NAU FIELD SAFETY PROGRAM

ENVIRONMENTAL HEALTH & SAFETY
1.0 Introduction
Field Work is an important part of teaching and research at Northern Arizona University (NAU). Employee safety is of the upmost importance during fieldwork. As research often takes students and staff off campus, this program has been written to address health and safety issues that may arise in the field. University policies and requirements are in place for travel and certain activities that may be included in field research. Those issues are addressed generally in this written program. For more specific information please contact your supervisor, or the NAU Environmental Health & Safety (EH&S) Office.

2.0 Scope
This field safety manual applies to all NAU employees, students, and volunteers performing research or work at all NAU campuses, or in the field. Specific policies exist for outreach work with minors.

3.0 Departmental Responsibilities
3.1 Deans and Directors
Deans and Directors of individual departments are responsible for fully supporting compliance with the NAU Field Safety Manual and its contents.

3.2 Faculty, Principle Investigators, and Supervisors
Departmental Faculty, Principle Investigators (PIs), and Supervisors, or their designees are responsible for research teams’ overall compliance with the NAU Field Safety Program. Each researcher must have access to this manual in paper or electronic format, and be familiar with its content and requirements. In addition, Faculty, PIs, and Supervisors, or their designates are responsible for the following:

- Hazard assessment of field research
- Completion of the Field Safety Checklist
- Assuring all safety requirements have been addressed prior to field research
- Identification of field research team members, including the Field Research Team Leader (See 3.3)
- Accounting for the presence of each team member before travelling to or from the site, particularly when more than one vehicle is being used.
- Establishment of emergency procedures and contacts
- Assuring a copy of the completed Field Safety Checklist is left on campus
- Review of completed Field Safety Checklist with research team members prior to field research beginning
- Providing project-specific standard operating procedures (SOPs) and special training when field specific activities create potential hazards. EH&S is available for consultation in these areas

3.3 Field Research Team Leader
Each research team shall appoint a field team leader. The Field Research Team Leader is responsible for knowing the potential hazards associated with the field research and reviewing the completed Northern Arizona University Field Safety Checklist with all team members prior to mobilization at the site of field work.
3.4 **Field Research Team Members**

Field trip participants are responsible for compliance with this written program and its contents prior to commencing fieldwork, and for the duration of the project. They must also participate in the completion of the Northern Arizona University **Field Safety Checklist** prior to mobilization at the site of fieldwork. Field Research Team Members must also stay within the scope of the proposed fieldwork when onsite.

4.0 **General Field Safety Guidelines**

One of the most important phases of your fieldwork activity will take place before you leave. Completion of the following items prior to departure will ensure that you will be in contact/be contacted by someone in the event of emergency, and that hazards have been evaluated and steps have been taken to mitigate those hazards:

- Completion of the NAU **Field Safety Checklist** (a completed copy of this checklist must stay on campus with your departmental office at all times through the duration of fieldwork)
- Project-specific hazard assessment for hazardous plants, animals, insects, terrain and weather (see hazard assessment portion of **NAU Field Safety Checklist**)
- Consult with the NAU Campus Health Center for immunizations that may be required or advised due to the nature of your fieldwork. Keep in mind that some immunizations require a series of inoculations and adequate lead-time must be considered to complete series
- In the event that you will work with animals, wild or domestic, consult the Institutional Animal Care and Use Committee (**IACUC**)  

4.1 **Supervisors Report of Injury or Illness (SRI)**

A Supervisors Report of Injury or Illness (SRI) must be completed whenever a work-related injury or illness occurs. An electronic copy of this form can be found online.

5.0 **Physical and Environmental Hazards**

All fieldwork has the potential to present physical and/or environmental hazards. As medical attention is not always readily available to field workers, special attention should be paid to hazard assessment and mitigation of those hazards when ever possible.

5.1 **Transportation**

5.1.1 **Transportation of Personnel**

5.1.2 **Vehicle Accidents**

Vehicle accidents can occur from driver fatigue or error, roadway or vehicle factors or driver impairment. NAU’s fleet safety policy requires that any employee or student undergo the **NAU Driver’s Authorization** process prior to operating any university vehicle. Supervisors are responsible for assuring that employees complete the screening. NAU expectations are that the operation of any vehicle for NAU research purposes be conducted in accordance with all applicable laws. The operation of 12-15 passenger vans
requires van safety training. This training can be taken through Facility Services. Facility Services also oversees accident reviews.

