7. As a team, discuss different hypotheses and the evidence that supported it or not.
8. Select two or three survey questions, write a claim, and provide the supporting evidence for the claim based on the surveys you collected.
9. Examples:

- People in our community are not concerned at all about mosquitoes and mosquito-borne diseases.
- Social media is a useful way to communicate to our community.

10. Explain how the data evidence from the community survey supports your claims.
11. As a team, share some claims you created and the evidence that supports them.

Hooray! You completed Task 2-4. Check it off the task list. *Go to Task 2-5!*

2-5 Identifying Community Partners

In Task 2-3 and 2-4, you learned more about what the community thinks about mosquitoes and the mosquito problem. Now it is time to identify some community partners. A community partner is any resource that has the potential to improve the quality of life within a community. Examples of community partners are:

People. Health workers, school staff, doctors, and teachers all have knowledge that could be helpful for the team during your research.

Places. Hospitals, health centers, libraries, police stations, and community centers all have information that could be helpful for the team during your research.

Community organizations and associations. Organizations and associations are groups of people that are working together around a common goal.

Government agencies. The Ministry of Health, or Department of Health have information that could be helpful for the team during your research.

Objective

In this task, the team will be focusing on the following questions from the question map in Task 1-10: Who are local people, organizations, and associations that can provide valuable information related to this problem?

In this task, the team will identify some local community partners that could help us better understand the problem question: How can we ensure health for all from mosquito-borne diseases?

Go to the Task 2-5 folder and get the Identifying Community Partners instructions, Meet the Team reading, and Data Sheet. There is only one version of this task.

1. As a team, read the Meet the Team reading about why it is important to identify and work with partners. Have each person state one important reason why it is important to identify and work with partners during research.
2. Use the instructions and data sheet in the task folder to develop a list of team partners.
3. Identify whether any of the community partners are within the research site map you created in Task 2-1. If so, mark and identify those on your research map.
4. If the community partners are mainly outside of your research site map, consider making a new map that is focused specifically on the community partners. Plot the locations of all partners on a community map.

Hooray! You completed Task 2-5. Check it off the task list. *Go to Task 2-6!*

2-6 Debriefing Community

This is the last task of Part Two: Community.

Objective

In this task, we will debrief Part Two: Community. This is good to do before we move on to the next part. Each debrief will be very similar and is broken down into the same parts. The objective is to think about and discuss helpful information that was gathered during that part.

1. Remember the team norms.
   - Recognize the benefits of listening to a range of different perspectives and viewpoints.
   - Be open to new ideas and perspectives that challenge your own.
   - Be willing to cooperate with others to change things for the better.
2. Remember to use your meaningful conversation starters as needed throughout this discussion.
   - I agree with _____ because…
   - I disagree with _____ because…
   - I'd like to go back to what _____ said about …
   - I'd like to add_____
   - I noticed that …
   - Another example is …
3. Remember when you are making claims from evidence to use the following sentences.
   - I think this claim is best supported because …
   - I do not think this claim is best supported because …
   - I think this piece of evidence supports this claim because …
   - I do not think this piece of evidence supports this claim because …

2-6

4. Go to the Task 2-6 folder to get Debriefing Community instructions. There is only one version of the debrief.

5. Follow the instructions in the task folder to complete the five sections of the debrief.
   - Question Map Analysis
   - Community Partners
   - Perspectives
   - Identity
   - Problem Question

Hooray! You completed Task 2-6 and Part Two. Check it off the task list.

Congratulations, you have completed Part Two of your research. Give yourself a pat on the back. You now know more about what your community thinks about mosquitoes. Keep this research easily available. The next part of your research will focus on understanding the life of the mosquito. The team will need to learn more about the mosquito as an animal. This includes learning about:

- Different types of mosquitoes
- Life cycle of mosquitoes
- Where mosquitoes live
- What mosquitoes eat
- What are the behaviors of mosquitoes

Continue to Part 3: Life

Notes:

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PART THREE. LIFE TASK LIST

This is the list of tasks for Part Three. Life

Check them off as you complete them.

TASKS

- 3-1 ☐ Collecting Mosquito Eggs
- 3-2 ☐ Comparing Mosquitoes
- 3-3 ☐ Investigating Mosquito Distribution
- 3-4 ☐ Understanding Mosquito Life Cycle
- 3-5 ☐ Analyzing Collected Eggs and Larva
- 3-6 ☐ Analyzing Community Surveys (Life)
- 3-7 ☐ Debriefing Life

In this part, the team will focus on learning about the life of the mosquito. Research will include collecting and comparing mosquitoes within research sites while studying the life cycle and global distribution of different mosquitoes.




3-1 Collecting Mosquito Eggs

Welcome to Part Three: Life and Task 3-1. In Part Two you learned more about what people in your community think about mosquitoes. Now the team will begin learning more about the life of the mosquito. For the tasks later in Part Three, it will be beneficial to collect and observe live mosquito eggs, larvae, and pupae in your research site. You may have already started doing this in Task 1-4. However, if you have not, the collection process can take some time. So it's a good idea to build and set out the traps and then monitor them daily while you are working on the other tasks in Part Three.

Objective

In this task, the team will be focusing on the following questions from the question map. How can we monitor the distribution of mosquitoes?

Monitoring the local mosquitoes can help the team determine where mosquitoes are distributed across the community. Teams will also have the opportunity to participate in a larger Citizen Science project called The Invasive Mosquito Project. This project involves collecting samples from teams over a much larger area. This data will be used to make larger distribution maps of mosquitoes. Participation in the Citizen Science project is voluntary, but participate if you can.

Citizen Science Tip

Participate in the Invasive Mosquito Citizen Science Project if you can. Also, do research to see if there are other citizen science projects in your location you can participate in.

1. Go to the Task 3-1 folder and get the Collecting Mosquito Eggs step-by-step guide for setting up collection cups, Egg Collection procedure, Live Collection instructions, Citizen Science- Invasive Mosquito Project background information, and Invasive Mosquito Project collection form.

2. As a team, use the step-by-step guide and egg collection procedure to set up egg collection cups in your research site. If you're experimenting with the collection design, outline your experimental design. Read the safety notes in the procedure and collection notes before placing cups outside.

3-1

3. Mark your research site map from Task 2-1 with the location of your team's cups.
4. Monitor the cups daily. Refill with water as needed. Be careful of any eggs or larvae in the container.
5. Leave the cups out for seven to fourteen days. Then follow the collection procedure to observe any eggs, larvae, or pupae.
6. Use the Invasive Mosquito Project Collection record form to collect data. Use this even if the team is not participating in the Citizen Science project.
7. If you're participating in the Citizen Science project, mail some of the eggs according to the procedure and collection notes. Save some eggs for others tasks later in this part.
8. If you have found a different Citizen Science project involving mosquito eggs to participate in, do that!

Research Tip

More information about identifying and storing collected eggs and larvae is included in Tasks 3-4 and 3-5, if you need it now.

Citizen Science Tip

The more people that participate in Citizen Science projects, the more we all will learn from them. Think about how you could gather information about your community to be part of these global projects.

Hooray! You completed Task 3-1. Check it off the task list. *Go to Task 3-2!*

3-2 Comparing Mosquitoes

Objective

In this task, the team will be focusing on the following questions from the question map:

How do different mosquitoes compare and contrast?

