Tick-Borne Diseases and the U.S. Military: Impacts on Health, Readiness, and Mitigation Strategies

Prepared by Dr. Jared Wolfe
College of Forest Resources and Environmental Science
Michigan Technological University
March 17, 2025

Introduction and Report Overview

Tick-borne diseases—most notably Lyme disease—represent a significant and growing health risk for U.S. military personnel and their families. Military personnel often spend extensive periods in environments conducive to tick exposure, including field training exercises, deployments, and recreational activities in areas where ticks are common. Over recent decades, cases of Lyme disease and other tick-borne illnesses have steadily increased, prompting significant concern regarding the impacts of these diseases on both troop health and operational readiness (CDMRP 2023; U.S. Air Force Reserve Command 2023). Military health agencies and research communities have been actively monitoring these trends, documenting health outcomes, and developing strategies aimed at prevention, surveillance, and effective management. Understanding these dynamics is critical not only for maintaining individual health but also for ensuring that service members remain fully capable of performing their duties and completing their missions. This report provides a thorough examination of tick-borne disease risks and impacts within military contexts. First, it outlines prevalence trends, highlighting the increased incidence of tick-borne illnesses among service members and their families over recent decades. It then describes the key tick species responsible for transmitting these diseases, along with the principal wildlife reservoirs that sustain these pathogens in the environment. Subsequently, the report presents a detailed review of habitat characteristics and microclimatic conditions that favor both tick vectors and their wildlife reservoir hosts. This section is important because it identifies specific environmental factors—such as vegetative composition, landscape structure, humidity, and temperature—that directly influence tick populations and disease transmission potential. Finally, the report examines ongoing mitigation efforts and cutting-edge research initiatives conducted by the Department of Defense (DoD), including personal protective measures, surveillance programs, early treatment strategies, and innovative research endeavors through agencies like DARPA. By synthesizing these findings and initiatives, this report provides a comprehensive resource aimed at informing and guiding effective

tick-borne disease prevention and management strategies within military and civilian contexts alike.

Prevalence Trends in Military Populations

Rising Incidence: Lyme disease incidence in the U.S. military has generally increased over the past 20 years (Stromdahl & Hickling 2012). This mirrors national trends—annually tens of thousands of Lyme disease cases are diagnosed in the U.S., and the true incidence is likely higher (CDMRP 2023). From 2005 to 2014, the Military Health System saw between roughly 500 and 900 Lyme disease cases per year (including active duty, retirees, and dependents), indicating a growth in reported cases over that decade (Veterans Studies Journal 2020). More recently, between 2006 and 2022, over 7,000 active-duty service members and 63,000 family members were diagnosed with tick-borne diseases, with Lyme disease accounting for ~80% of those cases (Lymedisease.org 2023). This equates to hundreds of military personnel and thousands of dependents affected annually. Although cases fluctuate year to year, the overall trend has been upward.

Military vs. Civilian Exposure: It is challenging to determine how much of this increase is directly attributable to military service versus general environmental exposure (Stromdahl & Hickling 2012). Military personnel may face elevated tick exposure during field training and deployments, but off-duty outdoor activities also contribute significantly (Stromdahl & Hickling 2012). A study at West Point (NY) found that over 2016–2018 the period prevalence of Lyme disease in service members was 292 per 100,000, whereas their family members had a higher prevalence of 581 per 100,000 (Cameron 2021). This suggests that dependents—who often engage in outdoor recreation or reside in tick-endemic areas around bases—can be at least as affected as the troops. In the West Point study, family members had more cases than cadets, partly because cadets spend much of the academic year indoors, and also because troops use tick prevention measures (like treated uniforms) more consistently (Cameron 2021). These findings underscore that both on-duty and off-duty exposures drive tick-borne illness rates.