5.1.3 Transport/Shipment of Equipment and Field Samples
Special transportation and shipping requirements apply to the transport of certain chemical, biological or radioactive samples or products. Contact the NAU EH&S Office for more information.

5.2 Slips, Trips and Falls
Hiking or walking on uneven terrain, scrambling over loose soils or rocks, or steep embankments and weather factors such as rain, snow and ice can create slip, trip and fall hazards. Footwear that is suitable for fieldwork conditions must be selected and mandated during the duration of the project. In some cases, the use of crampons, or other traction enhancing footwear may be necessary. Proper lighting must also be considered in certain work areas for fall prevention.

5.3 Dehydration
To prevent dehydration, fieldwork participants should consume at least two quarts of water per day. When working strenuously, or in extreme heat, electrolyte beverages should be consumed in addition to water. When working in remote areas, pre-planning for water supply and sources is crucial. Researchers should also avoid excess consumption of caffeinated beverages, and take frequent breaks to avoid dehydration. Symptoms of dehydration include increased thirst, dry mouth, flushed skin, dizziness, headache, weakness, muscle cramps and dark urine. Researchers should watch for these symptoms in themselves and others on the field research team.

5.4 Impure Water Consumption
Harmful organisms and pathogens can live in natural water sources and if consumed, can result in gastrointestinal illnesses and flu-like symptoms. These illnesses when combined with exertion and heat can result in life-threatening dehydration and electrolyte imbalances. To avoid waterborne illness, bring water to the extent possible. If natural water sources need to be used, always treat water with tablets, purifiers, or by boiling for at least 3 minutes.

5.5 Sun Exposure
Outdoor work, especially in desert and high altitude regions, can result in extreme sun exposure and sunburn. Wear brimmed hats and cover exposed skin with light colored clothing and apply sun block with a sun protection factor (spf) of 30 or greater to minimize sunburn risk.

5.6 Temperature Extremes
When conducting field research high and low temperatures of the region should be researched, proper clothing selected and review of the following temperature related hazards should be reviewed with field team members. See Table 1.
5.7 Extreme Weather
Severe weather can result in physical injury or death. To the extent possible, follow local weather forecasts. Be aware of special weather concerns and bring appropriate equipment to deal with severe weather. In the event of snow storms, heavy rain, lightning, tornadoes or hurricanes, seek shelter immediately. If you are working in areas prone to flash flooding, establish an exit plan and meeting place on high ground prior to work.

5.8 High Altitude Illness
Work at high altitude can result in decreased oxygen intake. Along with increased breathing rate, this can result in high altitude illness. To avoid altitude illness, allow your body to acclimatize by gaining elevation gradually. Altitude illness is characterized by headache, nausea and weakness. Treatment includes the use of supplemental oxygen, and retreating to lower elevation.

<table>
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<tr>
<th>Table 1 – Temperature Extremes</th>
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<td>Illness</td>
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<td>Heat Exhaustion</td>
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<td>Heat Stroke</td>
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<td>Frostbite</td>
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<td>Hypothermia</td>
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5.9 **Water Safety**
When fieldwork involves working on or around open water, follow US Coastguard guidelines for vessel safety and personal flotation devices. Water safety requirements must be assessed in the reviewed with all field trip participants prior to the commencement of field activities. All hazards must be assessed in the NAU Field Safety Checklist (Appendix A). Adhere to all applicable regional watercraft guidelines and regulations.

5.10 **Excavation Safety**
Research activities such as soil sampling and archaeological exploration can involve work in trenches and excavations. These excavations should be properly sloped and shored to provide safe means of access and egress and prevent cave-in. Consult with EH&S for specific requirements.

5.11 **Work at Heights**
When working at heights, follow the “six foot rule”. Any work being done 6’ or greater off the ground requires the use of fall protection such as rails, guards, harnesses and lanyards, and PPE. Any work being done on a roof must be done 6 feet from the edge or the aforementioned safety measures are required as well. Consult with EH&S for more information.

