Threat Assessment Department
Navy Environmental & Preventive Medicine Unit 2
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MEDICAL FORCE PROTECTION
PHILIPPINES

Assessment: NEPMU-2 and the Armed Forces Medical Intelligence Center (AFMIC) assess the Philippines as a **HIGH RISK** country. Without force health protection measures, mission effectiveness will be seriously jeopardized.

Diseases of Greatest Risk:

The main force health protection emphasis should be on these diseases, which are the most likely to degrade operations by potentially affecting a large percentage of personnel or causing severe illness in a smaller percentage. Diseases are grouped into transmission categories that are prioritized in descending order of risk.

Food- or Waterborne Diseases:	Diarrhea – Bacteria, Hepatitis A, Typhoid/Paratyphoid Fever
Vector-borne Diseases:	Dengue Fever, Malaria
Sexually Transmitted Diseases:	Hepatitis B, HIV/AIDS
Animal Contact Diseases:	Rabies

Diseases of Lesser Risk:

These diseases also warrant force protection emphasis. They are assessed to have lower likelihood to degrade operations because they generally affect smaller numbers of personnel or cause mild symptoms. Other diseases assessed as lesser risk are those that may be present that could degrade operations under conditions favorable for transmission.

Food- or Waterborne Diseases:	Brucellosis, Cholera, Diarrhea – Protozoal, Hepatitis E
Vector-borne Diseases:	Chikungunya, Japanese Encephalitis, Typus – Mite-borne (Scrub Typhus)
Sexually Transmitted Diseases:	Gonorrhea/Chlamydia
Water-contact Diseases:	Leptospirosis, Schistosomiasis
Person-to-person contact Diseases:	Tuberculosis
Aerosolized Dust/Soil Contact:	Hantavirus Hemorrhagic Fever with Renal Syndrome (HFRS)
Animal Contact Diseases:	Anthrax , Q-Fever

Requirements Before Deployment:

1. **Immunizations**:
   a. The following routine immunizations for deployable personnel should be up to date: MMR, polio, hepatitis A, tetanus (Td) booster, typhoid, influenza, and yellow fever.
   b. Current influenza immunization, even if local flu season is past and new vaccine is not yet available.
   c. Special immunizations:
      1) **Japanese Encephalitis vaccine** is indicated in some circumstances (see additional information below).
      2) **Pneumococcal vaccine** is required for asplenic servicemembers.
      3) Consider **rabies immunization** if work will require exposure to domestic or wild animals.
      4) Consider **hepatitis B immunization** for personnel who might be exposed to blood, stay longer than 6 months, or be exposed to medical treatment.

2. **Malaria Chemoprophylaxis**: 70-80% *P. falciparum*, 20-30% *P. vivax*. The risk is year-round, and is elevated during wetter months (May through November). Risk exists in all areas below 600m (1,969ft), except no risk in the provinces of Aklan, Benguet, Bilaran, Bohol, Camiguin, Capiz, Catanduanes, Cebu, Guimaras, Iloilo, Leyte, Masbate, Northern Samar, Sequijor, Borocay resort area, the plains of Negros and Panay, and metropolitan Manila. No risk is considered to exist in urban areas. Risk of malaria is highest on Luzon, Palawan, Mindoro, and Mindanao islands. Chemoprophylaxis regimens include a, b, or c, and MUST include primaquine post-exposure prophylaxis:

   a. Mefloquine (non-aviators only): 250 mg per week starting 2 weeks before entering risk area. Must continue until 4 weeks after leaving.
   b. Doxycycline (aviators or alternative prophylaxis): 100 mg per day starting 2 days before entering risk area. Must continue for 4 weeks after leaving.
   c. Malarone (Atovaquone 250mg / Proguanil 100mg): 1 tablet per day starting 2 days before entering risk area. Must continue for 7 days after leaving.

