

# Vector-borne Infectious Diseases in Kazakhstan

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Vector-borne Disease:	Incubation Period:	Agent:	Mode of Transmission/ Vector:	Epidemiology:	Remarks:
Bunya Fever		<i>Bunyavirus</i> , Bunyaviridae	<b>Transmission:</b> Bite from different species of <i>Haemaphysalis</i> (hard tick) <b>Primary vector:</b> <i>Haemaphysalis concinna</i> , <i>H. punctata</i> (sheep tick) <b>Reservoir:</b> Sheep	<b>Transmission period:</b> May-Oct. <b>Incidence and seroprevalence:</b> No epidemiological data are available at this time <b>Bite properties:</b> Sheep ticks belong to the hard tick family Ixodidae and also afflict people; they feed at one spot for several days; adults live near sheep stables, sheep pastures, etc., where they can fast for 2 to 3 years; life span can exceed 4 years	<b>Preventive measures:</b> - Avoidance of sheep pens, sheep pastures, etc. - Search/removal of hard ticks from self and companions - Use skin repellent and permethrin-treated clothing
Issyk-Kul Fever		Issyk-Kul-virus, unclassified, Bunyaviridae	<b>Transmission:</b> Bite from different species of hard and soft ticks <b>Primary vectors:</b> Hard tick: <i>Ixodes persulcatus</i> (taiga tick), <i>Hyalomma</i> spp. (sheep ticks),	<b>Transmission period:</b> April-Oct. with peak in July/Aug. <b>Incidence and seroprevalence:</b> 1982 outbreak near Tajikistan, seropositivity rate in humans there up to 8% <b>Bite properties:</b> Hard ticks ( <i>Ixodes</i> and <i>Hyalomma</i>	<b>Preventive measures:</b> - Avoidance of sheep pens, sheep pastures, etc. -Search/removal of hard ticks from self and companions -Use skin repellent and permethrin-treated

			Soft ticks: <i>Argas vespertilionis</i>	spp.) feed at one spot for several days, development lasts 2-4 years; the taiga tick chiefly inhabits forests in the country's northern region. Soft ticks, family Argasidae, live in animal pens (including deserted ones), wall cracks, nests, etc., and may fast up to 4 years; they bite for short periods, mostly at night for 5 to 10 minutes, depending on the species of soft tick; severe bite reactions are possible	clothing -For transmission by soft ticks in lodging or camps, use treated mosquito nets -Soft tick control of the local area by spray/aerosol of acaricide (e.g., 1-2% Propoxur)
Japanese Encephalitis		Japanese encephalitis virus, <i>Flavivirus</i> , Flaviviridae	<b>Transmission:</b> Bite from <i>Culex</i> mosquito <b>Primary vector:</b> <i>Culex tritaeniorhynchus</i> (sole endemic vector)	<b>Transmission period:</b> May-Oct. <b>Incidence and seroprevalence:</b> Antibodies in animal reservoirs (e.g., birds) were verified in the late 1970s; until that time, human cases had not been reported; range similar to that of the sole endemic JE vector, <i>Cx. tritaeniorhynchus</i> , with the result that infection is only possible in the country's southern region (south of about 50° latitude) <b>Bite properties:</b> Female <i>Culex</i> mosquitoes bite at dawn and dusk as well as indoors, wintering in basements etc.; flight radius up to 2 km <b>Breeding grounds:</b> In urban areas, colonizes any available small, stagnant or polluted body of water (cisterns, buckets, cans, old tires, etc.)	<b>Preventive measures:</b> - <b>Indoors:</b> Permethrin-treated mosquito net, insect repellent - <b>Outdoors:</b> Larval mosquito control; use insect repellent combined with permethrin-treated clothing