How do mosquitoes spread diseases?

In this task, the team will examine different types of mosquitoes. The team will learn about different physical characteristics and behaviors of these different mosquitoes.

1. Go to the Task 3-2 folder and get the Mosquito Images. There is only one version of this task.
2. Look at the images of the five different types of mosquitoes. Remember, there are more than 3,000 different types of mosquitoes around the world. So, this is a small sample of the different types.
3. For each mosquito, make a list of observations to compare and contrast each type by describing the physical characteristics of each. Include observations about different parts of their body, including the head, proboscis, back of the mosquito, legs, wings
4. As a team, share some interesting observations that are unique to each type of mosquito.
5. Are all mosquitoes physically the same? Why or why not? Use your observation evidence to support your claims. Remember to use the claim/evidence sentence starters during the discussion.
   - I think this piece of evidence supports this claim because …
   - I do not think this piece of evidence supports this claim because …
   - I agree because …
   - I disagree because …

3-2

6. As a team, compare and contrast the feeding habits of each mosquito. What are some common sources of food for different male and female mosquitoes?
7. Using the feeding habits evidence, make a claim stating which of these types of mosquitoes you think could transmit diseases to humans. I think the _____mosquito could possibly transmit diseases to humans. I think these pieces of evidence support this claim...
8. Using the feeding habits evidence, make a claim stating which mosquitoes you think probably do not transmit diseases to humans. I think the _____mosquito possibly does not transmit diseases to humans. I think these pieces of evidence support this claim.
9. Using the evidence, make a claim about which gender (male or female) you think is more likely the cause of disease transmission to humans. I think the _____mosquito is more likely the cause of disease transmission to humans. I think these pieces of evidence support this claim...
10. As a team, share your claim statements and supporting evidence. Remember to use the claim/evidence sentence starters during the discussion.
11. Go to the Task 3-2 folder and get the Meet the Team- Medically Important Mosquitoes reader.

12. Read the Meet the Team reader. Use the evidence in the reader to analyze your claims in steps seven, eight, and nine about mosquitoes. Does the evidence from the researcher support your claims? Why or why not?

13. Why is it important to always support your claims with evidence?
14. Update your claims as needed.

Hooray! You completed Task 3-2. Check it off the task list. *Go to Task 3-3!*

3-3 Investigating Mosquito Distribution

In Task 3-2, the team learned that not all mosquitoes spread diseases to humans. We also learned more about the medically significant mosquitoes that can spread disease to humans. These are the mosquitoes we will focus our research on. A big question we must investigate is where these mosquitoes live. We also need to learn about the environmental conditions that affect where mosquitoes like to live.

Objective

In this task, the team will look at various maps to help us with these questions. Then the team will determine how to monitor the local environment over time. This data can be used to support decisions about when mosquitoes may be a problem in the community.

In this task, the team will be focusing on the following questions from the question map in Task 1-10. Where do mosquitoes live? What factors influence where they live?

Go to the Task 3-3 folder and get the Mosquito Distribution Maps. This task has only one version.

1. Follow the directions in the task folder to complete the Mosquito Distribution Map analysis on the following:
   - Political distribution
   - Aedes and political distribution
   - Temperature, Aedes, and political distribution
   - Precipitation, temperature, Aedes and political distribution
   - Anopheles, precipitation, temperature and political distribution
   - Culex, precipitation, temperature and political distribution

Research Tip

Maps can be printed or viewed digitally. Do what works best for your team. And if you have other maps you want to include in this analysis, do it!

3-3

2. As a team, discuss:
    - How can maps be helpful when studying mosquitoes and mosquito-borne diseases?
    - How do the environmental conditions (temperature and precipitation) change throughout the year in your location?
        - Does it rain more or less in your community at different times of year?
        - Does it snow in your community?
        - Does the temperature change at different times of the year in your community?
    - How does understanding the environmental conditions (temperature and precipitation) of your location help when thinking about the problem question: How can we ensure health for all from mosquito-borne diseases?
    - How could you monitor the changes in temperature and precipitation in your community throughout the year?
3. To understand the mosquito problem better in your local community, it is useful to collect some data evidence in your research site about the environmental conditions of temperature and precipitation. This data can then be used to determine if there are different times of the year when the conditions are better for mosquitoes.
4. Go to the Task 3-3 folder and get the Monitoring Local Weather instructions. Use the information and data sheet to determine how you will monitor the local weather over time in your community. Determine how this information could be useful to your local community when thinking about mosquitoes.

Hooray! You completed Task 3-3. Check it off the task list. *Go to Task 3-4!*

3-4 Understanding Mosquito Life Cycle

In Part Three the team has learned about different types of mosquitoes. Your team may have already collected mosquito eggs during Task 3-1. These eggs are one stage of the mosquito life cycle. Soon they will become adult mosquitoes. It is important to understand all stages of the mosquito life cycle.

Objective

In this task, the team will work to understand the life cycle of the mosquito. If live egg, larvae, or pupae samples are available to the team from Task 3-1, experimentation methods are suggested here. If live samples are not available do not worry. Continue to monitor your collection cups in your research site. You can always come back to this experiment after you collect samples.

In this task, the team will be focusing on the following questions from the question map in Task 1-10. How do mosquitoes develop and reproduce? What factors influence how mosquitoes develop and reproduce?

The team will use this analysis to think about factors that may effect the life cycle and problem question. The team will also think about how understanding the life cycle could be useful when making solutions for the community.

1. Go to the Task 3-4 folder and get the Understanding Mosquito Life Cycle instructions. Choose the Mosquito A or Mosquito B task from the task folder. The Mosquito B task includes the instructions for working with live samples. You can also do both tasks if you want.
2. As a team, discuss how understanding the life cycle of the mosquito could be helpful when thinking about our problem question: How can we ensure health for all from mosquito-borne diseases?

Research Tip

When collecting or working with live samples, follow basic safety precautions. Review the safety documents in the task folder as needed.

Hooray! You completed Task 3-4. Check it off the task list. *Go to Task 3-5!*

3-5 Analyzing Collected Eggs + Larva

In Task 3-1 the team started collecting mosquito eggs and larvae in your research site. If your team has been successful in collecting mosquito eggs and larvae then the next step is to analyze them. If you have not collected any eggs and larvae at this point in your research, do not worry. Continue to monitor your collection cups in your research site. Then return to this task if and when you collect eggs or larvae.

Objective

In this task, the team will learn how to analyze live mosquito eggs and larvae. If live egg or larva samples are available to the team, analysis methods are suggested. The team will use this analysis to think about factors that may effect the life cycle and problem question.

In this task, the team will be focusing on the following questions from the question map: How do different mosquitoes compare? How can we monitor the distribution of mosquitoes?

1. Go to the Task 3-5 folder and get the Analyzing Collected Eggs and Larvae instructions. There is only one version of this task. If you have not collected eggs or larvae move on to the next task. If you collect eggs or larvae in the future, come back to this task.