   - *Post Exposure Prophylaxis*: Primaquine, 30 mg per day starting on the day leaving the risk area and continued for 14 days. Primaquine post-exposure prophylaxis runs concurrently with mefloquine, doxycycline, or Malarone. (Alternate dosages of primaquine are recommended for G6PD deficient personnel.)

3. **Tuberculosis**: All service members should have a tuberculin skin test (TST or "PPD") done and results recorded within twelve months prior to deploying to these countries. A follow-up TST should be done approximately 3 months after returning.

4. **Personal Protective Measures**: DEET anti-arthropod skin lotion must be issued and used by all personnel. Permethrin treatment is highly recommended for all field uniforms and bed nets. Sunscreen, lip balm, and hearing protection should be issued as needed.

5. **Laboratory**: HIV and G-6PD testing should be up to date.

6. **Health Assessment**: Complete pre-deployment health assessment (DD Form 2795)[1] per NEHC TM 6490.00-1.

Requirements During Deployment:

1. Consume food, water, and ice only from US-approved sources; "Boil it, cook it, peel it, or forget it".
2. Involve preventive medicine personnel with troop campsite selection.
3. Ensure proper hand-washing facilities near all latrines or food service/dining facilities.
4. Enforce hand washing.
5. Ensure proper removal of garbage and solid waste.
6. Eliminate food/waste sources that attract pests in living areas.
7. Avoid sexual contact. If sexually active, use condoms.
8. Use DEET and other personal protective measures against insects and other arthropod-borne diseases. Personal protective measures include but are not limited to proper wear of uniform, use of bed nets, and daily "buddy checks" in tick and mite infested areas.
9. Minimize non-battle injuries by ensuring safety measures are followed. Precautions include hearing and eye protection, enough water consumption, suitable work/rest cycles, and acclimatization to environment and stress management.
10. Monitor climatic conditions and enforce appropriate hot/cold weather discipline.
11. Avoid contact with animals and hazardous plants.
12. Avoid unnecessary contact with lakes, rivers, streams, and other surface water.
13. Conduct DNBI surveillance per NEHC TM 6490.00-1.

[1] Mail completed original copy of DD 2795 and 2796 to: Army Medical Surveillance Activity, Building T-20, Room 213 (Attn: Deployment Surveillance), 6900 Georgia Ave, N.W., Washington D.C. 20307-5001