Other Tick-Borne Illnesses: While Lyme disease is the most common, military medical data show other tick-borne diseases contribute to a significant minority of cases. Approximately 20% of tick-borne disease diagnoses in military populations (2006–2022) were illnesses other than Lyme (Lymedisease.org 2023). These include spotted fever rickettsioses (e.g., Rocky Mountain Spotted Fever), ehrlichiosis and anaplasmosis, babesiosis, and others—all of which have also been increasing in incidence in the U.S. (CDMRP 2023). For example, spotted fever group Rickettsia infections are more common in southeastern states where some bases are located. Additionally, overseas

personnel face region-specific risks like tick-borne encephalitis (TBE) in Europe; notably, 9 cases of TBE were reported among U.S. military members or dependents in Germany from 2012–2020 (CDC 2021). In summary, historical data and recent surveillance indicate a growing burden of diverse tick-borne illnesses impacting the military community.

Health Effects on Service Members

Acute and Chronic Symptoms: Lyme disease and other tick-borne infections can cause significant acute illness and, if not promptly treated, long-term health problems. Early Lyme disease typically presents with fever, fatigue, headaches, and sometimes the hallmark “bull’s-eye” rash (erythema migrans), though the rash is absent in many cases (Army Public Health Center [APHC] 2023). If untreated, the infection can disseminate and lead to serious complications affecting the joints, heart, and nervous system (APHC 2023). Servicemembers have experienced Lyme carditis (heart rhythm disturbances), neurologic Lyme disease (such as facial palsy or cognitive impairment), and Lyme arthritis—all of which can require extended medical care. Other tick-borne diseases like Rocky Mountain spotted fever or ehrlichiosis can present as high fevers with severe headache, muscle pain, and in severe cases, lead to organ failure if not treated, posing a risk of hospitalization or even death (CDC 2022).

Chronic and Lingering Issues: Some military personnel and veterans suffer from chronic sequelae after tick-borne infections. For instance, persistent Lyme disease symptoms (sometimes termed chronic or post-treatment Lyme disease) may include ongoing fatigue, pain, neurological deficits, and cognitive difficulties. Air Force Colonel Nicole Malachowski’s case is a high-profile example: a tick-borne illness left her with debilitating neurologic damage that ended her flying career. She described “intractable pain, insurmountable fatigue, cognitive dysfunction, speech problems… even moments of temporary paralysis,” ultimately rendering her unfit for duty (Malachowski 2019). Such cases highlight how a single tick bite can have career-ending consequences. Beyond Lyme, other infections can also cause lasting harm—for example, some survivors of ehrlichiosis or babesiosis may have prolonged fatigue or organ damage. The mental health toll is also significant: chronic illness can lead to depression, anxiety, and feelings of isolation, issues which may be magnified in military populations already under stress (Lymedisease.org 2023). Military health providers note that the inability to perform one’s duties or uncertainty about recovery can diminish a soldier’s sense of purpose and well-being (Lymedisease.org 2023).

Treatment and Recovery: The good news is that many tick-borne illnesses are treatable if identified early. Most Lyme disease cases can be cured with antibiotics when caught in the initial stage (APHC 2023). The Department of Defense emphasizes

training for clinicians to recognize tick-borne diseases and initiate prompt treatment, even if lab tests are pending, to prevent complications (APHC 2023). However, diagnosis can be challenging—the absence of a rash or the non-specific flu-like symptoms often lead to missed or delayed diagnoses (APHC 2023). This underscores the need for improved diagnostics. For those with chronic symptoms, long-term rehabilitation and specialized care (including physical therapy and mental health support) may be needed. The VA and military treatment facilities must manage veterans who return with tick-borne illnesses acquired during service or in their post-service residences (Project Lyme 2023). Overall, tick-borne diseases can affect virtually every organ system, and their health impacts range from days of lost duty for mild cases to permanent disability in severe cases.

Impact on Operational Readiness: Tick-borne diseases have direct and indirect effects on military readiness. When service members fall ill, even temporarily, it can remove them from training or deployment, straining unit manpower. Lost duty days accumulate when troops are sick or recovering. In more severe instances, experienced personnel may be medically evacuated from operational theaters or placed on limited duty. If a soldier develops chronic complications that preclude fitness for duty, the military loses the benefit of their training and expertise. “Years of specialized training and experience are lost when a soldier is medically retired due to Lyme disease,” one report noted, “This loss of skilled personnel affects unit readiness and overall mission capability” (Lymedisease.org 2023). In other words, every premature medical discharge represents both a personal tragedy and a loss of investment for the armed forces.

