

Vector-borne Infectious Diseases in Turkmenistan

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Translated by TRS Translation Services, Washington, DC

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Vector-borne Disease:	Incubation Period:	Agent:	Mode of Transmission/Vector:	Epidemiology:	Remarks:
Bunya Fever		Bunya fever virus, <i>Bunyavirus</i> , Bunyaviridae	Transmission: Bite of various hard ticks in the genus <i>Haemaphysalis</i> Primary vectors: <i>Haemaphysalis cornupunctata</i> , <i>H. sulcata</i> , <i>Haemaphysalis</i> spp. (sheep ticks) Reservoir: Sheep	Transmission period: March-Oct. Incidence and seroprevalence: Disease is endemic and antibodies have been detected in the population; no further epidemiological data are available at this time Bite properties: Vectors are hard ticks that also afflict humans; they feed at one spot for several days; adults linger near sheep stables, pastures, etc., where they can fast for 2 to 3 years; total life span can exceed 4 years	Preventive measures: - Avoidance of sheep stables and pastures, etc. - Search/removal of hard ticks from self and companions - Use insect repellent and permethrin-treated clothing
Japanese Encephalitis		Japanese encephalitis virus, <i>Flavivirus</i> , Flaviviridae	Transmission: Bite of <i>Culex</i> and <i>Anopheles</i> mosquitoes Primary vector: <i>Culex tritaeniorrhynchus</i> (endemic nationally)	Transmission period: May to Oct. Incidence and seroprevalence: No human cases have as yet been reported from Turkmenistan; antibodies in animal reservoirs (birds) were detected in the late 1970s in Kazakhstan, possibly reflecting the	Preventive measures: - Indoors: Permethrin-treated mosquito net, or insect repellent - Outdoors: Larval mosquito control; use insect repellent

				<p>prevalence of the endemic JE primary vector, <i>Culex tritaeniorrynychus</i>; a JE infection is possible nationwide, but not likely at this time</p> <p>Bite properties: Female <i>Culex</i> and <i>Anopheles</i> mosquitoes bite at dawn and dusk as well as indoors; <i>Culex</i> females overwinter in basements, etc.; flight radius up to 2 km</p> <p>Breeding grounds: For <i>Culex</i>: thrives in small, stagnant or polluted bodies of water (cisterns, buckets, cans, old tires, etc.) in urban areas; for <i>An.hyrceanus</i>: breeds in valley rice paddies</p>	<p>combined with permethrin-treated clothing</p>
Crimean-Congo Hemorrhagic Fever		<p>Crimean-Congo hemorrhagic fever virus, <i>Nairovirus</i>, Bunyaviridae</p>	<p>Transmission: Bite or exposure to hard tick cell material, mostly <i>Hyalomma</i> spp.; or soft ticks in the genus <i>Ornithodoros</i></p> <p>Primary vector: <i>Hyalomma marginatum</i> (sheep tick)</p> <p>Secondary vectors: <i>H. anatolicum</i>, <i>H. detritum</i>, <i>H. dromedarii</i>, <i>H. impeltatum</i>, <i>H. schulzei</i>, <i>H. asiaticum</i></p>	<p>Transmission period: April-Oct., with peak from June-Sept.</p> <p>Incidence and seroprevalence: Focally endemic nationally; occurs mostly in sheep shearers and shepherds; 6.2-11% of sheep ticks (<i>Hyalomma</i> spp.) and livestock carry the virus in endemic areas; seroprevalence in humans in the 1970s averaged 0.4% (cross-section of 2,300 people)</p> <p>Habitat: Vector ticks live in dry areas, animal stables and trails, and former pastures</p> <p>Bite properties: Hard ticks of the genus <i>Hyalomma</i></p>	<p>Preventive measures:</p> <ul style="list-style-type: none"> - Avoidance of old animal stables, etc. - Use insect repellent and permethrin-treated clothing (permethrin is a more effective repellent than DEET) - Search/removal of hard ticks from self and companions - For soft tick vectors in lodging: use of treated mosquito nets with simultaneous soft tick control (e.g., 1-2%

