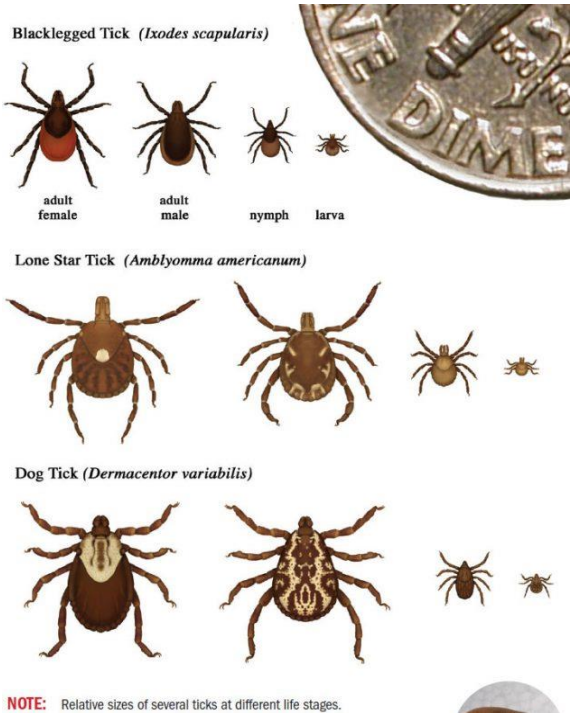
School-Based Tick-borne Disease Education Toolkit

Teacher Crash Course:



How are Lyme and other tick-borne diseases transmitted?

Ticks spread germs that cause disease through the process of feeding. Depending on the type of tick and its stage of life, preparing to feed can take from 10 minutes to 2 hours. When the tick finds a feeding spot, it grasps the skin and cuts into the surface. The tick then inserts its feeding tube. Many types of ticks also release a cement-like substance that keeps them firmly attached during the meal. The feeding tube can have barbs which help keep the tick in place. Ticks also can release small amounts of saliva (spit) with numbing properties so that the animal or person can't feel that the tick has attached itself. If the tick is in a sheltered spot, it can go unnoticed. A tick will suck the blood slowly for several days. If the host animal/person has a bloodborne infection, the tick will take in the germs with the blood. Small amounts of saliva from the tick may also enter the skin of the host animal/person during the feeding process. If the tick contains germs, they can be spread to the host animal/person in this way. After feeding, most ticks will drop off and prepare for the next life stage. At its next feeding, it can then spread disease to the new host.

What types of ticks are there and what diseases do they transmit?

The three most common types of ticks that bite humans are the Blacklegged Tick (*Ixodes scapularis)* more commonly known of as the deer tick, the Lone Star Tick, and the Dog Tick. The most common tick-borne diseases in New Jersey are Anaplasmosis, Babesiosis, Ehrlichiosis, Lyme disease, and Spotted Fever Group Rickettsiosis. Lyme disease is by far the most common.

Tick	**Disease(s) Transmitted**
Blacklegged "deer" tick	Lyme disease, anaplasmosis, babesiosis, Powassan
Dog tick	Spotted Fever Group Rickettsiosis, tularemia
Lone star tick	Ehrlichiosis, tularemia