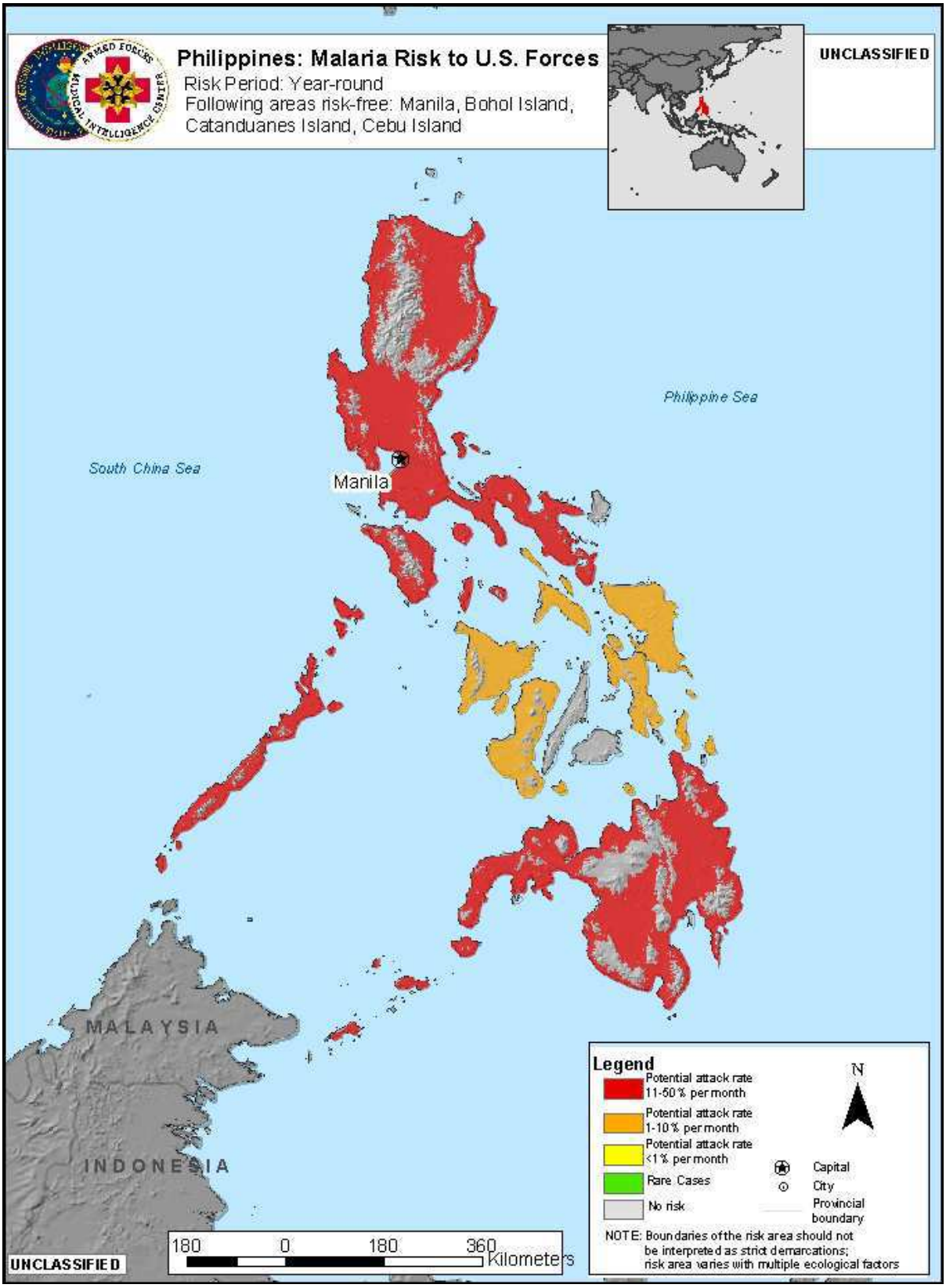
Requirements After Deployment:

1. Conduct post-deployment preventive medicine briefing. Refer to Post-Deployment Health Clinical Practice Guidelines for guidance on the evaluation of post-deployment conditions.
2. Ensure that all medical records compiled during deployment, including DD Forms 2795 and 2796, are incorporated into the individual's permanent medical record and that copies of appropriate forms have been forwarded to the Army Medical Surveillance Activity. Ensure that DD Form 2766 is updated with deployment information.
3. Ensure that all post-deployment health issues (especially those noted in DD Form 2796) are addressed and properly documented.
4. Advise personnel to report to medical for evaluation for any illnesses that occur post-deployment, especially if fever occurs.
5. Get HIV and PPD testing as required by your medical department or Task Force Surgeon.
6. Ensure personnel complete the full malaria post-exposure prophylaxis regimen.
7. Complete post-deployment health assessment (DD Form 2796)[1] per NEHC TM 6490.00-1.

Additional Information Regarding Japanese Encephalitis (JE):

The risk to short-term travelers and those who confine their travel to urban centers is very low. Expatriates and travelers living for prolonged periods (>30 days) in rural areas where JE is endemic or epidemic are at greater risk. Travelers with extensive unprotected outdoor, evening, and nighttime exposure in rural areas, such as might be experienced while bicycling, camping, or engaging in certain occupational activities, may be at high risk even if their trip is brief.

JE is endemic on all islands of the Philippines. Risk is year-round, but greatest between April and January. In recent years, there have been outbreaks in Nueva Ecija, Luzon, and Manila.