5.12 **Machinery Hazards**
The use of machinery in field research can result in hazards such as lacerations, electrocution, and pinching. Machinery with combustion mechanisms can result in hazardous atmospheres and must not be used in confined spaces, or nearby where exhaust could enter the space. Use of certain machinery will require special training prior to work.

5.12.3 **Chainsaw Use**
The use of chainsaws results in thousands of injuries and deaths annually in the United States. When fieldwork involves the use of a chainsaw, consult the OSHA Fact Sheet: Working Safely with Chainsaws.

5.12.4 **Lockout/Tagout**
Work with or maintenance of equipment can result in injury from electric shock or injury when inadvertently energized. Consult NAU EH&S for hazard assessment and safety requirements on equipment in the field.

5.13 **Hunting Season**
A hunting accident can result in serious injury or death. Be sure to avoid hunting areas during hunting season. Wear appropriately colored safety clothing when working in areas frequented by hunters, and avoid behaviors that could be mistaken for animal movements such as using foliage for a screen.
6.0 Animals and Pests
There are many general safety hazards pertaining to animals and other indigenous creatures that exist in nearly every location worldwide. All field researchers, regardless of the work location, should read through this section to learn general guidelines for preventing unwanted encounters with animals and “pests”.

Follow these general guidelines to prevent close encounters of the painful kind:

- Wear insect repellent - **mosquito-borne illnesses are responsible for more than a million deaths each year.**
- Use netting to keep pests away from food and people.
- Keep garbage in rodent-proof containers and stored away from your campsite or work area. Food crumbs and debris may attract insects and animals.
- Thoroughly shake all clothing and bedding before use.
- Do not camp or sleep near obvious animal nests or burrows.
- Carefully look for pests before placing your hands, feet or body in areas where pests live or hide (wood piles, crevices, etc.).
- Avoid contact with sick or dead animals.

6.1 Rodents
Steps can be taken to reduce the risk of rodent-borne diseases. The most effective step is to make your work area unattractive to rodents. When indoors, cover or repair holes into a building to prevent unwanted rodents. If camping, keep the area clean of crumbs, food scraps, trash and store food carefully to prevent attracting rodents. Don’t camp near rodent burrows. If rodent feces or dead rodents are discovered, some precautions will help reduce the risk of exposure to rodent-borne diseases when cleaning the area:

- Indoors: **Do not stir up dust.** Ventilate the area by opening the doors and windows for at least 30 minutes to diffuse potentially infectious aerosolized material. Use cross-ventilation and leave the area during the airing-out period.

- Dead Rodent: Using gloves soak the rodent, droppings and nest with a solution of 1 part bleach to 9 parts water, let soak for at least 5 minutes before picking it up with a plastic bag. Place bag in a second plastic bag.

- Rodent Feces: Don’t sweep or vacuum rodent droppings. Spray the droppings with 1 part bleach to 9 parts water, let soak for at least 5 minutes, and then wipe up the droppings. If possible, wet mop the area with the bleach solution.

6.2 Animal Attacks/Bites
Depending on your research location, animals can pose a danger. The following information should be considered a basic overview of species by location, including measures to prevent encounters, and first aid to use in the event of an encounter. This is not an all inclusive list. Your pre-fieldwork hazard assessment should include research on which animals you are likely to encounter during your work.
6.2.1 Bears
Black Bear (North America), Grizzly Bear (Alaska, Western Canada, Pacific Northwest), Polar Bear (Arctic) can be encountered during fieldwork. To avoid encounters, never approach a bear or bear cub. Wear a bell, or other noisemaker while working in bear country. Keep food and fragrant items out of sleeping areas and in bear boxes or bear canisters. Stay away from bears’ natural food sources. If you encounter a bear, do not run. Move slowly and speak in a low, soft voice. If attacked, assume the fetal position and play dead, protecting your head.

6.3.1 Mountain Lions
Mountain lions can be encountered while working in North, Central and South America. To avoid a mountain lion encounter avoid activities during times when mountain lions are most active: dawn, dusk, at night. Avoid walking near dense growth, or rock outcroppings. Be aware of the surrounding area above and behind you. In the event of a mountain lion encounter, do not run. Make yourself appear larger by waving your arms (and if possible, jacket) above your head. Use a loud voice, throw sticks and rocks and look the animal in the eye in an attempt to scare it away. If attacked, protect your head and neck and use your thumbs to poke the animal in the eyes.