Mission disruption can also occur. An outbreak cluster on a base (for example, several Marines contracting ehrlichiosis during a field exercise in tick-infested terrain) could sideline multiple team members at once. Even one key individual falling ill at the wrong time—say, a platoon leader incapacitated by acute Rocky Mountain spotted fever—can degrade a unit’s effectiveness until a replacement is slotted in. Historical military medical records show instances of training camps where numerous soldiers reported tick bites and subsequent fevers (“Fort Bragg fever” was a term used in WWII for a rash illness later understood as a tick-borne typhus) (ACHH 2020; UNC Global Health 2023). Today, commanders at bases in endemic areas must account for tick threats during training, sometimes modifying or timing field exercises to lower exposure risk.

Family Readiness: There is also a broader readiness consideration: the health of military families. Dependents who contract tick-borne diseases can indirectly impact a service member’s readiness. As Dr. Angel Davey of the Tick-Borne Disease Research Program points out, if a spouse or child is chronically ill from a tick bite, the service member may need to take on caregiver duties or face added stress, potentially affecting their focus and availability for duty (Lymedisease.org 2023). Military families often live on or near installations in tick-rich regions, and family illnesses can thus ripple into the

service member's performance. The DoD increasingly recognizes that protecting the force includes protecting military families' health.

Surveillance and Reports by Military Health Agencies: Military health organizations actively monitor tick-borne disease cases and publish analyses to guide prevention. The U.S. Army Public Health Center (APHC) tracks Lyme disease in Soldiers and beneficiaries through its Disease Reporting System internet (DRSi) and the MilTICK program (APHC 2023). DRSi is a reporting tool for medical providers to log cases of certain diseases; APHC epidemiologists have found that the military's DRSi Lyme data mirror civilian patterns—with cases peaking in June/July and higher incidence in males (APHC 2023). Notably, West Point (U.S. Military Academy) consistently reports a high number of Lyme cases among active-duty personnel, reflecting the endemic nature of the Hudson Valley region (APHC 2023). APHC officials caution that underreporting is an issue (busy providers might treat a tick illness but not file a formal report), meaning the true burden is likely greater than what surveillance figures show (APHC 2023). They encourage thorough reporting because these data help target tick mitigation efforts to high-risk areas (APHC 2023).

MilTICK Program: Operated by the Army's Public Health Center, MilTICK is a free tick testing and identification service for DoD personnel and beneficiaries (APHC 2023). Any tick removed from a service member or dependent can be mailed in; entomologists will identify the tick species and test it for pathogens, reporting results back to the provider and patient. This program serves two purposes: it guides individual patient care (e.g., if a removed tick tests positive for Lyme bacteria, a doctor might proactively treat the bite), and it maps tick-borne threats across installations (Lymedisease.org 2023). MilTICK's database helps military epidemiologists see where infected ticks are being found, revealing emerging hotspots. "Data from ticks submitted to MilTICK help us assess areas where tick-borne diseases are emerging as well as changing risks to DoD personnel," says APHC scientist Dr. Robyn Nadolny (APHC 2023). In 2024 the program was expanded with MilTICK SURE-PATH (Surveillance for Understudied, Rare, and Emerging Pathogens) to enhance monitoring of lesser-known tick-borne agents (Lymedisease.org 2023). These surveillance efforts, combined with CDC data and local public health intel, allow military health agencies to issue timely warnings (e.g., tick advisories during summer training cycles) and to evaluate the effectiveness of preventive measures.