Philippines: Malaria Risk to U.S. Forces
Risk Period: Year-round
Following areas risk-free: Manila, Bohol Island, Catanduanes Island, Cebu Island
UNCLASSIFIED
Philippine Sea
South China Sea
Manila
MALAYSIA
INDONESIA
Legend
Potential attack rate 11-50% per month
Potential attack rate 1-10% per month
Potential attack rate <1% per month
Rare Cases
No risk
Capital
City
Provincial boundary
N
NOTE: Boundaries of the risk area should not be interpreted as strict demarcations; risk area varies with multiple ecological factors
180 0 180 360 Kilometers
UNCLASSIFIED

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MEDICAL FORCE PROTECTION – ADDITIONAL INFORMATION: PHILIPPINES

Environment:

Topography
The Philippines is an archipelago comprising more than 7,100 islands, with a total land area of approximately 300,176 sq km (115,899 sq mi), equaling an area slightly larger than Arizona. Eleven of these islands make up more than 94 percent of the land area, and only 462 islands have a land area of more than 2.6 sq km (1 sq mi). Larger islands are mountainous, with narrow strips of lowlands along the coasts. Nearly all of the major islands have interior mountain ranges with average heights of 1,200 to 2,400 meters (3,900 to 7,000 ft). The highest elevation is Mt. Apo, which reaches an elevation of approximately 3,000 meters (9,800 ft) above sea level. Most of the islands have active volcanoes.

Climate
The climate in the Philippines is mostly tropical. Temperatures are uniform, resulting in mean daily temperatures between 26 and 28°C (79 and 82°F). The northeastern monsoon brings cool, dry air from December through February, while the southwestern monsoon brings heavy rain from May through November.

In general, the western regions of the islands receive between 2,030 and 3,550 mm (80 to 140 in) of precipitation annually; the eastern regions receive less than 3,050 mm (120 in).The Cagayan Valley in northern Luzon and the Cotabato and Dayao-Agusan Valleys on Mindanao receive less than 1,780 mm (70 in) annually.

The Republic of the Philippines is considered one of the most disaster-prone countries in the world. The main hazards are typhoons, storm surges, floods, volcanoes, earthquakes, tsunamis, and landslides. As recently as June 2001, more than 32,000 people fled the erupting Mayon volcano in the central region of Bicol. Although typhoons have been reported during every month of the year, they generally occur from June through November. It is not uncommon for 30 or more of these storms to occur during a single typhoon season.

Environmental Contamination:

Background
The major industries of the Republic of the Philippines are food, textiles, chemicals, petroleum and coal products, electrical machinery, and transport equipment. The major exports are electronics, garments, auto parts, furniture, coconut products, mineral products, agro-based products, and fruits and vegetables. The Philippines is a major producer of gold, chromite, and copper. The Government of the Philippines continues to press forward with new environmental regulations, including a Clean Air Act (CAA) and a Clean Water Act (CWA). Implementation of both these acts has been the subject of debate. Leaded fuels were prohibited under the CAA, and enforcement at the major distributors appears to be working, but other sources of leaded fuels exist and are posing problems. The CWA has not been completely enacted. It is anticipated that enforcement will begin in coming years. Across all sectors, enforcement of existing environmental laws is inconsistent, and corruption poses special problems to agencies attempting to clean-up existing pollution and prevent further degradation of the environment.

Air Contamination
The DENR reported in 2000 that 70 percent of air pollution was from mobile sources and 30 percent from industry and other sources. The primary industrial sources of air pollution in metro Manila are textile mills (sulfur dioxide), food and related products manufacturing (sulfur dioxide), paper and related products (particulate matter), and petroleum and coal products (particulate matter).The Philippine Department of the Environment and Natural Resources (DENR) previously had identified the largest polluters countrywide as sugar mills and refineries; mines; the cement, lime, and plaster industries; and hog and poultry farms.