6.3.3 Sharks
Sharks can be encountered worldwide on ocean shores. The most dangerous species include Great White, Bull, Tiger and Oceanic Whitetip. To prevent shark encounters, never swim alone, don’t enter the water when bleeding, and don’t wear contrasting colors or bright jewelry. In the event of a shark encounter, call for help, and swim toward safety. If defensive measures are necessary, kick and punch the shark. Seek medical attention for serious wounds.

6.3.4 Crocodiles and Alligators
Crocodiles and Alligators can be encountered in the tropics and subtropics of North America, Australia, Eastern China and Africa. To avoid encounters, avoid waters known to be inhabited. If you spot a crocodile or alligator, stay a minimum of 30 feet away. Seek medical attention for injuries or wounds.

6.3.2 Snakes
Fieldwork in North America and Mexico can result in encounters with venomous snakes including rattlesnakes, cottonmouths, coral snakes, water moccasins and copperheads. To avoid snake encounters, walk in open areas, wear heavy boots and use a walking stick to disturb brush in front of you. In the event you are bitten, let the wound bleed freely for 30 seconds. Keep the patient calm and keep the area immobilized at heart level. Seek medical attention immediately, phoning ahead if possible.

6.3.3 Spiders
In North America, the Black Widow and Brown Recluse are the most common venomous spiders encountered. To avoid contact, use caution when disturbing rock piles, logs, bark, gardens, outdoor privies and old buildings. Wear gloves, and shake out bedding
and clothing before use. If bitten, clean the wound, and keep area immobilized at heart level. Seek medical attention immediately.

6.3.4 Scorpions
Scorpions can be encountered in North America, especially in Arizona, Southeast California and Utah, and in Mexico. To avoid contact, avoid lumber piles and old tree stumps, wear gloves and shake out bedding and clothing before use. If stung by a scorpion, clean wound, apply cold pack and keep area immobilized at heart level. If needed, use a painkiller or antihistamine. Seek medical attention if you don’t experience an improvement in symptoms.

6.3.5 Bees, Wasps, etc.
Fieldwork participants with known bee allergies should make co-workers aware of their allergy and bring medication. To avoid contact with bees and wasps, keep scented drinks and food covered. Wear shoes to avoid stings to the feet. Avoid wearing bright colors, floral prints and perfume. Move slowly or stand still.

6.3.6 Fleas and Ticks
Fleas and ticks can be encountered in shrubbery and high grasses. To avoid contact, wear long clothing made of a tightly woven material. Use insect repellant, and stay on the widest part of paths. If you are bitten by a flea or tick, remove it with tweezers or tissue. Clean the wound and watch for signs of illness (see Table 3) Seek medical attention if needed.

7.0 Diseases
There are diseases caused by viruses, bacteria, fungi, and parasites in nearly every location worldwide. This guide is not intended to cover every health risk in every location, but to provide information about some common diseases. Always check with your health care provider or NAU Campus Health Center before travelling out of the country to learn about specific health risks for the region in which you will conduct your research. All field researchers, regardless of the work location, should read through this section to learn more about some general diseases that exist worldwide. See Table 2 for General Disease Information. If your research is in North America, please also see Table 3: North America. If your research will take you out of North America, please also see Table 4: International.

8.0 Chemical Exposure
If chemical products such as sample preservatives or disinfection products are used in fieldwork, special training will be required prior to the commencement fieldwork. The type of training required will depend on the chemical and work setting. Please contact NAU’s EH&S Office for more information on chemical hazard assessment and safety requirements. As a general rule, you should always have a copy of the Safety Data Sheet (SDS) with you when using, transporting, or storing a chemical product.
9.0 Additional Resources
Additional NAU resources available to NAU field researchers, but not directly covered in this manual include:

- NAU Safe Working and Learning Environment Policy 5.15
- NAU Travel Office
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<th>Type</th>
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<th>Exposure Route</th>
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<tbody>
<tr>
<td>Campylobacteriosis</td>
<td>Worldwide</td>
<td>Foodborne – poultry products, unpasteurized milk or water contaminated with <em>Campylobacter</em></td>
<td>-Diarrhea -Gastrointestinal symptoms -Fever</td>
<td>-Drink plenty of fluids -Seek medical attention if symptoms persist</td>
<td>-Always cook food thoroughly -Never drink water from an impure source -Do not drink unpasteurized milk -Wash hands with soap and water frequently</td>
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<tr>
<td>Cholera</td>
<td>Africa, Asia, Latin America</td>
<td>Foodborne – food and water contaminated with <em>Vibrio cholerae</em></td>
<td>-Diarrhea -Gastrointestinal symptoms</td>
<td>-Drink plenty of fluids -Seek medical attention if symptoms persist</td>
<td>-Always cook food thoroughly -Never drink water from an impure source -Wash hands with soap and water frequently</td>
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<tr>
<td><em>E. coli</em> O157:H7 and Shiga toxin-producing <em>E. coli</em> Gastroenteritis</td>
<td>Worldwide</td>
<td>Foodborne – beef, unpasteurized milk, unwashed raw vegetables, water contaminated with <em>Escherichia coli</em></td>
<td>-Diarrhea -Gastrointestinal symptoms</td>
<td>-Drink plenty of fluids -Seek medical attention if symptoms persist</td>
<td>-Always cook food thoroughly -Wash vegetables before consuming -Never drink water from an impure source -Wash hands with soap and water frequently</td>
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<tr>
<td>Hepatitis A (Vaccine Available)</td>
<td>Worldwide (under-developed countries)</td>
<td>Foodborne –water, shellfish, unwashed raw vegetables contaminated with Hepatitis A virus</td>
<td>-Diarrhea -Gastrointestinal symptoms</td>
<td>-Drink plenty of fluids (bottled or purified water – not local water) -Seek medical attention if symptoms persist</td>
<td>-Obtain a vaccine -Always cook food thoroughly -Wash vegetables before consuming -Never drink water from an impure source -Wash hands with soap and water frequently</td>
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<td>Histo-plasmosis</td>
<td>Worldwide</td>
<td>Inhalation of fungus <em>Histoplasma capsulatum</em> from soil contaminated with bat or bird droppings</td>
<td>-Mild flu-like -Rarely can be acute pulmonary histoplasmosis</td>
<td>-See a doctor if you suspect histoplasmosis -Typically clears up in 3 weeks</td>
<td>-Use caution when disturbing dry soils or working near bat or bird droppings -Personal protective equipment may be needed</td>
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<tr>
<td>Human Immuno-deficiency virus/ Acquired Immune Deficiency Syndrome (HIV/AIDS)</td>
<td>Worldwide</td>
<td>-Being exposed to blood or body fluids infected with HIV -Having sex or sharing needles with someone infected with HIV</td>
<td>-May have flu-like symptoms 14-60 days post infection -Attacks the immune system, may eventually result in opportunistic infections or cancers</td>
<td>-None -Blood test for diagnosis -Treatment with antiretroviral drugs for long term maintenance</td>
<td>-Follow Bloodborne Pathogen training when handling any unfixed human blood or tissue -Do not engaging in risky activities</td>
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<tr>
<td>Influenza (seasonal)</td>
<td>Worldwide</td>
<td>Inhalation of influenza virus -Contact with birds infected with influenza</td>
<td>-Fever (usually high) -Headache -Extreme tiredness -Dry cough -Sore throat -Runny or stuffy nose -Muscle aches -Stomach symptoms more common in children</td>
<td>-Flu antiviral drugs can treat the flu or prevent infection -Your health care professional will decide whether you should take antiviral drugs -Antiviral drugs should</td>
<td>-Annual flu vaccination -Cover your nose and mouth with a tissue or your elbow when you cough or sneeze -Wash hands with soap and water frequently -If you are not near</td>
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<td>Leptospirosis</td>
<td>Worldwide</td>
<td>Ingestion, swimming, or other activities in water contaminated with <em>Leptospira</em></td>
<td>-Flu-like</td>
<td>-See a doctor if you suspect leptospirosis</td>
<td>-Use care when working in the water, especially after a flooding event</td>
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<td>-Occasionally more serious symptoms</td>
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<td>-Avoid entering the water with open wounds</td>
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<td>Norovirus “Norwalk-like viruses” (NLV)</td>