				feed at one spot for several days on the same host and fall off freely after feeding; larvae and nymphs bite small mammals; larger nymphs and adults prefer larger mammals or humans and are not host specific; fasting adult ticks survive up to 4 years	Propoxur acaricide)
Sandfly Fever (Papatasi Fever)		Sand fly fever virus <i>Phlebovirus</i> , Bunyaviridae, Sicilian, Naples and Karimabad serotypes identified	Transmission: Sand fly bite Primary vector: <i>Phlebotomus papatasi</i>	Transmission period: April-Oct., with peaks in early June and in August; transovarial transmission possible Incidence and seroprevalence: Urban transmission occurs; no further epidemiological data are available at this time Breeding grounds: See Cutaneous Leishmaniasis Bite properties: Same as <i>L. tropica</i> (see cutaneous leishmaniasis)	Same as cutaneous leishmaniasis (<i>L. tropica</i>)
Isfahan Virus		Isfahan virus fever, Rhabdoviridae	Transmission: Sand fly bite Primary vector: <i>Phlebotomus papatasi</i>	Transmission period: April-Oct., with peaks in early June and in August; transovarial transmission possible Incidence and seroprevalence: Endemic prevalence confirmed (Kirov district); however, no further data are available at this time Breeding grounds: See Cutaneous Leishmaniasis Bite properties: Same as <i>L. tropica</i> (see cutaneous leishmaniasis)	Same as cutaneous leishmaniasis (<i>L. tropica</i>)
Tahyna Fever		Tahyna fever	Transmission: Bite of	Transmission period: May-Oct.	Preventive measures:

		<p>virus, <i>Bunyavirus</i>, Bunyaviridae</p>	<p>various <i>Aedes</i> mosquitoes Primary vectors: <i>Aedes vexans</i>, <i>Ae. cantans</i>, <i>Ae. sticticus</i> (“forest and meadow mosquitoes”), <i>Aedes</i> spp. Reservoirs: Small mammals</p>	<p>Incidence and seroprevalence: Disease is endemic; no further epidemiological data are available at this time Bite properties: <i>Aedes</i> mosquitoes bite outdoors during the day and somewhat at dusk but do not actively migrate indoors (exophilic, exophagic); the bite response to <i>Ae.</i> <i>vexans</i> is especially unpleasant. Over 200 human bites per minute have been documented during swarms; flight radius of this species is up to 20 km Breeding grounds: Floodwater mosquitoes emerge in large numbers in forests, where they may breed in knot holes, and/or in meadows in spring or after heavy rains; overwintering occurs in the egg stage. Eggs are capable of hatching year-round.</p>	<p>- Eliminate breeding grounds in camp areas - Use insect repellent and permethrin-treated clothing</p>
West Nile Fever		<p>West Nile fever virus, <i>Flavivirus</i>, Flaviviridae</p>	<p>Transmission: Bite of <i>Culex pipiens</i> (house mosquito) Primary vector: <i>Culex pipiens</i> (house mos- quito) Reservoirs: Birds</p>	<p>Transmission period: May-Nov. Incidence and seroprevalence: Definitely enzootic; no further epidemiological data are available at this time Bite properties: <i>Culex pipiens</i> bites at dawn and dusk as well as indoors (endophilic, endophagic); infectious females overwinter in buildings, cellars, and</p>	<p>Preventive measures: - Indoors: Permethrin- treated mosquito net, or insect repellent - Outdoors: Larval mosquito control; use insect repellent combined with permethrin-treated clothing; reduction of</p>