The World Bank reported in 2002 that air quality in the urban centers of the Philippines (Manila, Baguio, Cebu and Davao) is worsening. Although no specific data were available for 2003 for these locations, reports indicate little if any reduction in particulate emissions from vehicles, and total suspended particulate (TSP) mass concentrations are

likely to be in the range of greater than 200 micrograms per cubic meter, as reported in 2001. The World Health Organization limit for TSP is 120 micrograms per cubic meter. In addition, the CAA regulates particulate matter with a particle diameter of less than 10 microns (PM-10) under specific standards due to the increased risk that these particles pose through inhalation. No specific data were available for 2003, but the worsening air quality reported suggests that concentrations for PM-10 may be higher than those found in 2001 (Baguio, 75.2 micrograms per cubic meter; Manila, 65.8; Cebu City, 45; and Davao City, 39.8). The US EPA NAAQS for PM-10 is 50 micrograms per cubic meter (annual mean). The US further regulates particulate matter with a particle diameter of less than 2.5 microns (PM-2.5) based on the additional hazards posed due to inhalation and deposition probability. The US EPA NAAQS for PM-2.5 is 15 micrograms per cubic meter (annual mean).

The CAA restricts leaded fuels, but the local public transportation system relies heavily on motorized tricycles. Tricycles use a fuel called "takal," which is made from used four-stroke motor oil. Takal reportedly contains engine waste products including zinc, lead, chromium, and dioxins, which are released through the tricycle's exhaust. No specific values were reported for mass concentrations of these materials in the exhaust.

The government has identified other potential sources of air pollution, and steps are being taken to control releases. The CAA called for a reduction in the sulfur content of coal used in industry. Open burning of trash and garbage and the burning of rubber tires in Manila is prohibited. Debate regarding waste emissions from coal fired power plants continues to focus on release of mercury, hexavalent chromium, arsenic, cadmium, and other waste products. Smoke from fires in Indonesia (Sumatra and Kalimantan) is contributing to a haze blanket over all of Southeast Asia. The Asian haze is directly correlated with El Nino events in the region. The Puerto Princesa airport in Palawan was temporarily closed in 2002 because of low visibility. Although there were early reports of the haze in 2003, it is likely to be a mild year, based on El Nino modeling. Short-term exposure to nitrogen oxides, particulate matter, and sulfur dioxide above established standards presents a risk of transient acute respiratory symptoms such as coughing, wheezing, and reduced lung function, especially in asthmatic individuals. Concentrations of lead, chromium, and other metals are reportedly elevated in urban areas, but no specific levels are available.

Food Contamination

Specific information on chemical contamination of food products is unavailable for the Philippines. In general, chemical contamination of food may result from deposition of particulates from industrial activities, uptake of persistent chemicals in soil, pesticide and fertilizer misuse in agricultural production, and improper processing or storage. In general, low-level chemical contamination of food is a concern only for long-term exposures.
Food borne outbreaks are common and are exacerbated by summer weather, lack of refrigeration, inadequate food safety regulations, and limited or no enforcement of sanitation standards.

Contamination of food with fecal pathogens may result from use of fertilizers derived from human or animal waste, unsanitary food preparation techniques, and improper handling of prepared food products. Even one-time exposure to fecal contamination in food may cause a variety of acute enteric infections. See the Infectious Disease Risk Assessment for further details.

From 1996 through 2002, the Philippines Department of Health banned the sale of seafood or issued warnings in various locations throughout the Philippine archipelago because of toxic algal blooms potentially causing paralytic shellfish poisoning. The acute effects of paralytic shellfish poisoning normally appear within one hour and include tingling, numbness, burning of the lips, rash, and fever. In severe cases, paralytic shellfish poisoning may cause respiratory paralysis and death. Cooking does not destroy the toxin causing paralytic shellfish poisoning.