Crimean-Congo Hemorrhagic Fever		Crimean-Congo Hemorrhagic Fever virus, <i>Nairovirus</i> , Bunyaviridae	<p><b>Transmission:</b> Bite or exposure to hard tick cell material, mostly <i>Hyalomma</i> spp.; or soft ticks in the genus <i>Ornithodoros</i></p> <p><b>Primary vector:</b> <i>Hyalomma marginatum</i> (sheep tick)</p> <p><b>Secondary vectors:</b> <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><b>Transmission period:</b> May-Sept.</p> <p><b>Incidence and seroprevalence</b> Endemic nationally, especially in the southwest; June 1995 outbreak of 43 confirmed cases almost exclusively in sheep shearers; up to 40% of sheep ticks (<i>Hyalomma</i> spp.) carry the virus; seroprevalence in humans up to 1%</p> <p><b>Habitat:</b> Dry areas, animal stables and trails, former pastures</p> <p><b>Bite properties:</b> Hard ticks of the genus <i>Hyalomma</i> 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 favor large mammals or humans and are not at all host specific; fasting adult ticks survive up to 4 years</p>	<p><b>Preventive measures:</b></p> <ul style="list-style-type: none"> <li>- Avoidance of old animal stables, etc.</li> <li>- Use of skin repellent or permethrin-treated clothing (for ticks, permethrin is a more effective repellent than DEET)</li> <li>- Search/removal of hard ticks from self and companions</li> <li>- For soft tick vectors in lodging: treated mosquito nets with simultaneous soft tick control using 1-2% Propoxur acaricide</li> </ul>
Sand Fly Fever (Papatasi Fever)		Sand fly fever virus, <i>Phlebovirus</i> , Bunyaviridae, Sicilian und Naples serotypes identified	<p><b>Transmission:</b> Sand fly bite</p> <p><b>Primary vector:</b> <i>Phlebotomus papatasi</i></p>	<p><b>Transmission period:</b> April-Oct. (peaks in early June and August), transovarial transmission possible</p> <p><b>Incidence and seroprevalence:</b> No epidemiological data are available at this time</p> <p><b>Bite properties:</b> Sand flies bite at dawn and dusk as well as indoors; females winter in basements, etc.</p> <p><b>Breeding grounds:</b> See Cutaneous Leishmaniasis</p> <p><b>Bite properties:</b> Same as <i>L. tropica</i> (see CL)</p>	Same as cutaneous leishmaniasis ( <i>L. tropica</i> )

Sindbis Fever		Sindbis fever virus, <i>Alphavirus</i> , Togaviridae	<b>Transmission:</b> Mosquito bite <b>Primary vectors:</b> <i>Culex pipiens</i> , <i>Cx. bitaeniorhynchus</i> , <i>Cx. tritaeniorhynchus</i> <b>Reservoir:</b> Birds	<b>Transmission period:</b> May-Sept. <b>Incidence and seroprevalence:</b> No epidemiological data are available at this time <b>Bite properties:</b> <i>Culex</i> mosquitoes bite at dawn and dusk and also indoors; females overwinter in basements, etc. <b>Breeding grounds:</b> In urban areas, colonizes any available small, stagnant or polluted body of water (cisterns, buckets, cans, old tires, etc.)	<b>Preventive measures:</b> - <b>Indoors:</b> Permethrin-treated mosquito net, insect repellent - <b>Outdoors:</b> Larval mosquito control, insect repellent combined with permethrin-treated clothing; observe proper waste disposal (water collecting in empty food containers, tires, etc.)
Syr-Darya Fever		Syr-Darya-virus, unclassified	<b>Vector unknown</b> , no indication found in literature; possibly <i>Aedes</i> mosquitoes, due to an association with flood waters (forest or meadow mosquitoes)	<b>Transmission period:</b> May-Oct. <b>Incidence and seroprevalence:</b> Enzootic in the country's south; 1972 outbreak in the flood regions of the Syr Darya and Illi rivers; seroprevalence (early 1980s): in humans up to 15% positive, in other mammals up to 16% positive	<b>Preventive measures:</b> - Elimination of breeding grounds in camp areas - Insect repellent combined with permethrin-treated clothing - Use of permethrin-treated mosquito nets until positive clarification of method of transmission
Tahyna Fever		Tahyna fever virus, <i>Bunyavirus</i> , Bunyaviridae	<b>Transmission:</b> Bite from various <i>Aedes</i> mosquitoes <b>Primary vector:</b> <i>Aedes vexans</i> , <i>Ae. cantans</i> , <i>Ae. sticticus</i> (forest and meadow mosquitoes) <b>Reservoir:</b>	<b>Transmission period:</b> May-Oct. <b>Incidence and seroprevalence:</b> No data available at this time <b>Bite properties:</b> <i>Aedes</i> mosquitoes bite outdoors during the day and somewhat at dawn; they don't actively enter homes (exophilic,	<b>Preventive measures:</b> - Eliminate breeding grounds in camp areas - Use insect repellent and permethrin-treated clothing