2. Use this resource to learn about the different parts of eggs and larvae. Use this resource to analyze your live samples.
3. If possible, try to identify whether you collected an Aedes, Anopheles, or Culex mosquito. Remember, it is not easy. There are also thousands of other types of mosquitoes. So it might not be one of these.
4. As a team, discuss the following questions.
   - How can identifying the mosquitoes living in our community be helpful to understand the distribution of mosquitoes?
   - Problem question: How can we ensure health for all from mosquito borne diseases?

Citizen Science Tip

Consider participating in the Invasive Mosquito Citizen Science Project from Task 3-1. Also, do research to see if there are other citizen science projects in your location you can participate in using the samples you collected.

Hooray! You completed Task 3-5. Check it off the task list. *Go to Task 3-6!*

3-6 Analyzing Community Surveys (Life)

In Task 2-3, the team surveyed people in your local community about mosquitoes.

Objective

In this task, you will do the same analysis you did during Task 2-4. Now you will focus on the community survey results only for Part Three: Life. The team will analyze the other parts of the survey in future tasks. So, keep the survey results in a safe place.

In this task, the team will be focusing on the following questions from the question map in task 1-10. What do people in our local community think and know about mosquitoes and mosquito-borne diseases? How can we effectively share and communicate mosquito borne disease evidence with the community?

1. Go to the Task 3-6 folder and get the survey analysis instructions and questions. Choose the Mosquito A or Mosquito B task from the task folder.
2. As a team, determine how to compile the community survey results for part three for all team members. You will want to analyze the compiled data from the entire team and community. Develop your own method for compiling the data for part three, or use one of the methods in the instructions.
3. Create some graphs about this compiled community survey data. Use the instructions and examples in the task folder.
4. Use the graphs and data to answer these questions.
   - What interesting patterns do you see in the data from part three questions?
   - Which questions did most people in the community agree on?

Research Tip

As you may have noticed, the survey is broken into the same parts as this research guide. Analyze only the results from that part of the survey while working on that Part of the guide to make the analysis more manageable.

3-6

- Which questions did people in the community have different responses for?
- Discuss how this survey evidence could be useful when thinking about the question: What do people in our local community think about mosquitoes and mosquito borne diseases?
- Discuss how this survey evidence could be useful when thinking about the question: How can we effectively share and communicate mosquito borne disease evidence with the community?
- Discuss how this survey evidence could be useful when thinking about the problem question: How can we ensure health for all from mosquito-borne diseases?

5. Select one or two survey questions, write a claim, and provide the supporting evidence for the claim based on the question and evidence collected.
6. Examples:
   - The local community does not have a good understanding of what time of day mosquitoes bite.
   - The local community does not have a good understanding that only female mosquitoes can transmit diseases to humans.
7. Explain how the data evidence from the community survey supports your claims.
8. As a team, share some claims you created and the evidence that supports those claims.

Hooray! You completed Task 3-6. Check it off the task list. *Go to Task 3-7!*

3-7 Debriefing Life

This is the last task of Part Three: Life.

Objective

In this task, we will debrief Part Three: Life. This is good to do before we move on to the next part. The objective is to think about and discuss helpful information that was gathered during that part.

1. Remember the team norms.
   - Recognize the benefits of listening to a range of different perspectives and viewpoints.
   - Be open to new ideas and perspectives that challenge your own.
   - Be willing to cooperate with others to change things for the better.
2. Remember to use your meaningful conversation starters as needed throughout this discussion.
   - I agree with _____ because…
   - I disagree with _____ because…
   - I'd like to go back to what _____ said about …
   - I'd like to add_____
   - I noticed that …
   - Another example is …
3. Remember when you are making claims from evidence to use the following sentences.
   - I think this claim is best supported because …
   - I do not think this claim is best supported because …
   - I think this piece of evidence supports this claim because …
   - I do not think this piece of evidence supports this claim because …

3-7

4. Go to the Task 3-7 folder to get Debriefing Life instructions. There is only one version of the debrief.

5. Follow the instructions in the task folder to complete the five sections of the debrief.
   - Question map analysis
   - Community partners
   - Perspectives
   - Identity
   - Problem question

Hooray! You completed Task 3-7 and Part Three. Check it off the task list.

Congratulations, you have completed Part Three of your research. Give yourself a pat on the back. You now know more about the life of the mosquito. Keep this research easily available. Think about how it could help with your final project. The next part of your research will focus on understanding more how diseases are transmitted or spread to humans. This includes learning about:

- Mosquito-borne disease distribution
- Disease hosts
- Factors that affect transmission

Continue to Part 4: Transmission

Notes:

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PART FOUR. TRANSMISSION TASK LIST

This is the list of tasks for Part Four. Transmission

Check them off as you complete them.

TASKS

- 4-1 ☐ Investigating Mosquito Borne Disease Distribution
- 4-2 ☐ Modeling Vector Disease Transmission
- 4-3 ☐ Understanding Disease Hosts
- 4-4 ☐ Identifying Local Disease Hosts
- 4-5 ☐ Collecting Local Transmission Histories
- 4-6 ☐ Analyzing Community Surveys (Transmission)
- 4-7 ☐ Debriefing Transmission

In this part, the team will focus on understanding factors that affect how mosquito-borne diseases are transmitted. Research includes identifying potential host animals, local histories, and changes in the local environment that could affect how diseases may be transmitted through your research site now and in the future.




4-1 Investigating Mosquito-borne Disease Distribution

Welcome to Part Four: Transmission and Task 4-1. In Part Three you learned more about the mosquito as an animal. Now the team will begin learning more about how diseases are spread from mosquitoes to humans and other animals.

Objective

In this task, the team will be focusing on the following questions from the question map.

- What is the distribution of mosquito-borne diseases around the world?
- What factors influence the spread of mosquito-borne diseases?

The team will now examine a variety of maps to think about the relationship between mosquitoes, diseases spread by mosquitoes, temperature, and precipitation. The team will also read some frequently asked questions (FAQs) about the different mosquito-borne diseases, to learn more.

1. Go to the Task 4-1 folder and get the Mosquito-Borne Disease FAQ Sheets, maps, and analysis questions. There is only one version of this task, but two options for organizing are provided.
2. As a team, use the maps and FAQ sheets to complete the analysis questions.
3. As a team, share all important information that could be useful to the research.
4. As a team, discuss the following questions:

- How can maps be helpful when studying mosquitoes and mosquito-borne diseases?
- How does understanding the environmental conditions (temperature, precipitation, elevation) of your location help when thinking about the problem question: How can we ensure health for all from mosquito-borne diseases?

4-1

• How does understanding the distribution of different mosquitoes and diseases help when thinking about the problem question: How can we ensure health for all from mosquito-borne diseases?

• How do the environmental conditions (temperature and precipitation) change throughout the year in your location? Does it rain more or less in your community at different times of year? Does it snow in your community? Does the temperature change at different times of the year in your community?

• Have you been monitoring the environmental conditions of your location since Task 3-3? If so, what have you learned so far? If not, how could you monitor the changes in temperature and precipitation in your community throughout the year? Look at the instructions in Task 3-3 to get started.

Research Tip

What other mosquito-borne diseases are affecting people in your location or in other parts of the world? Do some research to find out and compare it to the analysis you did here.

Citizen Science Tip

Collecting and sharing data about your research site can be helpful to scientists when making and updating maps like these about diseases around the world. Think about how you could share your data with others.