				<p>animal Stables, sometimes in large numbers Breeding grounds: Thrives in small, stagnant or polluted bodies of water (cisterns, buckets, cans, old tires, etc.) in urban areas</p>	breeding grounds by proper waste storage
Hemorrhagic Fever with Renal Syndrome		<p>Hantaviruses of the Seoul, Hantaan, Dobrava, and Puumala Genotypes, Bunyaviridae</p>	<p>Transmission: Contact with infectious dust or aerosols (rodent excrement, rodent urine); secondarily, by such vectors as hematophagous mites Primary vectors/reservoirs (nationwide incidence) - Hantaan/Dobrava serotype: <i>Apodemus sylvaticus</i> (field mouse), <i>A. agrarius</i> (striped field mouse), <i>A. flavicollis</i> (yellow-necked mouse) - Puumala serotype: <i>Clethrionomys glareolus</i> (bank vole), <i>Ondatra zibethicus</i> (muskrat)</p>	<p>Incidence and seroprevalence: Focally endemic, seroepidemiological data are not available at this time; HFRS is still a serious problem in the neighboring states of Kazakhstan and especially in China with more than 100,000 cases/year and focal incidence rates over 200/100,000. All rodent reservoirs occurring there, especially rats, striped field mice (<i>Apodemus agrarius</i>), and prairie voles (<i>Microtus</i> spp.) are endemic nationally. Transmission period: Peaks in spring and fall; year-round transmission possible in synanthropic rodents (rats, Seoul serotype; occurrence uncertain) Mode of transmission: - Transmission can be sylvatic, rural, or urban, depending on the behavior patterns of the vector/reservoir species and their degree of synanthropy - Rodents release urine in tiny droplets (micromicturition) to mark their territories; such aerosols</p>	<p>Preventive measures: - In urban/camp areas: eradication of synanthropic rodents (rats and mice) by the combined implementation of rodenticide (poison-baiting) with structural preventive measures, as well as hygienic measures (optimized waste disposal, for example); cleansing of all affected areas of rodent excrement, including upstream disinfection, where necessary - in rural and sylvatic areas, use pourable poison bait for epidemic control of prairie voles and field mice</p>

				efficiently transmit virus	
Siberian Tick Typhus		<i>Rickettsia sibirica</i>	<p>Transmission: Hard tick bite, especially sheep ticks of the genera <i>Dermacentor</i> and <i>Haemaphysalis</i></p> <p>Primary vectors: <i>Dermacentor silvarum</i>, <i>D. marginatus</i>, <i>D. niveus</i>, <i>Haemaphysalis concinna</i> (all nationwide)</p>	<p>Transmission period: March-Oct., with a peak in May-June</p> <p>Incidence and seroprevalence: Nationwide in tick habitats; no further epidemiological data are available at this time</p> <p>Bite properties: Vector ticks also afflict humans; they feed at one spot for several days; adults linger near sheep stables, pastures, etc., where they can fast for 2 to 3 years; sheep ticks cannot reproduce in heated living spaces</p>	<p>Preventive measures:</p> <ul style="list-style-type: none"> - Avoidance of sheep stables and pastures, etc. - Search/removal of hard ticks from self and companions - Use insect repellent and permethrin-treated clothing
Louse-borne Typhus, Epidemic Typhus		<i>Rickettsia prowazeki</i>	<p>Transmission: Intake of infectious body louse material</p> <p>Primary vector: <i>Pediculus humanus</i> (body louse)</p> <p>Reservoir: Humans (Brill-Zinsser disease)</p>	<p>Transmission period: Chiefly during the winter months from Dec.-April</p> <p>Incidence and seroprevalence: Confirmed focal occurrence in Turkmenistan; official incidence of 13 cases/100,000 in the Ashkhabad region in 1991; further epidemiological data are not available at this time</p> <p>Bite properties: Lice live in human clothing and deposit their eggs (nits) there; they reach sexual maturity 2-3 weeks after hatching and require a blood meal at least every 6 days; transmission of the agent occurs by inhalation of louse feces or by scratching infected louse material (crushed louse tissue) into the bite</p>	<p>Preventive measures:</p> <ul style="list-style-type: none"> - In endemic and epidemic regions: - Report every case of louse infestation - Since insect powders for the mass control of body lice are no longer available NATO-wide, treatment of clothing is the only recourse - Never “break off” body lice; this is one of the primary modes of infection (by scratching into the wound infectious louse cells under the fingernails)