Other Agency Reports: The Department of Defense's Armed Forces Health Surveillance Division (AFHSD) routinely analyzes tick-borne disease trends in its Medical Surveillance Monthly Reports. For example, one AFHSD analysis noted Lyme disease was the "most frequently reported vector-borne disease among active component U.S. service members" with an incidence around 16 cases per 100,000 person-years in recent years (AFHSD 2023). The Department of Veterans Affairs has

also researched tick-borne disease risk in veterans. A VA-associated study found that Lyme disease incidence rates are higher in counties with larger veteran populations, suggesting that many veterans settle in rural, tick-prone areas (U.S. Air Force Reserve Command 2023). This has implications for VA healthcare services, as they may see a disproportionate number of Lyme disease cases. The CDC provides epidemiological support and guidance to military public health officials, and in 2021 the CDC formally approved a tick-borne encephalitis vaccine (TICOVAC) for U.S. personnel traveling to TBE-endemic areas—a policy particularly relevant for troops in Europe (CDC 2021). Overall, a network of military and federal agencies is engaged in tracking tick-borne disease threats, and their reports consistently highlight a need for vigilance in the armed forces.

Tick-Endemic Regions and Base-Specific Risks

Stateside Hotspots: A large proportion of U.S. military bases are located in tick-endemic regions. In fact, about 75% of all U.S. military installations sit in states that accounted for 99% of the approximately 500,000 tick-borne disease cases reported to the CDC between 2004 and 2016 (U.S. Air Force Reserve Command 2023). Many of these bases are in the Northeast and Upper Midwest—areas with well-known Lyme disease epidemics. For example, installations in states like Pennsylvania, New York, Virginia, Maryland, Wisconsin, and Minnesota are at high risk. The U.S. Military Academy at West Point, NY, has been singled out due to its location in an intensely endemic county; it reports numerous Lyme cases each year among cadets and staff (Army Public Health Center [APHC] 2023). Nearby Fort Drum, NY, and Aberdeen Proving Ground, MD, are other examples where tick populations (particularly the blacklegged deer tick that carries Lyme) thrive in the surrounding forests and fields. The Upper Midwest bases (e.g., in Wisconsin and Minnesota) see both Lyme and anaplasmosis cases from deer ticks, as well as spotted fevers from dog ticks.

Regional Differences: In the Southeastern U.S., Lyme disease is less common (ticks there are different species), but other tick-borne diseases pose risks. Bases in North Carolina, Georgia, and Texas encounter illnesses like Rocky Mountain Spotted Fever (RMSF) and Ehrlichiosis, transmitted by the American dog tick and lone star tick. For instance, Fort Bragg, NC, has historically dealt with spotted fever cases—the region has some of the highest rates of spotted fever rickettsiosis in the country (UNC Global Health 2023). Meanwhile, lone star tick bites in the South can cause ehrlichiosis and have even been linked to Alpha-gal syndrome (a red-meat allergy), which could affect troops' diets. In California and the West Coast, certain training areas have Lyme disease (carried by the western blacklegged tick), though at lower incidence than the Northeast. Military training in these areas still requires precautions, as illustrated by tick

surveys at bases like Fort McCoy, WI, Arnold AFB, TN, and others that participate in ecological studies of Lyme risk (APHC 2023). These studies note that heavily wooded and grassy training grounds in the East/Midwest are “hotbeds” of Lyme, whereas southern sites with the same ticks yield fewer Lyme cases (likely due to ecological and behavioral differences of ticks and hosts) (APHC 2023).

Overseas Risks: U.S. forces stationed abroad face tick exposures as well. In Europe, particularly in parts of Germany, Eastern Europe, and the Baltics, the Ixodes ticks transmit not only Lyme bacteria but also Tick-Borne Encephalitis (TBE) virus. U.S. military health reports documented a handful of TBE cases in American personnel/families in Germany over the past decade (CDC 2021). To protect troops, European Command has offered TBE vaccination under special clearance even before a U.S.-licensed vaccine existed (CDC 2021). In Asia and other regions, ticks can carry pathogens like scrub typhus or Crimean-Congo hemorrhagic fever, which military preventive medicine units keep on their radar for deployed forces. Each base or theater conducts risk assessments to identify local tick species and diseases present. For instance, Navy entomologists at the Navy Entomology Center of Excellence (NECE) run tick surveillance training to ensure all branches can identify and respond to tick problems on their installations (Defense Visual Information Distribution Service [DVIDS] 2023). In summary, almost wherever the U.S. military operates—from the woodlands of New England to the deserts of California to the forests of Germany—there are ticks and associated disease risks that must be managed.