Hooray! You completed Task 4-1. Check it off the task list. *Go to Task 4-2!*

4-2

Modeling Vector Disease Transmission

Objective

In this task, the team will model the spread and transmission of a disease among a group of mosquitoes (vector) and humans (host). The team will use the model to explore how a disease can move through a group of humans (hosts) using a mosquito (vector). We will also explore how different factors can affect disease transmission.

In this task, the team will be focusing on the following questions from the question map. How do mosquitoes spread disease? What factors influence this?

1. Go to the Task 4-2 folder and get the Modeling Vector Disease Transmission activity. Choose the Mosquito A or Mosquito B version of the task. Remember, both can be played inside or outside. You decide!

2. Run as many models as you can, following the task instructions. Collect and compile the data.
3. Compare and contrast the results of different model setups. What effect does the model have on the transmission rate?
4. As a team, discuss the following:
   - Were more or fewer people infected than you expected?
   - What are some ways this model does not accurately model mosquito-human interactions?
   - What factors can affect how quickly a disease spreads through a group of mosquitoes and humans?
   - What other factors do these models not incorporate? How could you incorporate them into the model?
5. Develop a new model of your own using this setup. Run the model and compare the results.
   - How can models like these be useful when thinking about questions on the map, such as what factors influence how mosquitoes spread diseases? How can we ensure health for all from mosquito-borne diseases?

4-3 Understanding Disease Hosts

In Task 4-2, the team learned more about factors that affect how diseases can be spread to a host. In the models in Task 4-2, the human was the host. The mosquito was the vector.

Objective

In this task, the team will run a series of transmission models with a variety of different mosquito-borne disease hosts. This will help you understand more factors that can affect the spread and transmission of mosquito-borne diseases through a community.

In this task, the team will be focusing on the following questions from the question map.

- How do mosquitoes spread disease?
- What factors influence this?

1. Go to the Task 4-3 folder and get the Vector and Host Game instructions. There is only one version of this task, but can be played inside or outside. You decide!

2. As a team, go over the following terms.
   - A disease vector is an organism that can transmit diseases between humans or from animals to humans.
   - A disease host is an organism that can harbor a disease and typically provide the disease nourishment and shelter. Diseases can survive in a host over a period of time. There are two types of hosts, primary and secondary.
   - In primary hosts, the diseases living in these hosts can be spread back to other mosquitoes and then to other humans or animals.
   - In secondary hosts, the disease is not transmitted to other mosquitoes or animals.
3. Use the instructions in the task folder to play the Vector and Host Game.
4. As a team, discuss the questions in the game instructions.
5. As a team, discuss:
   - How can models such as this game be helpful when doing research?
   - What are some ways this model does not accurately model mosquito-human interactions?
   - What factors can affect how quickly a disease spreads through a group of mosquitoes and humans?
   - What other factors do these models not incorporate? How could you incorporate them into the model?
6. Develop a new model of your own using this setup. Run the model and compare the results

• How can models such as these be useful when thinking about questions on the map, such as what factors influence how mosquitoes spread diseases? How can we ensure health for all from mosquito-borne diseases?

4-4 Identifying Local Disease Hosts

In Task 4-3 the team learned that mosquitoes can use different hosts. The addition of different disease hosts in a community can affect the problem.

Objective

In this task, the team will work to identify animal hosts and signs of animals hosts in and around the research site. Knowing what hosts might live in and around your research site can be useful when you think about how different diseases could move through your community. In this task, the team will be focusing on the following questions from the question map.

- How do mosquitoes spread disease?
- What factors influence this?

1. Go to the Task 4-4 folder and get the Identifying Local Disease Hosts instructions. There is only one version of this task.
2. As a team, look over the list of potential mosquito vector disease hosts.
3. Do you know if any of these disease hosts live in your area? If so, what and where.
4. View any of the Learning Lab resources for this task about studying disease hosts, if you are able.
5. Why might it be important to learn more about animals living in your community when thinking about mosquito-borne diseases?
6. Follow the instructions in the task folder to complete the Research Site Disease Host Survey for Active Wildlife and Evidence of Wildlife.
7. As a team, discuss the following:

• Based on the observations of your research site, how could this information be useful when thinking about how mosquitoes could spread diseases in your local community?

• Changes in wildlife can affect mosquitoes in your local area. How could you monitor wildlife changes in your research site in the future? How could this information be useful to address the problem question in the future?

• How could this information be useful when developing solutions to manage mosquitos in your local community?

• How could this information be useful when thinking about the problem question: How can we ensure health for all from mosquito-borne diseases?

4-5 Collecting Local Transmission Histories

In previous tasks, the team learned about some factors that affect the spread of mosquito-borne diseases. These factors include temperature, precipitation, disease hosts, and income.

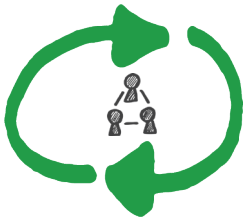
Objective

In this task, the team will explore some other factors that can affect the spread of mosquito-borne diseases in a community. The team will also work to understand how these factors have changed over time in the community. These factors include urbanization, natural disasters, deforestation, and changes in population. To understand how these factors have changed in your community, the team must talk to local people of various ages.

In this task, the team will be focusing on the following questions from the question map.

- What factors influence how mosquitoes develop and reproduce?
- What factors influence how mosquitoes spread disease?
- Who are local people, organizations, associations that can provide valuable information related to this problem?

1. Go to the Task 4-5 folder and get the Meet the Team reading. This reading includes the interview questions.
2. As a team, read the Meet the Team reading.
3. Outline three to five very important points from the reading. Share as a team.
4. Use the resources in the Learning Lab task folder to learn more about the effects of natural disasters and urbanization on mosquitoes.
5. Read the interview questions provided.
6. Decide which questions you will use during your interview.
7. Create any additional interview questions as a team.
8. Identify various people in your community that team members could interview.



4-5

9. Determine how you will document the responses of the people you are interviewing.
10. Conduct interviews with these people.
11. As a team, share and compile the results of these interviews.
12. As a team, discuss the following:
    - Based on your interviews, how has the urbanization of your community changed over time?
    - Has it become more crowded? Have many people moved there or moved away? Has human contact with animals increased or decreased?
    - Have any natural events, such as large storms, tornadoes, or hurricanes, happened in the area?
    - Have people become more or less healthy? How has their living situation changed for better or worse?
    - What are some limitations of these types of interviews?
    - How are interviews about the past different than data or evidence from the past?
    - How did the interviews shed light on the present? Write a few examples of current things that make more sense now than before you heard about the past.
    - How might these things, or other parts of what you heard, tie into the community's health?
    - How can the information from these interviews be useful when considering the problem question and other questions from the map?
    - What factors influence how mosquitoes develop and reproduce? What factors influence how mosquitoes spread disease?
    - Who are local people, organizations, associations that can provide valuable information related to this problem?
    - How can we ensure health for all from mosquito-borne diseases?

Research Tip

Use the field safety tips in the safety documents on Learning Lab before going out into the community to survey or interview people. Be polite, never go alone, and always be aware of your surroundings.