				wound; louse-borne typhus is extremely dependent on the socio-economic environment (i.e., refugees, refugee camps)	
Mediterranean Fever (Boutonneuse Fever)		<i>Rickettsia conorii</i>	<p>Transmission: Bite of various hard ticks</p> <p>Primary vector: <i>Rhipicephalus sanguineus</i> (brown dog tick)</p> <p>Secondary vectors: <i>Hyalomma marginatum</i>, <i>H. anatolicum</i>, <i>Rhipicephalus turanicus</i></p> <p>Reservoirs: Wild rodents, dogs, other mammals</p>	<p>Transmission period: March-Nov.; year-round in cases of building infestations or chronic infestations in dogs</p> <p>Incidence and seroprevalence: Reported sporadically at an unknown epidemiological level; especially endemic in the south</p> <p>Bite properties: Brown dog ticks also afflict humans; they feed at one spot for several days, females lay up to 2,000 eggs in residential buildings, where the larvae hatch and attack humans and domestic animals</p>	<p>Preventive measures:</p> <ul style="list-style-type: none"> - Avoidance of old animal stables, etc. - Use insect repellent and permethrin-treated clothing (permethrin is a more effective repellent than DEET) - Search/removal of hard ticks from self and companions - For infestations in housing: use of treated mosquito nets with simultaneous tick control (e.g., 1-2% Propoxur acaricide)
Murine Typhus, Endemic Typhus Fever		<i>Rickettsia typhi</i> (formerly <i>R. mooseri</i>)	<p>Transmission: Intake of infectious rodent flea material (cellular or fecal)</p> <p>Primary vectors: <i>Xenopsylla</i> spp.(rat fleas)</p> <p>Secondary vectors: <i>Ctenocephalides felis</i> (cat flea), other rodent fleas</p> <p>Reservoirs: Rats harboring the enzootic vector <i>Polyplax spinulosa</i> (rat louse)</p>	<p>Transmission period: Year-round in cases of rat infestation</p> <p>Incidence and seroprevalence: Endemic in at least the southwestern 1/3 of the country; current epidemiological data for Turkmenistan are not available</p> <p>Bite properties: Rat fleas are nest specific, not host specific; all animal fleas also bite humans; fleas survive approx. 10 days without a blood meal, up to 2 months at low temperatures;</p>	<p>Preventive measures:</p> <ul style="list-style-type: none"> - Indoors: Regular eradication of rats and rodents and cleaning of buildings - Outdoors: Flea control with subsequent rat and rodent control

				transmission of the agent occurs by inhalation, or by scratching dust containing infectious flea material (crushed fleas or flea feces) into wounds	
Plague		<i>Yersinia pestis</i>	<p>Transmission: (only urban rodent plague): fleas</p> <p>Primary vectors: <i>Ctenocephalides canis</i> (dog flea), <i>C. felis</i> (cat flea), <i>Pulex irritans</i> (human flea), other rodent fleas</p> <p>Urban reservoir: House rat (<i>Rattus rattus</i>)</p> <p>Sylvatic reservoirs: Primarily <i>Rhombomys opimus</i> (great gerbil), also <i>Meriones persicus</i>, <i>M. libycus</i>, <i>M. vinogradovi</i>, various Dipodidae (gerbils), Microtinae (meadow mice), European ground squirrel (<i>Citellus suslicus</i>), etc. The rat flea <i>Xenopsylla cheopis</i> exists in the southern region of the country; <i>X. astia</i> does not occur nationwide; the human flea is endemic nationally</p>	<p>Transmission period: Possible year-round in cases of house rat infestation</p> <p>Incidence and seroprevalence: Enzootic rodent plague is highly endemic in a large focus in the northwest part of the country (entire Karakum region on the Caspian Sea) (northern 1/3), where there are continuous sporadic human cases; possible outbreaks were averted there by vaccination programs; no further details on incidence and seroprevalence in humans in Turkmenistan is available</p> <p>Breeding grounds: Fleas are nest specific, usually remaining in the nests of their hosts</p> <p>Bite properties: Rat fleas are nest specific, not host specific; all animal fleas also bite humans; rat fleas survive approx. 10 days without a blood meal, up to 2 months at low temperatures; a plague-infected flea lives an average of 3.2 days, since fleas inject adjuvant into the wound when they bite, and plague-infected fleas experience a “blood thrombus”</p>	<p>Preventive measures:</p> <ul style="list-style-type: none"> - Indoors: Permethrin-treated mosquito net (flea defense), insect repellent, rat control in accordance with health regulations - Outdoors: Use insect repellent and permethrin-treated clothing - In urban plague focus: First, rat flea control with nondispersive insect powder, then rat eradication using rodenticides - Flea monitoring: If more than 5 rat fleas per rat are found in a rodent plague-endemic region (accumulation on the surviving rodents), a rodent plague epidemic is to be assumed