			Small mammals	<p>exophagic). The bite response to <i>Ae. vexans</i> is especially unpleasant. Over 200 human bites per minute have been documented during swarms. Pay attention to bite reactions. The flight radius of this species is up to 20 km</p> <p><b>Breeding grounds:</b> Floodwater mosquitoes emerge in large numbers in spring in forests (where they breed in tree holes) and/or in meadows after heavy rains. Overwintering occurs in the egg stage. Eggs are capable of hatching year-round</p>	
West Nile Fever		West Nile fever virus, <i>Flavivirus</i> , Flaviviridae	<p><b>Transmission:</b> Bite of <i>Culex pipiens</i> (house mosquito)</p> <p><b>Primary vector:</b> <i>Culex pipiens</i></p> <p><b>Reservoir:</b> Birds</p>	<p><b>Transmission period:</b> May-Nov.</p> <p><b>Incidence and seroprevalence:</b> No data available at this time</p> <p><b>Bite properties:</b> <i>Culex pipiens</i> bites at dawn and dusk as well as indoors (endophilic, endophagic); infectious females overwinter in buildings, cellars, and animal stables, sometimes in large numbers</p> <p><b>Breeding grounds:</b> In urban areas, colonizes any available small, stagnant or polluted body of water (cisterns, buckets, cans, old tires, etc.)</p>	<p><b>Preventive measures:</b></p> <p>- <b>Indoors:</b> Permethrin-treated mosquito net, and/or insect repellent</p> <p>- <b>Outdoors:</b> Larval mosquito control; insect repellent combined with permethrin-treated clothing</p>
Russian Spring-Summer Encephalitis (RSSE)		Russian spring-summer encephalitis virus,	<p><b>Transmission:</b> Bite from infectious hard ticks</p> <p><b>Primary vector:</b> <i>Ixodes persulcatus</i> (taiga tick)</p>	<p><b>Transmission period:</b> April-Oct. with May/June peak</p> <p><b>Incidence and seroprevalence:</b> Localized incidence in the region north of approx. 50° latitude. In the</p>	<p><b>Preventive measures:</b></p> <p>- Use of insect repellent and permethrin-treated clothing</p> <p>- Search for attached ticks</p>

		<i>Flavivirus</i> , Flaviviridae	<b>Reservoir:</b> Hard ticks (by transovarial and transstadial transmission), small mammals	late 1970s seropositive rates in humans up to 3%, in reservoir animals up to 10% <b>Bite properties:</b> <i>Ixodes persulcatus</i> readily attacks humans; all tick stages suck blood and are vectors (transovarial and transstadial transmission in the tick population); life cycle approx. 3 to 4 years; occurs predominantly along forest edges and in clearings or along animal trails in taiga forests; ticks quest for passing hosts from low shrubbery. The incidence of RSSE is strictly dependent on exposure (through mushroom picking, etc.) in tick-infested forests	on self and companions
Hemorrhagic Fever with Renal Syndrome		Hantaviruses of the Seoul, Hantaan and Puumala genotypes	<b>Transmission:</b> Contact with infectious dust or aerosols (rodent excrement, rodent urine), contact with infectious feces and urine, rodent bites, secondarily by vectors such as hematophagous mites <b>Primary vectors/reservoirs</b> (nationwide incidence) - <b>Seoul serotype:</b> House and brown rats - <b>Hantaan serotype:</b> <i>Apodemus sylvaticus</i> (field mouse), <i>A. agrarius</i> (striped	<b>Incidence and seroprevalence:</b> Case data on hantaviral diseases in Kazakhstan are nonexistent. In the neighboring states of Mongolia and China, HFRS is still a serious problem, with over 100,000 cases/year. All rodent reservoirs, especially rats, striped field mice ( <i>Apodemus agrarius</i> ), and meadow voles ( <i>Microtus</i> spp.) are found nationwide <b>Transmission period:</b> Peaks in spring and fall; in synanthropic rodents (rats), year-round transmission is possible	<b>Preventive measures:</b> - In urban/camp areas: rodent control (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 - In rural and sylvatic