4-6 Analyzing Community Surveys (Transmission)

In Task 2-3, the team surveyed people in your local community about mosquitoes.

Objective

In this task, you will do the same analysis you did during Tasks 2-4 and 3-6. Now you will focus on the community survey results only for Part Four: Transmission. The team will analyze the other parts of the survey in future tasks, so keep the survey results in a safe place.

In this task, the team will be focusing on the following questions from the question map in Task 1-10.

- What do people in our local community think and know about mosquitoes and mosquito-borne diseases?
- How can we effectively share and communicate mosquito-borne disease evidence with the community?

1. Go to the Task 4-6 folder and get the survey analysis instructions and questions. Choose the Mosquito A or Mosquito B task from the task folder.
2. As a team, determine how to compile the community survey results for Part Four from all team members. You will want to analyze the compiled data from the entire team. Develop your own method for compiling the data for Part Four, or use one of the methods in the instructions.
3. Create some graphs about this compiled community survey data. Use the instructions and examples in the task folder.
4. Use the graphs and data to answer these questions:
5. What interesting patterns do you see in the data from Part Four questions?
6. Which questions did most people in the community agree on?
7. Which questions did people in the community have different responses to?

Research Tip

As you may have noticed, the survey is broken into the same parts as this research guide. Analyze only the results from that part of the survey while working on that Part of the guide to make the analysis more manageable.

4-6

8. Discuss how this survey evidence could be useful when thinking about the question: What do people in our local community think about mosquitoes and mosquito-borne diseases?
9. Discuss how this survey evidence could be useful when thinking about the question: How can we effectively share and communicate mosquito-borne disease evidence with the community?
10. Discuss how this survey evidence could be useful when thinking about the problem question: How can we ensure health for all from mosquito-borne diseases?
11. Select one or two survey questions, write a claim, and provide the supporting evidence for the claim based on the question and evidence collected

Examples:

- The local community does not have a good understanding of what time of the day mosquitoes bite.
- The local community has poor understanding that only female mosquitoes can transmit diseases to humans.

12. Explain how the data evidence from the community survey supports your claims.
13. As a team, share some claims you created and the evidence that supports that claim.

Hooray! You completed Task 4-6. Check it off the task list. *Go to Task 4-7!*

4-7 Debriefing Transmission

This is the last task of Part Four: Transmission.

Objective

In this task, we will debrief Part Four: Transmission. This is good to do before we move on to the next part. Each debrief will be very similar and is broken down into the same parts. The objective is to think about and discuss helpful information that was gathered during that part.

1. Remember the team norms.
   - Recognize the benefits of listening to a range of different perspectives and viewpoints.
   - Be open to new ideas and perspectives that challenge your own.
   - Be willing to cooperate with others to change things for the better.
2. Remember to use your meaningful conversation starters as needed throughout this discussion.
   - I agree with _____ because…
   - I disagree with _____ because…
   - I'd like to go back to what _____ said about …
   - I'd like to add_____
   - I noticed that …
   - Another example is …
3. Remember when you are making claims from evidence to use the following sentences.
   - I think this claim is best supported because …
   - I do not think this claim is best supported because …
   - I think this piece of evidence supports this claim because …
   - I do not think this piece of evidence supports this claim because …

4-7

4. Go to the Task 4-7 folder to get Debriefing Transmission instructions. There is only one version of the debrief.

5. Follow the instructions in the task folder to complete the five sections of the debrief.
   - Question Map Analysis
   - Community Partners
   - Perspectives
   - Identity
   - Problem Question

Hooray! You completed Task 4-7 and Part 4. Check it off the task list.

Congratulations! You have completed Part Four of your research. Give yourself a pat on the back.

You now know more about how mosquito-borne diseases are spread and transmitted. You also know more about factors that can affect how these diseases spread.

Keep this research easily available. Think about how it could help with your final project.

The next part of your research will focus on understanding more about the habitats of mosquitoes throughout your community.

Continue to Part 5: Habitats.

Notes:

Notes:

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PART FIVE. HABITATS TASK LIST

This is the list of tasks for Part Five. Habitats

Check them off as you complete them.

TASKS

- 5-1 ☐ Understanding Mosquito Habitats
- 5-2 ☐ Identifying + Mapping Local Habitats
- 5-3 ☐ Surveying Local Vegetation Habitats
- 5-4 ☐ Analyzing Community Surveys (Habitats)
- 5-5 ☐ Debriefing Habitats

In this part, the team will focus on researching where mosquitoes live and breed in the community. Research of man-made and natural habitats will be conducted.




5-1 Understanding Mosquito Habitats

Welcome to Part Five: Habitats, and Task 5-1. In Part Four you learned more about how the mosquito spreads diseases. Now, the team will begin learning more about the specifics of where mosquitoes like to live and breed in your community.

Objective

In this task, the team will be focusing on the following question from the question map.

- Where do mosquitoes live and breed?

Mosquitoes can live and breed in a variety of human and natural habitats. A habitat is the home or environment of an animal, plant, or other organism. The first step is understanding all the different types of habitats and breeding sites of mosquitoes. Then, in Task 5-2, you can start looking for these habitats and breeding sites in your local community. This information will be useful when creating your management plan at the end of your research.

1. Go to the Task 5-1 folder and get the Habitat Bingo game. There is only one version of this task.

2. To get familiar with different mosquito habitats, go through each so the team knows what they are. These are places where mosquitoes may live and lay their eggs.
3. Play a few games of Zika Zapp Bingo.
4. As a team, discuss the following questions.

- Which habitats from the bingo game do you think might exist in your research site or community?
- How does understanding which habitats exist in your community help when thinking about the problem question: How can we ensure health for all from mosquito-borne diseases?

Hooray! You completed Task 5-1. Check it off the task list. *Go to Task 5-2!*

5-2 Identifying and Mapping Local Habitats

In this task, the team will identify potential mosquito habitats in and around your research site. The team should look for both human and natural potential habitats. Opportunities to engage in the Citizen Science program GLOBE Mosquito Habitat Mapper are provided. Participate if you can.

Objective

In this task, the team will be focusing on the following questions from the question map.

- Where do mosquitoes live and breed?
- What influences this?

1. Go to the Task 5-2 folder and get the Identifying and Mapping Local Habitats instructions and GLOBE. You will also need your research map from Task 2-1. There are two versions of this task. Mosquito A involves collecting data by hand. Mosquito B involves using the Citizen Science GLOBE Mosquito Habitat mapper app. Choose the version that works for you. It might also be helpful to do both if you can. In that case, start with Mosquito A and then do Mosquito B.
2. As a team, read the Meet the Team reading.
3. Conduct a research site evaluation.
4. As a team, discuss the following.

Citizen Science Tip

If your team has access to technology, such as a smart phone or tablet, consider how you could use the GLOBE Mosquito Habitat Mapper app to share your local data with scientists around the world.

- How could your habitat survey of your research site be useful when thinking about where mosquitoes live and develop in your local community?
- How could this information be useful when thinking about the problem question: How can we ensure health for all from mosquito-borne diseases?
- How could this information be useful when developing solutions to manage mosquitos in your local community?
- Changes in habitats can affect mosquitoes in your local area. How could you monitor habitat changes in your research site in the future? How could this information be useful to address the problem question in the future?