				in the esophagus because of the coagulase activity of <i>Y. pestis</i> ; fleas take a test bite that strongly increases the probability of transmission of the plague agent to humans	
Lyme Disease		<i>Borrelia burgdorferi</i> , s.l.	<p>Transmission: Hard tick bite</p> <p>Primary vector: <i>Ixodes</i> spp.</p> <p>Secondary Vector: Other <i>Ixodes</i> species</p>	<p>Transmission period: March-Oct.</p> <p>Incidence and seroprevalence: Incidence of Lyme Disease in Turkmenistan is uncertain; alleged occurrence of autochthonal cases in the country's northern region; the European and Asian primary vectors, <i>Ixodes ricinus</i> and <i>I. persulcatus</i>, are not endemic nationally; confirmed cases in northern Kasakstan, but no epidemiological data on prevalence</p> <p>Bite properties: <i>Ixodes</i> species readily attack humans; all tick stages suck blood and are vectors (transovarial and transstadial transmission); life cycle approx. 3-4 years; live predominantly in forest edges and clearings along animal trails, where they quest from low shrubbery</p> <p>-Vector ticks are usually infective about 24 hours after biting</p>	<p>Preventive measures:</p> <ul style="list-style-type: none"> - Use insect repellent and permethrin-treated clothing - Search for attached ticks on self and companions - Remove feeding hard ticks as quickly and carefully as possible in order to avert an infection with <i>Borrelia</i>
Tick-borne Relapsing Fever		<i>Borrelia persica</i>	<p>Transmission: Bites of soft ticks or fluid from coxal glands of male or female <i>Ornithodoros</i> spp.</p> <p>Primary vector:</p>	<p>Transmission period: April-Oct., with a peak in May-June; year-round in cases of building infestation</p> <p>Incidence and seroprevalence: Focally endemic in the country's</p>	<p>Preventive measures:</p> <ul style="list-style-type: none"> - Indoors: Soft tick monitoring and control with acaricide barrier spray; use of treated

			<p><i>Ornithodoros tholozani</i></p> <p>Reservoirs: Wild rodents</p>	<p>southern region; seroepidemiological data not available at this time; frequency of the disease is primarily associated with the proximity of animal stales and living quarters, especially in barren, rocky regions</p> <p>Habitat: Soft ticks live hidden in walls, cracks, animal stables, well walls and other protected areas, often up to 1m deep</p> <p>Bite properties: Soft ticks bite chiefly at night for 5-10 min.; due to the release of a neurotoxin, bite is unnoticed; life cycle may exceed 10 years, depending on species and living conditions; capable of fasting in infectious state for several years</p>	<p>mosquito nets</p> <p>- Outdoors: Use insect repellent and permethrin-treated clothing; acaricide barrier treatment; avoidance of old animal stables, caravansaries, etc.</p>
Epidemic Relapsing Fever		<i>Borrelia recurrentis</i>	<p>Transmission: By scratching of infected body louse material into wounds</p> <p>Primary vector: <i>Pediculus humanus</i> (body louse)</p>	<p>Transmission period: Predominantly during the winter months from Dec.-April</p> <p>Incidence and seroprevalence: Confirmed low level national Occurrence; seroepidemiological data not available at this time</p> <p>Bite properties: Lice live in human clothing and deposit their eggs (nits) there; they reach sexual maturity 2-3 weeks after hatching and require a blood meal at least every 6 days; transmission of the agent occurs by scratching infected louse material</p>	<p>Preventive measures:</p> <p>- In endemic and epidemic regions:</p> <ul style="list-style-type: none"> - Report every case of louse infestation - Since insect powders for the mass control of body lice are no longer available NATO-wide, treatment of clothing must be relied on as the only recourse - Never “break off” body lice; this is one of the