<td>Worldwide</td>
<td>Foodborne - food, water, surfaces or objects contaminated with Norovirus</td>
<td>Nausea, vomiting, diarrhea, stomach cramping</td>
<td>Stay hydrated</td>
<td>-Wash hands with soap and water frequently</td>
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<tr>
<td>Gastroenteritis</td>
<td></td>
<td>-Direct contact with another person who is infected</td>
<td>-Some people also have a low-grade fever, chills, headache, muscle aches, malaise</td>
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<td>-Wash fruits/vegetables, and steam oysters</td>
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<td>-Clean and disinfect contaminated surfaces immediately after illness using a bleach-based cleaner</td>
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<td>-Remove and wash contaminated clothing or linens</td>
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<td>Plague</td>
<td>Worldwide</td>
<td>Flea-borne - from rodents infected with <em>Yersinia pestis</em> to humans</td>
<td>-Flu-like</td>
<td>See a doctor if you suspect plague</td>
<td>-Use care when working in areas where plague is found</td>
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<td>-Direct contact with infected tissues from sick or dead animals</td>
<td>-Non-specific</td>
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<td>-Use caution when working with wild rodents</td>
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<td>-Swollen and painful lymph nodes (bubonic)</td>
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| Rabies (Vaccine Available)    | Worldwide       | -Infection from bite of an animal (e.g., raccoons, skunks, bats, foxes, coyotes, dogs, cats) infected with *Lyssavirus*  
                             | -Bat bites are difficult to see and may not be felt. Exposure is also possible when a bat is found in living or sleeping quarters. | -Fatal (within days of symptoms) w/o immediate treatment  
                             | -Early symptoms: fever, headache, malaise  
                             | -Later: insomnia, anxiety, confusion, paralysis, hallucinations, hypersalivation, difficulty swallowing, fear of water | Disinfect and wash the wound. See a doctor IMMEDIATELY if potentially exposed to a rabies-carrying species (e.g., bat, carnivore) | -Obtain a vaccine if you will be working with bats or carnivores  
                             | -Use extreme caution handling these animals  
                             | -Vaccinate pets                                                                 |
| Salmonellosis                 | Worldwide       | Foodborne – beef, poultry, milk, eggs, unwashed raw vegetables contaminated with salmonella bacteria | -Diarrhea  
                             | -Gastrointestinal symptoms | -Drink plenty of fluids  
                             | -Seek medical attention if symptoms persist | -Always cook food thoroughly  
                             | -Wash vegetables before consuming  
                             | -Wash hands with soap and water frequently                                                                 |
| Typhoid Fever (Vaccine Available) | Worldwide       | Foodborne – food and water contaminated with *Salmonella typhi*                  | -Diarrhea  
                             | -Gastrointestinal symptoms | -Drink plenty of fluids  
                             | -Seek medical attention if symptoms persist | -Obtain a vaccine  
                             | -Always cook food thoroughly  
                             | -Never drink water from an impure source                                                                 |
| Tetanus (Vaccine Available)   | Worldwide       | A wound that is infected with *Clostridium tetani*; tetanus toxin is produced by the bacteria and attacks nerves | -Early symptoms: lockjaw, stiffness in the neck and abdomen, difficulty swallowing  
                             | -Later symptoms: muscle spasms, seizures, nervous system disorders | -See doctor for wounds contaminated w/ dirt, feces, soil, or saliva; for puncture wounds; and for crushing, burns, and frostbite wounds | -Obtain a vaccine for tetanus every 10 years or immediately following a suspect wound or injury  
<pre><code>                         | -Once the disease starts it must run its course |
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<tr>
<td>Typhus Fever</td>
<td>Worldwide</td>
<td>Infection from bite of lice, fleas, ticks, or mites infected with <em>Rickettsiae</em> species</td>
<td>-Headache</td>
<td>-See a doctor if you suspect Typhus Fever</td>
<td>-Use insect repellant</td>
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<td></td>
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<td>-Fever</td>