Continue to Task 5-3

5-3 Surveying Local Vegetation Habitats

In Task 5-2, the team learned more about different human and natural potential mosquito habitats in your research site. Another factor that can influence the presence of mosquitoes in your area is the vegetation. Vegetation is a term used to describe all of the plants found in a particular area or habitat. Many mosquitoes, eggs, and larvae will use the natural vegetation (the plants) in and around your research site as habitats or places to live, breed, and develop. Other types of vegetation can help keep mosquitoes away and can be useful for mosquito management.

Objective

In this task, the team will survey the vegetation in the area to understand how it could affect the mosquitoes living in your research site.

In this task, the team will be focusing on the following questions from the question map.

- Where do mosquitoes live and breed?
- What influences this?

1. Go to the Task 5-3 folder and get the Vegetation Survey form. There are two versions of this task. Mosquito A involves collecting data by hand. Mosquito B involves using some additional technology. Choose the version that works for you. It might be helpful to do both if you can. In that case, start with Mosquito A and then do Mosquito B.
2. As a team, conduct the vegetation survey in and around your research site.
3. If you're able, collect leaf or plant samples to create a research site vegetation book. Use the plant collection instructions in the task folder as needed.
4. As a team, discuss:

- Based on your habitat and vegetation survey of your research site, how could this information be useful when thinking about where mosquitoes live and develop in your local community?
- How could this information be useful when thinking about the problem question: How can we ensure health for all from mosquito-borne diseases?
- How could this information be useful when developing solutions to manage mosquitos in your local community?
- Changes in vegetation can also affect mosquitoes in your local area. How could you monitor vegetation changes in your research site into the future? How could this information be useful to address the problem question into the future?

Continue to Task 5-4

5-4

Analyzing Community Surveys (Habitats)

In Task 2-3, the team surveyed people in your local community about mosquitoes.

Objective

In this task, you will do the same analysis you did during Tasks 2-4 and 3-6, and 4-6. Now you will focus on the community survey results only for Part Five: Habitats. The team will analyze the other parts of the survey in future tasks, so keep the survey results in a safe place.

In this task, the team will be focusing on the following questions from the question map in Task 1-10.

- What do people in our local community think and know about mosquitoes and mosquito-borne diseases?
- How can we effectively share and communicate mosquito-borne disease evidence with the community?

1. Go to the Task 5-4 folder and get the survey analysis instructions and questions. Choose the Mosquito A or Mosquito B task from the task folder.
2. As a team, determine how to compile the community survey results for Part Five from all team members. You will want to analyze the compiled data from the entire team. Develop your own method for compiling the data for Part Five, or use one of the methods in the instructions.
3. Create some graphs about this compiled community survey data. Use the instructions and examples in the task folder.
4. Use the graphs and data to answer these questions:
5. What interesting patterns do you see in the data from Part Five questions?
6. Which questions did most people in the community agree on?
7. Which questions did people in the community have different responses to?

Research Tip

As you may have noticed, the survey is broken into the same parts as this research guide. Analyze only the results from that part of the survey while working on that Part of the guide to make the analysis more manageable.

5-4

8. Discuss how this survey evidence could be useful when thinking about the question: What do people in our local community think about mosquitoes and mosquito-borne diseases?
9. Discuss how this survey evidence could be useful when thinking about the question: How can we effectively share and communicate mosquito-borne disease evidence with the community?
10. Discuss how this survey evidence could be useful when thinking about the problem question: How can we ensure health for all from mosquito-borne diseases?
11. Select one or two survey questions, write a claim, and provide the supporting evidence for the claim based on the question and evidence collected

Examples:

- The local community does not have a good understanding of where mosquitoes live and breed.
- Many local residents have standing water around their home that must be addressed when managing mosquitoes in the community.

12. Explain how the data evidence from the community survey supports your claims.
13. As a team, share some claims you created and the evidence that supports that claim.

Hooray! You completed Task 5-4. Check it off the task list. *Go to Task 5-5!*

5-5

Debriefing Habitats

This is the last task of Part Five: Habitats.

Objective

In this task, we will debrief Part Five: Habitats. This is good to do before we move on to the next part. The objective is to think about and discuss helpful information that was gathered during this part.

1. Remember the team norms.
   - Recognize the benefits of listening to a range of different perspectives and viewpoints.
   - Be open to new ideas and perspectives that challenge your own.
   - Be willing to cooperate with others to change things for the better.
2. Remember to use your meaningful conversation starters as needed throughout this discussion.
   - I agree with _____ because…
   - I disagree with _____ because…
   - I'd like to go back to what _____ said about …
   - I'd like to add_____
   - I noticed that …
   - Another example is …
3. Remember when you are making claims from evidence to use the following sentences.
   - I think this claim is best supported because …
   - I do not think this claim is best supported because …
   - I think this piece of evidence supports this claim because …
   - I do not think this piece of evidence supports this claim because …

5-5

4. Go to the Task 5-5 folder to get Debriefing Transmission instructions. There is only one version of the debrief.

5. Follow the instructions in the task folder to complete the five sections of the debrief.
   - Question Map Analysis
   - Community Partners
   - Perspectives
   - Identity
   - Problem Question

Hooray! You completed Task 5-5 and Part 5. Check it off the task list.

Congratulations! You have completed Part Five of your research. Give yourself a pat on the back.

You now know more about how and where mosquitoes live and breed. You also know more about factors that can affect where mosquitoes live and breed.

Keep this research easily available. Think about how it could help with your final project.

The next part of your research will focus on understanding different strategies to manage mosquitoes in your community.

Continue to Part 6: Management.

Notes:

Notes:

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PART SIX. MANAGEMENT TASK LIST

This is the list of tasks for Part Six. Management

Check them off as you complete them.

TASKS

- 6-1 ☐ Understanding Management Options
- 6-2 ☐ Developing Integrated Management Plans
- 6-3 ☐ Creating Local Integrated Management Plan
- 6-4 ☐ Analyzing Community Surveys (Management)
- 6-5 ☐ Debriefing Management

In this part, the team will focus on exploring a diversity of ways to manage mosquitoes. The team will then begin to develop integrated management plans for the local community concerning mosquitoes and mosquito-borne diseases.




6-1 Understanding Management Options

Welcome to Part Six: Management, and Task 6-1. In Part Five you learned more about where mosquitoes live and breed. Now, the team will begin learning more about the different mosquito management and control strategies.

Objective

In this task, the team will be focusing on the following question from the question map.

- What are the social, environmental, economic, and ethical considerations of various mosquito management and control plans?

There are many different methods to manage mosquitoes in your community. Not every method is appropriate for your location. There are many arguments for and against each strategy. You must consider all of the options before making decisions about what you think a community should do. In this task, the team will be learning about different mosquito management options. The team will also start to determine the social, environmental, economic, and ethical considerations of the different options.

1. Go to the Task 6-1 folder and get the Meet the Team reading. There is one version of this task.

2. Each team member can read the entire reading, or you can form groups and split the reading up. Each group should read about one researcher. Then, each group will share information on the management method discussed by the researcher they read about.