Mitigation Efforts and DoD Research Initiatives

Personal Protective Measures: The U.S. military has long stressed “tick bite prevention” as the first line of defense. Standard preventive measures include wearing permethrin-treated uniforms, use of DEET or picaridin insect repellent on exposed skin, tick checks after field activities, and prompt tick removal techniques (LymeDisease.org 2023; APHC 2023). The Army introduced factory-treated permethrin combat uniforms in 2012, which significantly repel ticks; however, research found the permethrin efficacy diminishes after about 3 months of field use and washes (Stromdahl & Hickling 2012). Proper wearing of the uniform (tucking pants into boots, sleeves down) is also emphasized to reduce skin exposure (CDMRP 2023).

Through the Armed Forces Pest Management Board, the DoD continually evaluates new repellents and treatments for uniforms to improve protection. Troops are educated on the “Tick Threat”: for example, pre-deployment health briefs in high-risk areas and annual tick awareness training each spring. These measures have paid off—studies at West Point noted that the cadets’ rigorous use of tick checks and treated gear likely contributed to their lower Lyme rates compared to local civilians (Cameron 2021). Still,

compliance can vary, and no measure is foolproof, so the military aims to reinforce these habits.

Surveillance and Early Treatment: Programs like MilTICK (discussed above) and routine tick surveillance on bases are mitigation tools that help identify problem areas and guide responses. If, say, an Army base finds a rise in ticks testing positive for a certain pathogen, targeted interventions (like increased spraying in training ranges or distributing extra tick repellent kits) can be implemented. The military's medical guidelines encourage physicians to treat tick-borne disease early—even presumptively—to prevent severe outcomes. This is a mitigation strategy at the clinical level: aggressive early antibiotics for suspected Lyme or doxycycline prophylaxis after a high-risk tick bite in areas of endemic disease. Such approaches can shorten illness duration and reduce long-term complications, thereby preserving readiness.

DoD Research Programs: Recognizing the need for better solutions, the Department of Defense invests in tick-borne disease research. A major effort is the Congressionally Directed Tick-Borne Disease Research Program (TBDRP), established in FY2016 under the DoD's medical research umbrella (CDMRP 2023). Congress launched TBDRP with the specific mission of addressing Lyme and other tick-borne diseases as threats to military forces and their dependents (CDMRP 2023). Initial funding of $5 million (driven by advocacy highlighting the military impact) has grown over the years (LymeDisease.org 2023).

Key research priorities include: improving understanding of tick-borne pathogen biology and human immune responses, developing better preventive tools (next-generation repellents, vaccines, anti-tick measures), creating rapid and accurate diagnostics (since current Lyme tests can miss early cases), and advancing treatments for both acute infections and chronic manifestations (LymeDisease.org 2023). For example, TBDRP has funded studies on novel Lyme disease vaccines and on therapies for persistent Lyme symptoms. Uniquely, this program integrates patients and caregivers into the research review process, ensuring military families' perspectives guide the research focus (LymeDisease.org 2023).

DARPA and Innovative Tech: While DARPA (Defense Advanced Research Projects Agency) has not run a tick-specific program to date, it has spearheaded cutting-edge work on vector-borne disease prevention that could benefit tick-bite protection. One example is DARPA's ReVector program, which is developing ways to modify the skin microbiome to make humans "invisible" or less attractive to blood-feeding insects (DARPA 2023). Though initially aimed at mosquitoes, such technology—if successful—might be applied to deter ticks from biting soldiers. DARPA's broader infectious disease initiatives (like the PREEMPT program targeting animal-borne viruses before they reach humans) also contribute tools and knowledge that could be repurposed for tick-borne

threats (DARPA 2023). Additionally, DoD labs (e.g. the U.S. Army Medical Research Institute of Infectious Diseases and Naval Medical Research centers) conduct research on tick-borne pathogens, evaluating things like new diagnostics (such as DNA-based tests that can detect multiple tick pathogens from one blood sample) and anti-tick vaccines for animals (to break the transmission cycle in the environment). The DoD is also partnering with civilian agencies in initiatives like LymeX, a public-private partnership where DARPA's advanced diagnostic technologies (for example, an "ECHO" biosignature platform for detecting infections via host response) are being explored to improve Lyme disease detection (HHS 2023). All these efforts underline a multi-front strategy: protecting personnel now with available tools, and investing in research for better long-term solutions.