				(crushed louse tissue) into the bite wound. Relapsing fever epidemics are highly dependent on the socio-economic environment (i.e., refugees, refugee camps)	primary modes of infection (by scratching into the wound infectious louse cells under the fingernails)
Trachoma		<i>Chlamydia trachomatis</i>	Transmission: Approx. 75% of <i>C. trachomatis</i> cases result from passive transmission by flies	Transmission period: Primarily May-Oct. Incidence and seroprevalence: Trachoma is moderately to highly endemic, especially in urban areas Mode of transmission: Transmission primarily (up to 75%) by contact with flies, which transfer the agent by touch or defecation	Preventive measures: - Fly and maggot control - Proper and professional disposal of organic waste, including feces, in order to inhibit fly infestation and reproduction - Installation of fly screens on all building openings - Use of ultraviolet light traps - Use of fly traps - Resistance: houseflies (<i>Musca domestica</i>) are resistant to chlorpyrifos, permethrin, fenvalerate and ethofenprox
Cutaneous Leishmaniasis		<i>Leishmania major, L. tropica</i>	Transmission: Sand fly bite Primary vectors: - human (anthroponotic) CL (human reservoir): <i>Phlebotomus caucasicus, P. sergenti</i> (both nationwide) - zoonotic CL: <i>P. papatasi, P. caucasicus</i> Secondary vectors: <i>P. longiductus, P. major, P.</i>	Transmission period: May-Nov., with peaks in June and Sept. Incidence and seroprevalence: Karakum Desert, and the Murgap River Valley inclusive of the canal system; occurrence of CL epidemics there every 1-3 years; extensive vaccination program carried out in the late 1960s and 1970s; official incidence in the Ashkhabad region	Preventive measures: - Indoors: Permethrin-treated mosquito net or insect repellent; move to 2 nd floor (out of range) - Outdoors: Use insect repellent and permethrin-treated clothing; don't wear shorts; eliminate breeding grounds through

			<p><i>mongolensis</i>, <i>P. ansarii</i></p> <p>Reservoirs: Wild rodents such as <i>Rhombomys opimus</i> (gerbil), <i>Meriones erythorourus</i>, <i>M. hurricanae</i>, <i>M. meridianus</i></p>	<p>was 36/100,000 in 1991</p> <p>Breeding grounds: Sand flies breed in decaying matter; larvae develop in moist, dark places, especially in reservoir rodent nests</p> <p>Bite properties: Sand flies are identifiable by their characteristic hopping manner when flying. Females bite at dusk and dawn; poor fliers, only active when no wind is present; actively migrate indoors to bite (endophilic, endophagic); regularly penetrate mosquito nets due to their small size; generation time 5-7 weeks; prefer to bite in the calf region</p>	<p>rodent control and the removal of bushes and shrubs in camp areas (greater clearance)</p>
Visceral Leishmaniasis		<i>Leishmania infantum</i>	<p>Transmission: Sand fly bite</p> <p>Primary vectors: <i>P. caucasicus</i>, <i>P. major</i> (both nationwide)</p> <p>Secondary vectors: <i>P. longiductus</i>, <i>P. smirnovi</i></p> <p>Reservoirs: Canidae (jackals, foxes, dogs)</p>	<p>Transmission period: April-Oct.</p> <p>Incidence and seroprevalence: Focally endemic nationally, with sporadic cases primarily in the areas around Ashkhabad, Chardzhou, Krasnovodsk and Mary; no further epidemiological data are available at this time</p> <p>Breeding grounds: See <i>L. tropica</i></p>	<p>Same as <i>L. tropica</i>; do not keep dogs in camp areas</p>
Tularemia		<i>Francisella tularensis</i>	<p>Transmission: Bite of infectious vectors, especially hard ticks; also, direct contact with infected animal material, chiefly rodents</p> <p>Primary vectors: Hard ticks, especially</p>	<p>Transmission period: April-Sept., with peak in May/June</p> <p>Incidence and seroprevalence: Focal and enzootically stable in Turkmenistan, with sporadic confirmed human cases; current epidemiological data are not available</p>	<p>Preventive measures:</p> <ul style="list-style-type: none"> - Avoid contaminated waters - Rat control over large areas around the camp with subsequent surface disinfection

