

Risks and Prevention of Vector-Borne Diseases

Vector-borne diseases (VBDs) are human illnesses caused by parasites, viruses or bacteria that are transmitted by vectors. Common vectors include ticks, mosquitoes, flies and fleas; less common vectors include triatomine bugs and some freshwater aquatic snails.

Vector-borne diseases are a risk in nearly all the wild areas of the Americas. Some of the wilderness environments in which our courses travel are home to a variety of vector species, and some of these species carry diseases that can become serious if diagnosis and treatment are delayed.

Fortunately, there are prevention steps that are very effective and, in the case of infection, treatment is usually simple and recovery complete, especially when the diagnosis is made early. Students and their families should educate themselves on the risks, prevention measures, and signs and symptoms. We have outlined some of these within this document. For health advice, please consult your physician.

Risks

The risk of VBDs can be managed, but it cannot be eliminated. Therefore, students and their families need to understand that:

- We judge the benefits of being outdoors to outweigh the risks for most people, provided reasonable precautions are taken on course, and reasonable vigilance is taken at home after course.
- Since we cannot eliminate all risk and still provide our desired outcomes, students (and families) need to decide for themselves whether to accept the inherent risks. Getting bitten by mosquitoes, ticks and fleas is one of the inherent risks of being outdoors.
- Being an active participant in safety management is one of the important life skills our students learn on course. Weighing the benefits of risks, analyzing risks and managing them well are strengths of successful people in all walks of life.

This risk is not static. Bacteria, viruses and parasites evolve continuously. As the global climate changes, so too do the ranges of the vectors. HIOBS strives to provide the most current references and information, but it is not a substitute for professional medical advice.

Vector-Borne Diseases

Vector	Disease	Areas of Risk (relevant to HIOBS courses)
Ticks	Lyme disease	Northeastern US
	Babesiosis	Northeastern US
	Ehrlichiosis	Eastern US
	Rocky Mountain Spotted Fever	Central and South America
	Southern Tick-Associated Rash Illness	Southeastern US
	Tularemia	All US
	Anaplasmosis	Northeastern US
	Bourbon virus (rare)	Southern US
	Powassan encephalitis	Northeastern US

Mosquitoes	Eastern equine encephalitis (rare)	Eastern US
	Dengue	Central and South America, Bahamas
	Malaria	Central and South America
	Zika	Central and South America, Bahamas
	West Nile virus	All US
	Chikungunya	Central and South America, Bahamas
Fleas	Tungiasis	Central and South America, Caribbean
	Leishmaniasis	Central and South America
	Typhus (Murine) (rare)	Southern US
	Plague (rare)	South America
Triatomine bugs	Chagas	Central and South America
Aquatic (freshwater) snails	Foodborne trematode infection	Central and South America
	Schistosomiasis	Central and South America

Signs and Symptoms

There are many symptoms associated with vector-borne diseases. Infected people may not have all of these symptoms and many of these symptoms can occur with other diseases as well. It is important to get signs and symptoms checked by a doctor because the patterns are unspecific. Consult your doctor if you have:

- Fever, chills
- Muscle or joint aches and pains (without known athletic or injury causes)
- Rash
- Headache
- Excessive fatigue (some fatigue is normal after a long wilderness course!)
- Confusion
- Facial paralysis
- Nausea, vomiting, diarrhea
- Weight loss, lack of appetite

Seek medical attention if signs and symptoms of an illness appear. Tell your doctor where you have traveled. Vector-borne diseases are diagnosed based on symptoms, blood tests, and the possibility that the person has been exposed to bites. Most cases can be successfully treated with specific types of antibiotics, especially if treatment is started early. However, some people may have symptoms such as arthritis, muscle and joint pain, or fatigue for an extended period of time.

Prevention

1. Wear and use protective clothing/equipment (long pants tucked into socks, for instance). Light colors make it easier to see ticks.
2. Use a chemical barrier. Treat clothing and footwear (long-sleeve shirts, jackets, hats, gaiters and boots) with permethrin to repel and disable ticks. Done at home before course, this treatment will last for up to a

month. Clothes treated professionally are effective even longer. See protocol for treating clothing with permethrin, below.

3. Use a chemical repellent. Apply insect repellent containing Picaridin or DEET to exposed skin, according to the directions on the container. This lasts for only a few hours before you have to reapply it. Properly used, repellents allow people to live and work outdoors with reduced risk from insect bites.¹
4. Staff will teach students to recognize ticks and remove them as soon as they are found. This is the BEST form of disease prevention. **Removing ticks within 24 hours considerably reduces the risk of being infected** with a disease-causing bacterium.
5. When traveling or camping in areas with woods, bushes, high grass or leaf litter, staff and students will check themselves for ticks at least twice every day.



Protocol for Treatment of Clothing with Permethrin

Permethrin is an extremely effective neurotoxin relative to arthropods (including ticks, fleas and mosquitos), does not have significant implications for human health and, when used correctly, poses little environmental risk. The CDC and the EPA have determined that the benefits of using permethrin to prevent tick-borne disease far outweigh the risks. There are two options:

1. Buy a permethrin treatment (such as those made by [Sawyer](#) and [Repel](#)) and apply it according to the directions. You will need to apply it at least 24 hours before packing your clothes, in a windless, ventilated area.
2. You can [send your clothes to Insect Shield®](#), and they will treat them and ship them back to you. Use the Coupon Code “HIOBS” to receive a 15% discount. Clothes treated professionally generally provide longer lasting protection.

Additional Permethrin Information

Permethrin is an insecticide in the pyrethroid family. Pyrethroids are synthetic chemicals that act like natural extracts from the chrysanthemum flower. Permethrin has been used for decades in a number of ways to control insects in homes, agriculture and in topical treatments for lice and scabies.

Permethrin is applied to clothing rather than skin because it is deactivated on skin within 20-30 minutes, not because it is more toxic than skin-applied chemicals like DEET. It has very low (less than 1% absorbability on human skin (DEET has 20%)², and very few people react aversely to contact with permethrin (other than in the eyes). Like all chemicals that do something, there is a small risk of harm, but the risks of vector-borne illness are considerably greater.

Permethrin can affect arthropods (such as ticks) and insects if they eat it or touch it. Permethrin is much more (over 2,250 times)³ toxic to ticks and insects than it is to people because of their much smaller size and because arthropods and insects can't break it down as quickly as mammals.

¹ Maine CDC: Repellent Fact Sheet: <http://www.maine.gov/dhhs/mecdc/infectious-disease/epi/vector-borne/documents/repellent-fact-sheet.pdf>

² The University of Rhode Island Tick Encounter Resource Center: <http://www.tickencounter.org/prevention/permethrin>

³ The University of Rhode Island Tick Encounter Resource Center: <http://www.tickencounter.org/prevention/permethrin>