Soil Contamination

Arsenic contamination was reported in 2002 in the areas around the coal fired power stations at Sual and Pulupandan. The report indicated a value of 41.8 milligrams per kilogram of fly ash from the plant. No data are available on the resulting arsenic concentration in soil or water. Proper disposal of solid waste still poses significant problems in urban areas. Land fills are inadequately designed. The capability to segregate hazardous wastes from solid wastes is inadequate. Enforcement of waste disposal regulations is limited by corruption and lack of facilities. Trash and garbage in rural areas is burned or thrown in watersheds, leading to further damage of the air or water quality in the area. In general, soil contamination is localized to specific areas surrounding industrial facilities and waste disposal sites. Even in such areas, significant exposure to contaminants in soil is unlikely in the absence of

wind-blown dust, active digging, or migration of contaminants from soil into ground water. As a result, soil contamination usually presents a low risk to human health.

Water Contamination
In general, water in the Philippines and specifically in the urban areas does not comply with US drinking water standards. The Clean Water Act (CWA) is in review and should be implemented in coming years. Domestic raw sewage, industrial wastes, and fertilizers contribute to contaminated water, one of the Philippines' main pollution problems. In Manila, squatter communities tap into water pipes, increasing the opportunity for elevated down-stream contamination levels.

According to the Philippines Center for Environmental Concerns, more than 360 of 419 rivers are polluted. In 2002, this agency reported that 50 rivers were considered to be biologically dead. In 2003, the DENR reported that approximately half of the rivers are considered biologically dead, including four major rivers in metro Manila (Pasig, Tullahan-Tenejeros, San Juan, and Paranaque-Zapote Rivers); four in Cebu (Guadalupe, Busay-Lahug, Mahiga, and Butuanon); and four in Negros Occidental (Cadaguit, Minoluan, Lupit, and Malihao). Contributing factors include inadequate sewage systems (only 8 percent of metro Manila has sewage connections), industrial and domestic waste, and mine tailings/heavy metal pollution. Smaller rivers and canals are burdened with solid wastes and sewage runoff. Marine waters are similarly polluted.

Consumption of water contaminated with raw sewage or runoff containing fecal pathogens may cause a variety of acute enteric infections. See the Infectious Disease Risk Assessment for further details.

In areas where small-scale gold mining is common, such as Luzon and eastern Mindanao, surface water may contain high levels of mercury. Mercury levels in surface water have been reported as high as 2.9 milligrams per liter. The US Environmental Protection Agency Maximum Contaminant Level (MCL) for mercury is 0.002 milligrams per liter. There also is reported evidence of deposition of mercury and gold-mercury amalgam in river sediments downstream from mining sites, and accumulation of mercury in fish and other sea life. Elevated mercury levels also have been reported in the surface water near the Calaca, Sual, and Pulupandan coal-fired power plants. Short-term exposure to high levels of mercury may cause acute health effects including damage to the nervous system and kidneys, and to developing fetuses. Long-term exposure to lower levels of mercury may cause similar delayed health effects due to accumulation of mercury in the body. These health effects generally are irreversible.

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Vector Risk Assessment Profile: Philippines

Administrative Notes
This Vector Risk Assessment Profile (VECTRAP) has been extracted from the VECTRAP prepared by the Navy Disease Vector Ecology and Control Center Naval Air Station, Jacksonville , FL 32212-0043 .
Message Address: NAVDISVECTECOLCONCEN JACKSONVILLE FL/MEI//
DSN: 942-2424
Commercial: (904) 542-2424
DSN Fax: 942-4324
Commercial Fax: (904) 542-4324
Email: mei@jax10.med.navy.mil
Web: *http://dvecc-jax.med.navy.mil*
More detailed vector information and resources are available through the Armed Forces Pest Management Board Website at http://www.afpmb.org

Revised on: October 2005

Disease Vector Information:

Malaria: Vector anopheline mosquitoes are scarce or absent in most urban centers. The primary rural vector mosquito, *Anopheles flavirostris*, has a peak biting period between 2200 and 0200; however, biting can occur before this time.