			field mouse), <i>A. flavicollis</i> (yellow-necked mouse) - <b>Puumala serotype:</b> <i>Clethrionomys glareolus</i> (bank vole), <i>Microtus</i> spp. (prairie vole), <i>Ondatra zibethicus</i> (muskrat)	<b>Modes of transmission:</b> - Behavior patterns of reservoir species and their level of synanthropy combine to render disease transmission sylvatic, rural, or urban - Reservoir rodents release urine in tiny droplets (micromicturition) to mark territory; virus transmission via aerosol or dust is therefore very efficient	areas, use pourable poison bait for epidemic control of prairie voles and field mice, if licensed
Siberian Tick Typhus		<i>Rickettsia sibirica</i>	<b>Transmission:</b> Bite of hard ticks, especially sheep ticks, <i>Dermacentor</i> spp. <b>Primary vectors:</b> <i>Dermacentor silvarum</i> (nationwide) and <i>D. marginatus</i> (endemic in the northeast)	<b>Transmission period:</b> May-Oct. <b>Incidence and seroprevalence:</b> No data available at this time <b>Bite properties:</b> Sheep 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	<b>Preventive measures:</b> - Avoidance of sheep stables, sheep pastures, etc. - Search/removal of hard ticks from self and companions - Use of insect repellent and permethrin-treated clothing
Rickettsialpox		<i>Rickettsia akari</i>	<b>Transmission:</b> Bite of hematophagous mouse mite <i>Liponyssoides sanguineus</i> , the only known vector <b>Vector:</b> <i>Liponyssoides sanguineus</i> <b>Reservoir:</b> House mice ( <i>Mus musculus</i> )	<b>Transmission period:</b> Possibly year-round (indoor prevalence) <b>Incidence and seroprevalence:</b> Present but at unknown epidemiological levels; regional occurrence of the disease is strongly localized (“hot spots”) <b>Bite properties:</b> Mouse mites are found on house mice, which infect and distribute the mites. In their search for a new host, the tiny mites	<b>Preventive measures:</b> - In urban areas/camp areas: - First, mite control in entire affected area, especially in rodent nests, only then begin rodent control - The use of insecticide-treated rodent bait stations is possible (mite control

				(size < 1mm) crawl within mouse-infected areas and bite humans.	on mice) - Control of synanthropic rodents (house mice and rats) by combined application of rodenticide (poison bait) and structural prevention - Hygiene measures (optimized waste disposal is very important); cleansing all affected areas of rodent excrement, with upstream disinfection if necessary
Plague		<i>Yersinia pestis</i>	<p><b>Transmission</b> (only urban rodent plague): fleas</p> <p><b>Primary vector:</b> <i>Ctenocephalides canis</i> (dog flea), <i>C. felis</i> (cat flea), <i>Pulex irritans</i> (human flea)</p> <p><b>Urban reservoir:</b> House rats (<i>Rattus rattus</i>)</p> <p><b>Sylvatic reservoirs:</b> Persian jird (<i>Meriones persicus</i>), North African Jird (<i>M. libicus</i>), Vinogradov's Gerbil (<i>M. vinogradoni</i>), various Dipodidae (jerboas), various Microtinae (voles), Spotted suslik (squirrel species <i>Citellus suslicus</i>), etc.</p>	<p><b>Transmission period:</b> Possibly year-round in house rat infested areas</p> <p><b>Incidence and seroprevalence:</b> Enzootic rodent plague is endemic in a strip from the Caspian Sea to Balkhash Lake, hyper-endemic with human bubonic plague cases in the region south of Balkhash Lake, the Novokazalinsk metropolitan area (Aral Lake) and Kzyl-Orda, as well as along the Caspian Sea in the region of Gur'yev-Akhtubinsk-Uralsk-Oktyabrsk; no details on incidence and seroprevalence in humans</p> <p><b>Breeding grounds:</b> Fleas are nest specific, remaining primarily in the resting places of their rodent hosts</p> <p><b>Bite properties:</b> Rodent fleas are nest</p>	<p><b>Preventive measures:</b></p> <p>- <b>Indoors:</b> Permethrin-treated mosquito net (flea defense), insect repellent, rat control</p> <p>- <b>Outdoors:</b> Use of insect repellent and permethrin-treated clothing</p> <p>- <b>In urban plague focus:</b> First, rat flea control with nondispersive insect powder, then rat elimination using rodenticides</p> <p>- <b>Flea monitoring:</b> If more than 5 rat fleas per rat are found in a rodent plague-endemic region</p>