<td>-Treatable with antibiotics</td>
<td>-Wear long sleeve shirts</td>
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<td>-Rash</td>
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<td>-Tuck pants into boots</td>
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| Coccidiodo-mycosis       | North and South America, semiarid regions | *Coccidioides* species fungus is inhaled when soil is disturbed | - None in most people ~60%  
- Flu-like (fever, cough, rash, headache, muscle aches)  
- Occasionally, chronic pulmonary infection or widespread disseminated infection (skin lesions, central nervous system infection, and bone and joint infection) | - See a doctor if you suspect Valley Fever                                                | - Wet soil before digging  
- If you are immunocompromised, wear a mask when digging  
- Stay inside during duststorms in areas where *Coccidioides* fungus is present  
- Keep doors and windows tightly closed |
| St. Louis Encephalitis   | North and South America   | - Mosquito-borne - infection from bite of a mosquito infected with *St. Louis Encephalitis* virus | - Mild - fever and headache  
- Severe - headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, paralysis, and rarely death | Seek medical attention immediately if you suspect encephalitis                         | - Use insect repellent  
- Many mosquitoes are most active at dusk and dawn, consider staying indoors during these hours  
- Wear long sleeves and pants  
- Avoid areas of standing water where mosquitoes breed |
<table>
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<tr>
<th>Type</th>
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| Lyme Disease                      | United States, Europe and Asia    | Infection through the bite of a tick infected with *Borrelia burgdorferi* (U.S.) *Borrelia afzelii* or *Borrelia garinii* (Europe) | - Spreading rash ("bullseye")  
- Early symptoms: flu-like  
- Later symptoms: arthritis and neurologic problems | See a doctor if you suspect Lyme Disease | - Avoid tick infested areas  
- Wear long sleeves and pants  
- Use insect repellant  
- Check clothing and hair for ticks and remove any ticks |
| Rocky Mountain Spotted Fever      | United States, southern Canada, Mexico, and Central America | Infection through the bite of an infected tick *Rickettsia rickettsii* | - Sudden onset of fever  
- Headache  
- Muscle pain  
- Spotty rash | See a doctor if you suspect Rocky Mountain Spotted Fever | - Avoid tick infested areas  
- Wear long pants, shirts  
- Use a repellant  
- Check clothing and hair for ticks and remove any ticks |
| Hantavirus Pulmonary Syndrome (HPS) – Sin Nombre Virus | North America | Inhalation of dusts or aerosols from the infected rodent’s feces, urine, or saliva  
- Vector: Deer mouse (*peromyscus maniculatus*) | - (Early, 1-5 weeks) fatigue, fever, muscle aches, chills, headaches, dizziness, sometimes abdominal problems  
- (Late, 4-10 days after early) coughing, shortness of breath | Seek medical attention **IMMEDIATELY** if you suspect HPS. The likelihood of survival is greatly increased with early diagnosis and treatment | - Avoid contact with rodents, especially their feces  
- See section 6.1 on dealing with rodent infested areas |
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| Arenavirus (White Water Arroyo) | North America | Inhalation of dusts or aerosols from the infected rodent’s feces,              | - Fever  
- Headache  
- Muscle aches  
- Severe                                                           | Seek medical attention **IMMEDIATELY** if you suspect WWA. The likelihood of survival is greatly increased with early diagnosis and treatment | - Avoid contact with rodents, especially their feces  
- See section 6.1 on dealing with rodent feces.                                                   |
| West Nile Virus             | North America | - Mosquito-borne - Infection from the bite of a mosquito infected with West Nile Virus  
- Handling infected birds                                                                 | - None in most people  
- Mild - fever, headache, body aches, nausea, vomiting, and sometimes swollen glands or a rash on the chest, stomach and back;  
- Severe - high fever, neck stiffness, stupor, muscle weakness, disorientation, coma, tremors, convulsions, vision loss, numbness, paralysis | See a doctor if you suspect that severe symptoms are due to West Nile Virus                                                                 | - Use insect repellent  
- Many mosquitoes are most active at dusk and dawn, consider staying indoors during these hours  
- Wear long sleeves and pants  
- Avoid areas of standing water where mosquitoes breed  
- Don’t handle dead birds with your bare hands |