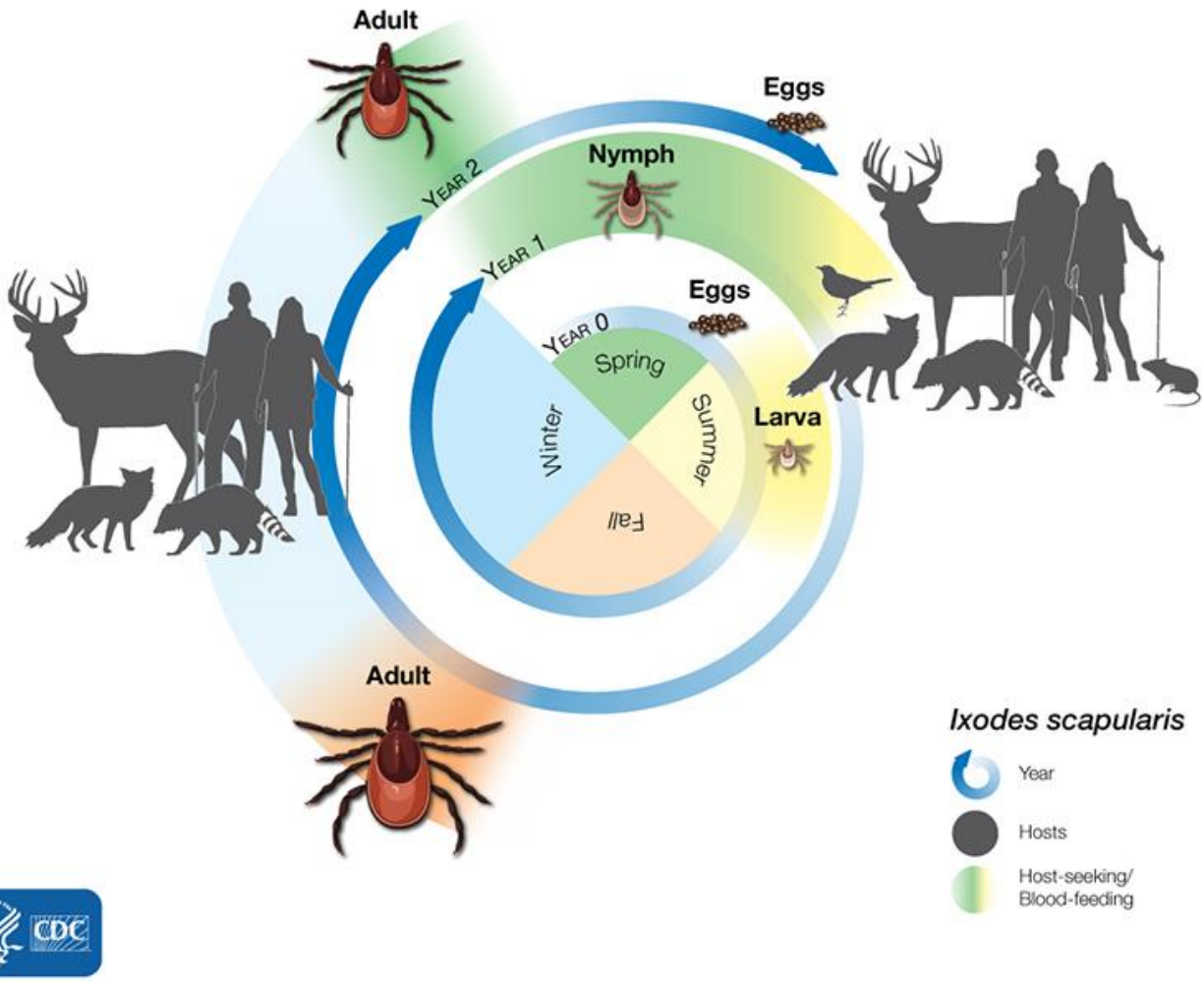
In late 2017, a tick called the "Asian longhorned tick" was found in NJ. This is concerning because it is not native to the US and poses a serious risk to livestock. As of now, none of these ticks have been found to carry any human diseases in the US. However, in East Asia, they carry bacteria that cause the diseases mentioned above, as well as a different, dangerous virus that affects humans and could potentially be brought to the US.

When is there the highest risk of being bitten by a tick?

Ticks go through four life stages: egg, six-legged larva, eight-legged nymph, and adult. In between each of these stages, the tick must feed on blood to survive and progress to the next stage. Larva are not known to transmit Lyme disease. but may transmit other less common tick-borne diseases. Nymphs are about the size of a poppy seed and feed on humans to convert into adults. Their feeding primarily takes place in the warm months of April to September. Adult ticks are about the size of a sesame seed and primarily feed on deer and other animals.