Conclusion

Tick-borne diseases have a tangible impact on U.S. military readiness and the health of service members and their families. The prevalence of Lyme disease and other tick-borne illnesses in the military community has risen over time, paralleling trends in the civilian population and reflecting the fact that a large number of bases are in high-risk areas (U.S. Air Force Reserve Command 2023). These diseases can impair troops through acute sickness and chronic after-effects, at worst sidelining highly trained personnel and ending careers (U.S. Air Force Reserve Command 2023; LymeDisease.org 2023). Military health agencies like the APHC and AFHSD are actively surveilling cases and ticks, and their findings consistently emphasize vigilance—especially during peak tick season and in endemic regions (APHC 2023). Numerous studies and reports from the DoD, VA, and CDC have informed better practices, from improved tick bite prevention training to guidelines for early treatment. High-risk installations (e.g. in the Northeast and upper Midwest) have implemented robust tick control and awareness programs, but the risk is nationwide and even global wherever troops deploy. On the positive side, the Department of Defense—with Congressional support—has ramped up efforts to mitigate tick-borne threats. The establishment of the Tick-Borne Disease Research Program in 2016 injected much-needed funding into research for vaccines, diagnostics, and treatments (LymeDisease.org 2023). Innovative approaches, some in collaboration with DARPA and other agencies, are on the horizon to better protect personnel from tick bites and to detect infections early. In summary, Lyme disease and its tick-borne relatives remain a force health protection challenge for the U.S. military. Through ongoing surveillance, education, and research, military leaders and scientists are striving to reduce disease incidence and ensure that these stealthy "bug bites" don't undermine the strength and readiness of America's fighting force (Stromdahl & Hickling 2012; LymeDisease.org 2023).

Literature Cited

APHC (Army Public Health Center). 2023. Lyme disease & tick-borne diseases surveillance and education programs. U.S. Army Public Health Center Reports.

Cameron, D. 2021. Lyme disease prevalence among military families at West Point. Daniel Cameron, MD.

CDC (Centers for Disease Control and Prevention). 2021. Tick-Borne Encephalitis Surveillance Data, Germany 2012–2020. Morbidity and Mortality Weekly Report.

CDC (Centers for Disease Control and Prevention). 2022. Rocky Mountain spotted fever epidemiology and distribution. CDC Annual Surveillance Report.

CDMRP (Congressionally Directed Medical Research Programs). 2023. Tick-Borne Disease Research Program Overview. U.S. Department of Defense, Congressionally Directed Medical Research Programs.

DARPA (Defense Advanced Research Projects Agency). 2023. ReVector and PREEMPT vector-borne disease research programs documentation. U.S. Department of Defense.

HHS (U.S. Department of Health & Human Services). 2023. LymeX Innovation Accelerator initiative overview.

LymeDisease.org. 2023. Epidemiological Data Summary on Tick-Borne Diseases in U.S. Military Personnel and Families.

Malachowski, N. 2019. Lyme disease impacts on military personnel. Congressional Testimony before the Tick-Borne Disease Working Group, U.S. Air Force Reserve Command.

Project Lyme. 2023. Veterans and tick-borne disease: ongoing impacts and support services.

Stromdahl, E.Y., & Hickling, G.J. 2012. Beyond Lyme: Etiology of tick-borne human diseases with emphasis on the southeastern United States. Zoonoses and Public Health, 59(2), 2-11.

U.S. Air Force Reserve Command. 2023. Impacts of Tick-Borne Diseases on Military Personnel. Health Readiness and Force Protection Advisory, 960th Cyberspace Wing Public Affairs.

UNC Global Health. 2023. Historical records of tick-borne typhus ("Fort Bragg fever") in military personnel, WWII. UNC Gillings School of Global Public Health Report.

Veterans Studies Journal. 2020. Lyme Disease in Military Populations: Epidemiological Trends. Journal of Veterans Studies, 6(1), 1-9.