			<p><i>Dermacentor</i> spp. (sheep ticks)</p> <p>Secondary vectors: Hematophagous, anthropophilic vectors, such as fleas, stable flies, mosquitoes (e.g., <i>Aedes vexans</i>), etc.</p> <p>Reservoirs: Rabbits, small rodents and other mammals</p>	<p>Epidemiology: Relatively stable enzootic foci in rabbit tick biotopes (steppe region), from which infected rodents spread to rural/urban inhabited areas</p>	<ul style="list-style-type: none"> - Mice control around sylvatic camp area (see Hantavirus) - Keep grave excavation to a minimum in areas of high rodent activity - Use insect repellent and permethrin-treated clothing - Search for attached ticks on self and companions - Remove feeding hard ticks as quickly and carefully as possible
Leptospirosis		<p><i>Leptospira icterohaemorrhagiae</i>, <i>Leptospira</i> spp.</p>	<p>Transmission: Via contaminated water through active skin penetration by the bacteria, as well as through contact with infectious rodent urine and animal material</p> <p>Primary vectors: Brown rat (<i>Rattus norvegicus</i>), hogs, mice</p> <p>Secondary vectors: Other mammals</p> <p>Reservoirs: Rats, other mammals</p>	<p>Transmission period: year-round</p> <p>Incidence and seroprevalence: Endemic in the country's humid Sections in rodents and among pets and livestock; no epidemiological data are available at this time</p> <p>Mode of transmission: - Special note: micromicturition of synanthropic infected rodents, such as rats, which constantly emit urine in tiny droplets. Leptospiral reservoirs spread the agent very efficiently over large areas; therefore, after rodents have been successfully cleared from an area, disinfection of the entire area must be considered</p>	<p>Preventive measures:</p> <ul style="list-style-type: none"> - Avoid contaminated waters - Rat control over large areas around the camp with subsequent surface disinfection
Malaria		<p><i>Plasmodium vivax</i></p>	<p>Transmission: Bite of <i>Anopheles</i> mosquitoes</p>	<p>Transmission period: May-Sept.</p> <p>Incidence and seroprevalence:</p>	<p>Preventive measures:</p> <ul style="list-style-type: none"> - Indoors: Use

			<p>Primary vectors: <i>An. superpictus</i> (nation-wide), <i>An. pulcherrimus</i> (only in southern 1/3), <i>An. martinius</i>, <i>An. fluviatilis</i> (nationwide)</p> <p>Secondary vectors: <i>An. messeae</i></p>	<p>Turkmenistan had been malaria-free since the early 1960s; the introduction of malaria began in the 1990s with new, autochtonal vivax cases; official case numbers, 1995: 0 cases; 1996: 3 cases; 1997: 4; 1998: 115; 1999: 10; 2000: 18 autochtonally acquired <i>Pl. vivax</i> cases; potential endemic regions are above all the Tejen and Murgab Rivers; there are currently 5 active foci in Serkhetabad District, other foci in Tagtabazar and Kerki Districts, the cities of Ashkhabad and Lebap, including the Dashkhovuz and Akhal areas; there is a nationwide, comprehensive and competent plan for the eradication of existing malaria foci as well as prevention of reintroduction; this plan has already been partially implemented with technical support from WHO and the Health Ministry of Turkmenistan</p> <p>Breeding grounds: Standing waters in urban areas (cans, buckets, old tires, etc.) to large, slowly flowing ponds and rivers, etc.</p> <p>Bite properties: Female <i>Anopheles</i> bite at dawn and dusk; <i>An. superpictus</i> does not bite in enclosed areas (exophilic, exophagic); other species actively migrate indoors and bite there (endophilic, endophagic);</p>	<p>permethrin-treated mosquito nets; do not use ultraviolet lamps</p> <p>- Outdoors: Use insect repellent and permethrin-treated clothing; minimize exposed skin</p> <p>- Continuous larval control and abatement in camp area; elimination of breeding grounds</p> <p>- Vector resistance status:</p> <p>- DDT: <i>An. maculipennis</i>, <i>An. hyrcanus</i>, <i>An. bifurcatus</i>; currently no resistance in <i>An. superpictus</i></p>
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				very small species penetrate untreated mosquito nets; flight radius 1-2 km	
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Endemic Venomous Animals in Turkmenistan