What is the life cycle of the deer tick?

The lifecycle of the deer tick generally lasts two years. During this time, they go through four life stages: egg, larva, nymph, and adult. After the eggs hatch, the ticks must have a blood meal at every stage to survive. Deer ticks can feed from mammals, birds, reptiles, and amphibians. The ticks need a new host at each stage of their life.



Are tick-borne diseases contagious (can they spread from person to person)?

Generally, no. In rare cases some tick-borne diseases can be spread from an infected blood transfusion or from mother to baby during pregnancy.

Where do ticks live?

Ticks live in or near wooded and grassy areas. The best way to avoid ticks is to walk in the center of trails and stay in areas that are sunny with short grass.

What steps can be taken to prevent being bitten by a tick?

On the person:

- Wear long clothes that are light in color (to better see any ticks)
- Tuck pants into socks, tops into pants, etc.
- Treat clothes with permethrin (an insecticide) or buy pre-treated clothing
- Use insect repellent, ideally with at least 20% DEET or another EPA-registered repellent

On the property:

- Limit damp, dark, brushy areas
- Create a 3-ft wide wood chip or gravel area between recreational areas and the woods to restrict tick migration
- Mow lawn regularly
- Keep children's play areas in the sunlight

What's the next step after outside activity has finished?

Clothing should be scanned for ticks and then put in a dryer on high heat for 10 minutes; this will kill any remaining ticks. Children should shower as soon as possible to wash off unattached ticks. Adults should help children to conduct a full body tick check. The image to the right shows the most common places ticks will attach, but ensure the full body is checked thoroughly.

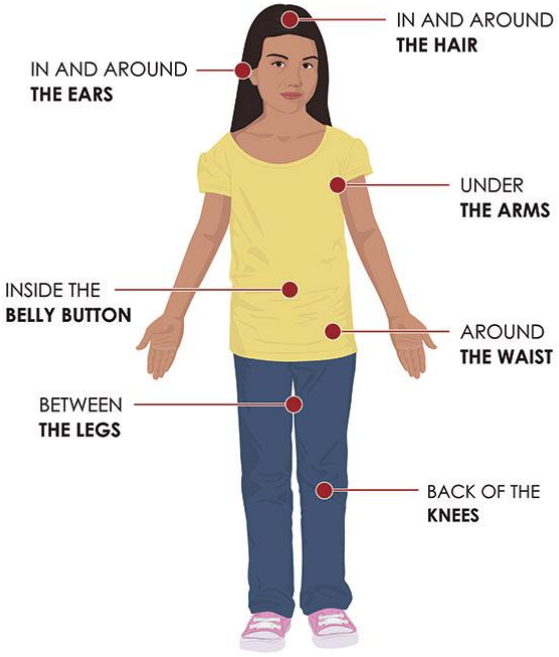


Figure 1: image from www.cdc.gov

What action should I take if I find an attached tick?

The only safe method of removing an attached tick is to use fine-tipped tweezers. Grip the tick by the head, as close to the skin as possible, and pull straight out with a steady motion. Squeezing the tick's body will cause it to release any bacteria into the skin. After all of the tick has been removed, clean the bite and your hands with rubbing alcohol or soap and water. If you develop symptoms, it can be helpful to your health care

provider to know what kind of tick it is. If a deer tick was attached for at least 36 hours, medication may be prescribed.

What are the early symptoms of Lyme disease?

One sign of Lyme disease is a bulls-eye rash (seen right), which will show as a bruise on darker skin, at the site of infection. Although this rash, called an Erythema migrans (EM) rash, definitively shows infection, only about 70-80% of infected persons develop it. Other early signs are flu-like symptoms such as fever, chills, headache, fatigue, muscle and joint aches, etc.