			The rat fleas <i>Xenopsylla cheopis</i> and <i>X. astia</i> , which do <u>not</u> occur nationwide	specific, not host specific; all animal fleas also bite humans; fleas survive approx. 10 days without a blood meal, up to 2 months in 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” in the esophagus because of the coagulase activity of <i>Y. pestis</i> (thus clotting blood); fleas take a test bite that strongly increases the probability of transmission of the plague agent to humans	(accumulation on the surviving rodents), a rodent plague epidemic is to be assumed.
Lyme Disease		<i>Borrelia burgdorferi</i> s.l.	<p><b>Transmission:</b> Hard tick bite</p> <p><b>Primary vector:</b> <i>Ixodes persulcatus</i> (taiga tick)</p> <p><b>Secondary vectors:</b> Other <i>Ixodes</i> spp.</p>	<p><b>Transmission period:</b> April-Oct.</p> <p><b>Incidence and seroprevalence:</b> Occurrence of Lyme disease in the northern third of the country has been confirmed; lack of epidemiological data on prevalence; up to 60% of <i>Ixodes persulcatus</i> ticks are <i>Borrelia</i> positive</p> <p><b>Bite properties:</b> <i>Ixodes persulcatus</i> readily attacks humans; all tick stages suck blood and are vectors (transovarial and transstadial transmission in the tick population); life cycle approx. 3-4 years; occurs predominantly along forest edges and in clearings or along animal trails in taiga forests; ticks quest for passing hosts from low</p>	<p><b>Preventive measures:</b></p> <ul style="list-style-type: none"> <li>- Use of insect repellent and permethrin-treated clothing</li> <li>- Search for attached ticks on self and companions</li> <li>- Remove feeding hard ticks as quickly and properly as possible in order to avert an infection with <i>Borrelia</i></li> </ul>

				<p>shrubbery</p> <p>- <i>Borrelia</i> infection first occurs after human is bitten; spirochetes then flow through the salivary glands in order to be transmitted to the host. Ticks are first infective for <i>Borrelia</i> after a minimum of 24 hrs.</p>	
Epidemic Relapsing Fever		<i>Borrelia recurrentis</i>	<p><b>Transmission:</b> Absorption (via scratching) of infected body louse matter</p> <p><b>Primary vector:</b> <i>Pediculus humanus</i> (body louse)</p>	<p><b>Transmission period:</b> Predominantly during the winter months from Dec.-April</p> <p><b>Incidence and seroprevalence:</b> Low level of occurrence nationally; seroepidemiological data are not available at this time</p> <p><b>Bite properties:</b> Lice live in human clothing and deposit their eggs (nits) there; they reach sexual maturity 2-3 weeks after hatching; lice require a blood meal at least every 6 days; transmission of the agent occurs by scratching of infective louse matter (crushed louse tissue) into the bite wound. A louse-borne relapsing fever epidemic is extremely dependent on the socio-economic environment (i.e., refugees, refugee camps)</p>	<p><b>Preventive measures:</b></p> <p>- <b>In endemic and epidemic regions:</b></p> <p>- Report every case of louse infestation</p> <p>- Since insect powders for the mass control of body lice are no longer available NATO-wide, treatment of clothing is the only recourse</p> <p>- 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)</p>
Cutaneous Leishmaniasis		<i>Leishmania tropica</i>	<p><b>Transmission:</b> Sand fly bite</p> <p><b>Primary vectors:</b></p> <p>- Human transmission cycle: <i>Phlebotomus caucasicus</i>, <i>P. sergenti</i></p> <p>- Zoonotic transmission</p>	<p><b>Transmission period:</b> April-Oct. (peaks in June and Sept.)</p> <p><b>Incidence and seroprevalence:</b> Found over the entire country south of approx. 48° latitude, frequency decreasing from west to east; no case</p>	<p><b>Preventive measures:</b></p> <p>- <b>Indoors:</b> Use permethrin-treated mosquito nets; live on the second story of buildings (out of sand fly flight</p>