Venomous Animal Group:	Name:	Toxicity:	Remarks:
Poisonous Snakes, mortality rate 25-100/100,000	<i>Naja naja oxiana</i> , spectacled or Indian cobra, oxus or brown cobra (Elapidae)	Extremely toxic	Occurs in almost all of the country's steppe region; up to 1.8 m long, primary color is yellowish, brownish, grayish or black, partial cruciform traces visible on back, two dark bands in neck region, atypical spectacled collar, but neck region is dilatable into a cobra-like hood; prefers rocky, cliffy habitats on mountainsides up to 3000 m; diurnal with maximum activity mornings and evenings; very clever and agile, raises anterior portion of body when it senses danger, does not spit over a distance, venom is primarily neurotoxic, pathology begins approx. 1 hour after bite, symptoms can worsen very quickly with death from respiratory paralysis; antivenom: Centro de Estandarization de Venenos y Antivenenos, Spain; Institut d'Etat des Serums et Vaccines, Iran; Ministry of Public Health, Russia
	<i>Agkistrodon intermedius caucasicus</i> , Central Asian pit viper (Crotalidae)	Mildly toxic	Endemic in the southeastern 1/2 of the country; during the day, hides under rocks, in rodent nests and chasms, rarely bites; 60 to 80 cm long, head flat and angular, hornnail on end of tail, coloring extremely variable from sand-yellow to brown to black, often with unevenly formed horizontal stripes; inhabits varying habitats from steppes to high mountain meadows; no bite complications resulting in death reported to date
	<i>Echis multisquamatus</i> ,	Extremely toxic	Common in the steppe region of Turkmenistan and

	multiscale or Transcaspiansaw-scaled viper, Central Asian sand viper (Viperidae)		the most dangerous poisonous snake there; very aggressive; up to 80 cm long, with brownish base coloring, lateral light and dark zigzag stripe, and black and white marks on back; emits a rattling sound when in danger; mortality rate 36%, severe injury in 30% of all bite cases, specific antivenom available (Institut d'Etat des Serums et Vaccines, Iran)
	<i>Daboia lebetina obtusa</i> , blunt-nosed viper, Levantine viper (Viperidae)	Extremely toxic	Especially common in the southern 1/2 of Turkmenistan; length up to 1.7 m, wide head with small scales, eyes have vertically oriented pupils, primary coloring fluctuates between stony gray, light gray, and greenish gray to reddish gray, pattern dissolves to darker horizontal band markings, mistakable for the harmless Münzennatter; inhabits cliffy/rocky areas and mountainsides that lean toward riverbeds, rarely occurs over 2,000 m elevation; very aggressive when disturbed; mortality rate 6.6%, severe trauma/injury in 28% of bite cases, specific antivenom is available
Arachnids	<i>Latrodectus tredecimguttatus</i> , European widow spider, black widow, other <i>Latrodectus</i> spp.	Moderately toxic	Immobile web spiders that stay primarily in their webs rather than actively hunt; extremely attentive; body is round, shiny black, most have 13 red or yellow markings on the back, body size 1-1.5 cm; very rarely deadly; signs of systemic poisoning (latrodectism), specific antivenom is available
	<i>Lycosa</i> spp., as well as other species of wolf spider	Mildly toxic	Active predator with wasp-like bite, usually only localized symptoms

	Sun spiders (Solifugae)	Nontoxic	Occur in the country's steppe region; very large (up to 10 cm) spider-like animals with crablike jaws but without poison glands; display pedipalps (pincers) when endangered, and emit a hissing sound by rubbing jaws; actively jump at humans from up to 30 cm away; bite painfully, bite has cruciform appearance high secondary infection rate
	A number of scorpions in the genera <i>Mesobuthus</i> and <i>Orthochirus</i> , especially: - <i>Mesobuthus eupeus</i> - <i>Orthochirus scrobiculosus</i> - in the extreme southern part of the country, <i>Androctonus crassicauda</i> , fat-tailed scorpion	Mildly toxic <i>Androctonus crassicauda</i> : species-specific antivenom is available	Occur throughout the country; scorpion venom in Tajikistani species acts hemolytically, with local pain, swelling, and necrosis; systemic poisoning is generally acute, no cases of death have been recorded in Turkmenistan to date (there are no extremely poisonous endemic species); aside from <i>Androctonus crassicauda</i> in the extreme southern part of the country (the limit of its range), no extremely toxic species are endemic
Centipedes	<i>Scolopendra cingulata</i> , megarian banded centipede, as well as other large species	Mildly toxic	An aggressive predator common in populated places, living among humans; up to 10 cm long, some endemic species are even longer, front pair of legs transformed into jaws with poison glands; systemic symptoms are generally acute, rarely last longer than a day; a bite mark from a large centipede may be indistinguishable from that of a mid-sized viper