6-1

3. When reading and presenting to the team, complete the following.
   - Briefly describe the management method and any Very Important Parts (VIPs),
   - Describe some arguments for and against each method.
   - Are there any social, environmental, economic, or ethical perspectives that should be considered when thinking about this management option?
   -

4. As a team, discuss the following questions:
   - Imagine you are creating a mosquito management plan for a city. This city has a certain amount of money to spend. Do you think it is better to spend all the money on just one management method or spread the money across a variety of different methods? Why?
   - How does understanding different management methods help when thinking about the problem question: How can we ensure health for all from mosquito-borne diseases?

Hooray! You completed Task 6-1. Check it off the task list. *Go to Task 6-2!*

6-2

Developing Integrated Management Plans

In Task 6-1, the team learned about different management options. These are all things a community can do to manage mosquitoes and mosquito-borne diseases. However, every location is different. It is important to create a management plan that is specific to your location. It is also important to create a management plan that combines a variety of methods. Combining multiple methods helps to address all of the different perspectives of the problem (social, economic, environmental, ethical). A plan that combines many different methods is called an integrated management plan.

Objective

In this task, the team will practice making integrated management plans. The team will be provided a variety of city scenarios and budgets (which we'll express in wealth units). From these scenarios and budgets, groups will make suggestions for how each city should develop their integrated management plan.

In this task, the team will be focusing on the following question from the question map.

- What are the social, environmental, economic, and ethical considerations of various mosquito management and control plans?

1. Go to the Task 6-2 folder and get the Meet the Team reading and the list of city scenarios and management options. There is only one version of this task, but there are many ways to customize it. Think about how you could break up the reading or scenarios, if needed.
2. As a team, read the Meet the Team reading.
3. From the reading, make a list of important things to consider when making a mosquito management plan.
4. Read through each city scenario and the list of management options.

6-2

5. Note the wealth units each management option costs and how many each city has in its budget.
6. Using the information in the scenario and the budget (wealth units), create a suggested integrated management plan from the list of options. Remember to add up the wealth units for each method. You cannot have a plan with more wealth units than the budget allows.
7. Consider how your plan will address all perspectives of the problem (social, economic, ethical, environmental).
8. As a team, discuss the following:
   - Share and discuss your integrated management plan for each city scenario.
   - Provide the reasoning for why you selected those methods for each city.Compare and contrast plans from different groups.
   - Identify and share how your plan addresses each perspective of the problem (social, economic, ethical, environmental).
   - Based on your plans, how could this information be useful when thinking about creating an integrated management plan for your community?
   - How could this information be useful when thinking about the problem question: How can we ensure health for all from mosquito-borne diseases?

Hooray! You completed Task 6-2. Check it off the task list. *Go to Task 6-3!*

6-3

Creating Local Integrated Management Plan

In Task 6-2, the team created integrated management plans for simulated cities. These plans outlined ways for a community to manage mosquitoes and mosquito-borne diseases. It is important to create a management plan that is specific to your location. It is also important to create a management plan that combines a variety of methods. Combining together multiple methods helps address all the different perspectives of the problem (social, economic, environmental, ethical). A plan that combines many different methods is called an integrated management plan (IMP).

Objective

In this task, the team will create a variety of integrated management plans for your local community. Using the list of management methods from Task 6-2, the team will develop a variety of IMPs for different budgets (wealth units). From these scenarios and budgets, groups will make suggestions for how the local community should develop their integrated management plan.

In this task, the team will be focusing on the following question from the question map.

- What are the social, environmental, economic, and ethical considerations of various mosquito management and control plans?

1. Go to the Task 6-3 folder and get the list of management options. There is only one version of this task.

2. Read through the list of management options.
3. Note the wealth units for each management option.
4. Divide the team into groups, individuals, or work together as a whole team.

6-3

5. Using the list of management options, create three integrated management plans for your local community, using the following budgets.
   - 150 wealth units
   - 100 wealth units
   - 50 wealth units
6. For each plan, determine how you are addressing the different perspectives of the problem (social, economic, ethical, environmental).
7. As a team, discuss the following:

- Share and discuss your integrated management plans for your community.
- Provide the reasoning for why you selected the methods for each budget level.
- Compare and contrast plans from different groups.
- Based on your plans, how could this information be useful when thinking about the problem question: How can we ensure health for all from mosquito-borne diseases?
- How could you best communicate this plan to local community members? Be creative and think about a communication plan that you think would work for local people.

Hooray! You completed Task 6-2. Check it off the task list. *Go to Task 6-3!*

6-4 Analyzing Community Surveys (Management)

In Task 2-3, the team surveyed people in your local community about mosquitoes.

Objective

In this task, you will do the same analysis you did during Tasks 2-4 and 3-6, and 4-6, and 5-4. Now you will focus on the community survey results only for Part Six: Management. The team will analyze the other parts of the survey in future tasks, so keep the survey results in a safe place.

In this task, the team will be focusing on the following questions from the question map in Task 1-10.

- What do people in our local community think and know about mosquitoes and mosquito-borne diseases?
- How can we effectively share and communicate mosquito-borne disease evidence with the community?

1. Go to the Task 6-4 folder and get the survey analysis instructions and questions. Choose the Mosquito A or Mosquito B task from the task folder.
2. As a team, determine how to compile the community survey results for Part Six from all team members. You will want to analyze the compiled data from the entire team. Develop your own method for compiling the data for Part Six, or use one of the methods in the instructions.
3. Create some graphs about this compiled community survey data. Use the instructions and examples in the task folder.
4. Use the graphs and data to answer these questions:
5. What interesting patterns do you see in the data from Part Six questions?
6. Which questions did most people in the community agree on?
7. Which questions did people in the community have different responses to?

Research Tip

As you may have noticed, the survey is broken into the same parts as this research guide. Analyze only the results from that part of the survey while working on that Part of the guide to make the analysis more manageable.

6-4

8. Discuss how this survey evidence could be useful when thinking about the question: What do people in our local community think about mosquitoes and mosquito-borne diseases?
9. Discuss how this survey evidence could be useful when thinking about the question: How can we effectively share and communicate mosquito-borne disease evidence with the community?
10. Discuss how this survey evidence could be useful when thinking about the problem question: How can we ensure health for all from mosquito-borne diseases?
11. Select one or two survey questions, write a claim, and provide the supporting evidence for the claim based on the question and evidence collected

Examples:

- Social media and newspapers are good methods to get mosquito information to community members.
- Many local residents are currently not taking any individual or household action to protect themselves from mosquito-borne diseases.

12. Explain how the data evidence from the community survey supports your claims.
13. As a team, share some claims you created and the evidence that supports that claim.

Hooray! You completed Task 6-4. Check it off the task list. *Go to Task 6-5!*

Debriefing Management

This is the last task of Part Six: Management.

Objective

In this task, we will debrief Part Six: Management. This is good to do before we move on to the next part. The objective is to think about and discuss helpful information that was gathered during this part.