			<p>cycle:  <i>P. caucasicus</i>, <i>P. papatasi</i>  <b>Secondary vectors:</b>  <i>P. andrejevi</i>, <i>P. salehi</i>, <i>P. mongolensis</i>, <i>P. alexandri</i>,  <i>P. ansari</i>  <b>Reservoirs:</b>  Wild rodents such as the Great Gerbil, <i>Rhombomys opimus</i>, various jirds (<i>Meriones erythourus</i>, <i>M. hurrianae</i>, <i>M. meridianus</i>)</p>	<p>numbers available at this time  <b>Breeding grounds:</b> Breeds in decaying matter; larval development takes place in dark, moist places, especially the nests of reservoir rodents  <b>Bite properties:</b> Females bite at dusk and dawn and are poor fliers, active only when no wind is present, though they readily enter structures to bite (endophilic, endophagic) and regularly penetrate mosquito nets due to their small size; generation time 5-7 weeks; prefer to bite in calf region</p>	<p>range)  <b>- Outdoors:</b> Use insect repellent and permethrin-treated clothing; don't wear shorts/sandals; eliminate breeding areas through rodent control and the removal of bushes and shrubs in camp areas (greater clearance)</p>
Visceral Leishmaniasis		<i>Leishmania donovani</i> , <i>L. infantum</i>	<p><b>Transmission:</b> Sand fly bite  <b>Primary vectors:</b>  <i>Phlebotomus smirnovi</i>, <i>P. caucasicus</i>  <b>Secondary vectors:</b>  <i>P. argentipes</i>, <i>P. chinensis</i>, <i>P. tobbi</i>, <i>P. kandelakii</i>, <i>P. wenyoni</i>  <b>Reservoirs:</b>  Canidae (jackals, foxes, dogs)</p>	<p><b>Transmission period:</b> April-Oct.  <b>Incidence and seroprevalence:</b>  Endemic south of 48° latitude, especially in the southwest along the Caspian Sea  <b>Breeding grounds:</b> See <i>L. tropica</i></p>	<p>As with <i>L. tropica</i>; do not keep dogs in encampment areas</p>
Leptospirosis		<i>Leptospira icterohaemo-</i>	<p><b>Transmission:</b> Via contaminated water through</p>	<p><b>Transmission period:</b> Year-long  <b>Incidence and seroprevalence:</b></p>	<p><b>Preventive measures:</b>  - Avoid contaminated</p>

		<i>rrhagiae</i>	<p>active skin penetration by the bacteria, as well as through contact with infectious rodent urine and animal matter</p> <p><b>Primary vectors:</b> Brown rat, <i>Rattus norvegicus</i>, hogs</p> <p><b>Secondary vectors</b> Other mammals</p> <p><b>Reservoir:</b> Rats, other mammals</p>	<p>Endemic, particularly in the eastern part of the country; in December 1998 epidemic onset in the metropolitan areas of Ust-Kamenogorsk, East Kazakhstan, with over 2000 cases of sickness and &gt;6 deaths</p> <p>- 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>waters</p> <p>- Rat control over a large area around the camp with subsequent surface disinfection</p>
Malaria		<i>Plasmodium vivax</i> ; <i>Pl. falciparum</i> , <i>Pl. malariae</i>	<p><b>Transmission:</b> <i>Anopheles</i> mosquito bite</p> <p><b>Primary vectors:</b> - <i>An. messeae</i> (nationwide); <i>An. superpictus</i> (southern regions),</p> <p><b>Secondary vectors:</b> - <i>An. fluviatilis</i>, <i>An. pulcherrimus</i> (south only, near 45 ° latitude)</p>	<p><b>Transmission period:</b> June-Sept.</p> <p><b>Incidence and seroprevalence:</b> Isolated cases of <i>Plasmodium vivax</i> have been reported in the southeast part of the country, where malaria may have been introduced</p> <p><b>Breeding grounds:</b> Standing waters in urban areas, ranging from small (cans, buckets, old tires, etc.) to large (slow flowing ponds with waterplants, etc.)</p> <p><b>Bite properties:</b> Females bite at dawn and dusk; <i>Anopheles superpictus</i> and <i>An. fluviatilis</i> do not bite in enclosed areas (exophilic, exophagic); other species actively migrate indoors and bite there</p>	<p><b>Preventive measures:</b></p> <p>- <b>Indoors:</b> Use permethrin-treated mosquito net, do not use ultraviolet lamps</p> <p>- <b>Outdoors:</b> Use insect repellent and permethrin-treated clothing; minimize exposed skin</p> <p>- Continuous larval control in camp area; elimination of breeding grounds</p> <p>- Vector resistance status unknown at this time</p>