How soon will symptoms occur after a tick bite, if infected?

Lyme disease	3-30 days
Ehrlichiosis	7-14 days
Anaplasmosis	7-14 days
Spotted Fever Group Rickettsiosis	2-14 days
Babesiosis	7-63+ days

How is Lyme diagnosed and treated?

If you notice any of the above symptoms, contact a healthcare professional. If your doctor thinks you require treatment, you will likely be prescribed antibiotics at your doctor's discretion. Most cases of Lyme disease can be cured with antibiotics, but it is important to treat infection early so that the bacteria do not spread in the body.

Additional Resources and Sources:

- https://nj.gov/health/cd/topics/lyme.shtml
- https://www.cdc.gov/ticks/index.html
- https://nj.gov/health/cd/documents/topics/vectorborne/C2471--tick-borne_diseases_brochure.pdf
- https://nj.gov/health/cd/topics/vectorborne.shtml
- https://www.nj.gov/health/cd/documents/topics/vectorborne/AsianLonghornedTick-P.pdf

Grades K-2

Learning Objectives

As a result of education about ticks and tick-borne illnesses, students or their parents/guardians will be able to:

1. Define preventative measures to reduce personal risk.
2. Recognize the early signs and symptoms of a tick-borne illness.
3. Explain how to safely remove an attached tick.

The student will be able to:

1. Distinguish what a tick looks like.
2. Discuss that tick can make us sick.
3. Identify animals that can carry ticks.
4. Recall what a tick check is.

The NJ School-Based Tick-borne Disease Education Toolkit includes a PowerPoint with script and a printable document with the same material for teaching. Also included is a letter for parents, a tick check calendar, a coloring page, and two word search puzzles that will be useful for this age range. The emphasis is on informing the parents on their responsibilities to keep their children safe and teaching the children basic information about ticks.

Grades K-2

Suggested teacher-guided discussion:

- Introduce the topic of bugs.
- Identify what a tick is and where they live.
- Identify the animals that ticks may be found on (deer, mice, birds, squirrels, dogs, cats, etc).
- Describe that some ticks can make you sick; ask the students what they feel like when they are sick.
- Explain that in order to keep from getting sick they can do certain things like dressing up and playing in warm, sunlit areas.
- Discuss how to dress appropriately to avoid tick exposure.
    - Have students give other examples of when you dress to protect yourself (helmet when biking, a coat and mittens in the snow)
- Discuss where safe play areas are outside.
- Explain the importance of performing tick checks, especially after playing outside.
- Encourage students to have their parents help them to complete a thorough tick check.
- Emphasize the importance of going to a trusted adult as soon as a tick is discovered and not touching the tick while it is attached
    - Have students brainstorm who they could go to for help (parent, teacher, nurse, other school adults)

Suggested student activities:

1. Use items such as poppy-seeds and sesame seeds to show how small ticks are
    a. the children can perform 'tick checks' with the representative items
2. Dress to repel
    a. Either bring in clothes that the children can use to show how to dress appropriately for outside or have the children tuck their pants into socks
3. Invite the school nurse in to talk about symptoms of tick-borne diseases and what to do if you find a tick attached to you.
4. Play outside and inform children of where to play safely; when coming inside, perform tick checks on each of the children.
5. Have the children trace their hand and then draw a tick on it (to scale).

Grades 3-5

Learning Objectives

As a result of education about ticks and tick-borne illnesses, students and their families will be able to:

1. List preventative measures to reduce personal risk.
2. Recognize the early signs and symptoms of a tick-borne illness.
3. Explain how to safely remove an attached tick.

The student will be able to:

1. Identify what a tick looks like and where it lives.
2. Conclude that a tick can make us sick by biting us.
3. Identify animals that can carry ticks.
4. Dress appropriately when playing outside.
5. Perform a tick check.