1. Remember the team norms.
   - Recognize the benefits of listening to a range of different perspectives and viewpoints.
   - Be open to new ideas and perspectives that challenge your own.
   - Be willing to cooperate with others to change things for the better.
2. Remember to use your meaningful conversation starters as needed throughout this discussion.
   - I agree with _____ because…
   - I disagree with _____ because…
   - I'd like to go back to what _____ said about …
   - I'd like to add_____
   - I noticed that …
   - Another example is …
3. Remember when you are making claims from evidence to use the following sentences.
   - I think this claim is best supported because …
   - I do not think this claim is best supported because …
   - I think this piece of evidence supports this claim because …
   - I do not think this piece of evidence supports this claim because …

6-5

4. Go to the Task 6-5 folder to get Debriefing Transmission instructions. There is only one version of the debrief.

5. Follow the instructions in the task folder to complete the five sections of the debrief.
   - Question Map Analysis
   - Community Partners
   - Perspectives
   - Identity
   - Problem Question

Hooray! You completed Task 6-5 and Part 6. Check it off the task list.

Congratulations! You have completed Part Six of your research. Give yourself a pat on the back.

You now know more about different ways mosquitoes can be managed. You have also created some plans for how your local community can address this problem. Keep these plans for the next and final part.

The next part of your research will focus on putting together your final project. This final project will include your integrated management plans, along with a communication plan and a presentation to team and community members.

Continue to Part 7: Action Plan

Notes:

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PART SEVEN. ACTION PLAN TASK LIST

This is the list of tasks for Part Seven. Action Plan

Check them off as you complete them.

TASKS

- 7-1 ☐ Assembling Part 1 of Plan: Research Area Background
- 7-2 ☐ Developing Part 2 of Plan: Action Goals
- 7-3 ☐ Creating Part 3 of Plan: Communication Strategy
- 7-4 ☐ Post-Surveying Team
- 7-5 ☐ Thinking about your Future Actions

In this part, the team will focus on developing a local community action plan. This plan will outline the research that was conducted, the actions the team thinks people need to take in the community, and a communication plan to share the plan with local community members.




7-1 Assembling Part One of the Community Action Plan: Research Area Background

Welcome to Part Seven: Action Plan. In Parts One through Six you learned many things about mosquitoes and mosquito-borne diseases. Now, the team must finish their work. To do this, you must create an action plan for your community. In Task 1-7, you learned about the action plan focused on creating solutions to the problem question: How can we ensure health for all from mosquito-borne diseases?

There are many possible solutions to this question. This is why you conducted research to learn more about the problem in your community. Now you must suggest decisions and actions you think people should take in the community. The community action plan will help communicate your solutions. All of the team research was done to help you complete this action plan.

Objective

In this task, the team will assemble the first part of your community action plan. This part involves assembling and organizing all of the research you have already completed.

1. Go to the Task 7-1 folder to read the details about assembling part one of the action plan: Research Area Background. There is only one version of this task.

2. Read through the details of the first part of the action plan again as a team. Ask questions about any parts that are not clear. Remember not to worry.

3. Use all of the work you have completed up to this point to assemble and organize this part of your action plan for the community.

Hooray! You completed Task 7-1. Check it off the task list. *Go to Task 7-2!*

7-2 Developing Part Two of the Community Action Plan: Action Goals

In Task 7-1, you assembled and organized all of the research you have already completed. It is one thing to do research and another to set local goals to help people take action on that research. It will be important to use the information you collected to figure what your future actions will be to help address the problem question: How can we ensure health for all from mosquito-borne diseases?

There are many possible solutions to this question. This is why we must now develop action goals for what to do next.

Objective

In this task, the team will assemble the second part of their community action plan. This part involves developing actions you think people should begin taking in the community to address the problem question.

1. Go to the Task 7-2 folder to read the details about assembling part two of the action plan: Action Goals. There is only one version of this task.

2. Read through the details of the second part of the action plan again as a team. Ask questions about any parts that are not clear. Remember not to worry.

3. Use all of the work you have completed up to this point to assemble and organize this part of your action plan for the community.

Hooray! You completed Task 7-2. Check it off the task list. *Go to Task 7-3!*

7-3 Creating Part Three of the Community Action Plan: Communication Strategy

In Tasks 7-1 and 7-2, you assembled and developed parts one and two of your plan. However, if no one outside of your research team knows about your plan, can it make an impact? No way! Next, you will need to develop a plan to creatively communicate your action plan with your community.

There are many possible ways you can communicate with your community. Be creative!

Objective

In this task, the team will assemble the third part of their community action plan. This part involves creating a communication strategy to communicate your plan to others.

1. Go to the Task 7-3 folder to read the details about assembling part three of the action plan: Communication Strategy. There is only one version of this task.

2. Read through the details of the third part of the action plan again as a team. Ask questions about any parts that are not clear. Remember not to worry.

3. Use all of the work you have completed up to this point to assemble and organize this part of your action plan for the community.

Hooray! You completed Task 7-3. Check it off the task list. *Go to Task 7-4!*

7-4 Post-Surveying Team

Congratulations!

You have completed your action plan.

Give yourself a pat on the back.

One last thing you must do is post-survey the team.

Objective

In this task, you will take the same survey you took in Task 1-3, and compare your answers between the two surveys. The objective is to look at how your ideas about the questions may have changed or remained the same since you started working on your research.

1. Go to the Task 1-3 folder to get the survey you took in Task 1-3. Use the same version (Mosquito A or Mosquito B) of the survey the team used for the team survey in Task 1-3.
2. Each team member should complete the survey again.
3. Compare and contrast the team's answers to the surveys between Task 1-3 and Task 7-4.
4. Identify any questions where your answers have changed. Why do you think your answers changed from Task 1-3 to Task 7-4?
5. Identify any questions where your answers have not changed. Why do you think your answers have not changed from Task 1-3 to Task 7-4?
6. How could this information be useful when thinking about the problem question: How can we ensure health for all from mosquito-borne diseases?

Hooray! You completed Task 7-4. Check it off the task list. *Go to Task 7-5!*

7-5 Thinking About Your Future Actions

Congratulations!

You have completed all parts of this research guide.

Give yourself a pat on the back.

But this does not mean we are finished.

Mosquitoes are still a major problem for many people in large parts of the world.

Your research has really just started.

Think about this:

- Are there any questions that are still not answered about mosquitoes?
- Is there anything else we still need to learn to help more people protect themselves from these diseases?

There is always something new to learn to help others.

This new understanding will continue to change the decisions we make.

We must think about how we can continue to make things better for the world.

Hopefully, the issue is clearer to you now.

How can you help it become clearer to other people around you?

How can you help someone in a different community learn more about this problem?

Just remember, every community is different.

The same answer is not always right for every place in the world.

But the question remains the same:

How can we ensure health for all from mosquito-borne diseases?

Be creative.

Ask questions.

Make a plan.

Explore the world around you.

Be open-minded.

And most important, think about how we can work together to make the world a better place.

Notes:

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Smithsonian Science for Global Goals (SSfGG) is a freely available curriculum developed by the Smithsonian Science Education Center (SSEC) in collaboration with the InterAcademy Partnership. It uses the United Nations Sustainable Development Goals (SDGs) as a framework to focus on sustainable actions that are student-defined and implemented.

Attempting to empower the next generation of decision makers capable of making the right choices about the complex socio-scientific issues facing human society, **SSfGG** blends together previous practices in Inquiry-Based Science Education (IBSE), Social Studies Education (SSE), Global Citizenship Education (GCE), Social Emotional Learning, and Education for Sustainable Development (ESD).

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