				(endophilic, endophagic); very small species penetrate non-treated mosquito nets; flight radius 1-2 km	
<b>Diseases of Veterinary Importance Warranting Special Inquiry:</b>					
Sheep Pox				No data regarding Kazakhstan available at this time	
Brucellosis		<i>Brucella</i> sp.		<b>Incidence and seroprevalence:</b> Endemic in the 1980s in the entire area south of approx. 50° latitude; further data on species distribution and epidemiology are not available at this time	
Anthrax, Splenic Fever		<i>Bacillus anthracis</i>		<b>Incidence and seroprevalence:</b> Endemic in the 1980s in the northwestern part of the country; detailed epidemiological data are not available at this time	

### Endemic Venomous Animals in Kazakhstan

<b>Venomous animal group:</b>	<b>Name:</b>	<b>Toxicity:</b>	<b>Remarks:</b>
Poisonous Snakes	<i>Agkistrodon halys</i> , pit viper (Crotalidae)	Mildly toxic	Prevalent in entire country, during the day under rocks, in rodent nests and chasms, rarely bites; 60 to 80 cm long, head flat and angular, horn nail on end of tail, coloring extremely variable from sand yellow to brown to black, often with unevenly formed horizontal stripes; found in varying habitats

			from steppes to high mountain meadows; no bite complications resulting in death reported to date
	<i>Echis multisquamatus</i> , Central Asian sand viper (Viperidae)	Extremely toxic	Prevalent in steppe regions in extreme southern Kazakhstan, where it is the most dangerous poisonous snake; very aggressive, up to 80 cm long with brownish base coloring and lateral light and dark zigzag stripe as well as 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
	<i>Vipera ursinii</i> , meadow viper (Viperidae)	Mildly toxic	Prevalent in entire country down to the extreme south, in humid valley lowlands; mildly aggressive, 25-50 cm long
	<i>Vipera berus</i> (common viper, adder)	Mildly toxic	60-75 cm long, 85 cm in rare cases, relatively narrow head, always vertically slitted pupils with red iris, zigzag stripe on back blends with cross stripes, markings absent in some specimens; favors marshes, swamps, mountain meadows up to 2000 m in altitude; active in daytime
Arachnids	<i>Lycosa tarantula</i> (European wolf spider), as well as other species of wolf spider	Mildly toxic	Active predator spider, wasp-like bite, usually only localized symptoms
	Sun spiders (Solifugae)	Nontoxic	Occurs in the southern steppe region; very large (up to 10 cm) spider-like animals with crablike jaws; does not have poison glands, displays its pedipalps (pincers) when endangered, and emits a hissing sound by rubbing its jaws; bites painfully, bite has high secondary infection rate and cruciform appearance
	Scorpions in the genera <i>Mesobuthus</i> and <i>Orthochirus</i>	Mildly toxic	Occurs only in the southern part of the country; the scorpion venom in Kazakhstani species acts

	<i>(Mesobuthus eupeus, Orthochirus scrobiculosus, etc)</i>		hemolytically, with local pain, swelling, and necrosis; systemic poisoning is generally acute, no cases of death have been recorded in Kazakhstan to date (no endemic species are extremely poisonous)
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, front pair of legs modified into jaws with poison glands; systemic symptoms are generally acute and rarely last longer than a day; a bite mark from a large centipede is rarely distinguishable from that of a mid-sized viper