The NJ School-Based Tick-borne Disease Education Toolkit for this age range focuses on a PowerPoint presentation with script designed as an interactive quiz to be completed after watching the YouTube video linked at the beginning of the slides. Also provided is a letter for parents, a tick check calendar, a crossword puzzle, and a maze. The emphasis is on informing the parents on their responsibilities to keep their children safe and teaching the children more detailed information about ticks, where to find them, and preventative measures they can take.

Grades 3-5

Suggested teacher-guided discussion:

- Introduce the topic of bugs
- Define what a tick is and where they live.
- Identify the different animals that they may be found on (deer, mice, birds, squirrels, dogs, cats, etc).
- Explain that ticks can make us sick which is why they are dangerous.
- Discuss preventative measures that can be taken to decrease risk of being bitten
    - Dressing appropriately (light-colored clothing and tucked in pants)
    - Playing in the sun and away from brushy areas
    - Wearing insect repellent
    - Showering right away
    - Drying clothes in high heat
- Explain the importance of performing tick checks, especially after being outside
- Encourage students to have their parents help them complete the tick check in order to see all the hidden places.
- Discuss how to perform a tick check and identify the places a tick will most likely be found.
- Emphasize the importance of going to a trusted adult as soon as a tick is discovered and not touching the tick while it is attached.

Suggested student activities:

1. Compare various insects
    a. use images of common insects and have them identify what they are as well as find the image of the tick
2. Invite the school nurse in to talk about symptoms of tick-borne diseases and what to do if you find a tick attached to you.
3. Play outside and inform children of where to play safely; when coming inside, perform tick checks on each of the children.
4. Have the children trace their hand and then draw a tick on it (to scale).

Middle and High School

Learning Objectives

As a result of education about ticks and tick-borne illnesses, students and their families will be able to:

1. List preventative measures to reduce personal risk.
2. Recognize the early signs and symptoms of a tick-borne illness.
3. Explain how to safely remove an attached tick.

The student will be able to:

1. Establish what a tick looks like and where it lives.
2. Describe how ticks transmit disease.
3. List the early signs and symptoms of a tick-borne illness.
4. Identify common ticks in NJ that can spread disease to humans.
5. Name the diseases that ticks can transmit to humans in NJ.
6. Discuss strategies for preventing tick bites.
7. Perform a tick check.
8. Explain how to safely remove an attached tick.

The NJ School-Based Tick-borne Disease Education Toolkit for this age range includes a PowerPoint presentation with script, interactive quiz to be completed afterwards, and a student handout. The emphasis is on informing students about ticks, where to find them, and preventative measures they can take.

Middle and High School

Suggested teacher-guided discussion:

- Discuss the relevance of ticks to NJ as one of the highest risk states
    - Use a map to show where ticks and tick-borne diseases are distributed in the US
- Describe the different types of ticks and which diseases they can transmit
- Discuss the life cycle of ticks and when feeding occurs
- Explain what tick-borne diseases are and the way in which ticks transmit disease
- Discuss preventative measures that can be taken to decrease risk of being bitten
    - Dressing appropriately (light-colored clothing and tucked in pants)
    - Playing in the sun and away from brushy areas
    - Showering right away
    - Drying clothes in high heat
- Explain the importance of performing tick checks every night and how best to perform one
- Describe how to safely remove a tick with tweezers
- Discuss the symptoms of tick-borne diseases and what to watch for if you find a tick attached

Suggested student activities:

1. Have students split into groups and research different aspects of the material
2. Have students create a tick-borne disease awareness bulletin board (if posted in the hall it can serve as both a learning tool and a resource)
3. Student research instead of guided discussion.

    Suggested topics:

    a. Different types of ticks and the diseases the transmit (include maps and statistics), life cycle and how/when they transmit disease
    b. Preventative measures that can be taken in terms of clothing, repellent, safe areas for outside activity, and preventative actions to be taken once inside
    c. How to properly remove a tick and what signs of illness to watch for