This mosquito will enter houses to feed on man, although animals such as carabao (Asian water buffalo) are preferred. During torrential rainy seasons, suitable breeding sites become scarce, thus reducing malaria incidence significantly.

This species breeds predominantly in clear, shaded, slow moving streams, seepage areas, grassy river edges and in foothill regions below 600 m. A 1988 study on the western coast of central Palawan, where *An. flavirostris* is the primary vector, found 30-percent of the general indigenous population was infected with malaria in spite of a spray program that applied DDT to houses at six-month intervals.

Secondary vectors include *An. maculatus*, which is found at higher elevations; and the coastal, brackish/salt water mosquito, *An. lateralis*, the vector throughout much of the Sulu Archipelago.

Anopheles balabacensis is an important vector on Palawan. This species is strongly anthropophilic and will bite in or near jungle, and indoors and outdoors. Adults are shade-loving inhabitants of dense forest and forest fringes, but will invade nearby villages at night in search of blood meals. Larval habitats include fresh water shaded pools and seepage's, ground depressions, hoof prints, wheel ruts and irrigation ditches.

Dengue Fever (DF) and Dengue Hemorrhagic Fever (DHF): The primary epidemic vector mosquito, *Aedes aegypti*, bites man in the daytime, freely entering houses where it may be found both resting and actively breeding. Typical breeding sites are indoor receptacles, tires, cans, jars and various other outside containers holding water.

Aedes albopictus is of secondary importance in transmission. Its behavior is similar to *Ae. aegypti*, but prefers more natural breeding places such as tree holes, leaf axils and bamboo stumps. Both species have shown resistance to DDT and dieldrin.

Japanese Encephalitis (JE): This virus is primarily transmitted to man by *Culex tritaeniorhynchus*. This mosquito can be found in both urban and rural areas, but is most common in the rural rice field environments. Breeding occurs in clear ground water habitats, marshes, streams and ponds. Adults are active throughout the night. Domestic animals and birds are the preferred hosts. Other *Culex* species may be involved including *Cx. quinquefasciatus* and

Cx. gelidus. *Aedes albopictus* has been implicated as well. Disease transmission is most often associated with high vector densities. Japanese encephalitis is thought to occur on all islands. Outbreaks have been reported in Nueva Ecija, Luzon, and Manila.

Chikungunya: *Aedes albopictus* is the primary vector. *Aedes aegypti* can become involved in urban/suburban disease transmission cycles.

Mite-Borne Typhus (Scrub Typhus): Larval trombiculid mites (chiggers), *Leptotrombidium deliense* and *L. akamushi*, are the primary vectors. A painless weal or eschar may develop at the chigger bite before the onset of symptoms. Foci of infection can be numerous and cover very small areas where the rickettsia, mites and suitable rodents exist. Areas of risk involve disturbed environments resulting from clearings, reforested areas, overgrown terrain, oil palm estates, and new settlements. These areas provide ample food and harborages for reservoir rodents. Filariasis: A variety of mosquitoes transmit the two species of human filarial worms. For urban *Wuchereria bancrofti* infections, *Culex quinquefasciatus* is found primarily in drainage ditches and associated sewage. In rural transmission, *Aedes poicilius* is the important vector. These species breeds in leaf axils, in particular, abaca and banana plants. This species is common throughout the archipelago. Adults feed readily on humans, entering houses at all hours of the day and night.

In addition to malaria, *Anopheles flavirostris* can also effectively vector this disease. Seven species of *Mansonia* are known to transmit *Brugia malayi*; *Mansonia bonneae* and *M. uniformis* are the principal vectors. All *Mansonia* species anchor themselves to the submerged stem and root systems of aquatic plants during larval development. Breeding areas are generally difficult to find and restricted to lowland permanent fresh water systems (swamp forests).

Plague and Murine Typhus: The Oriental rat flea, *Xenopsylla cheopis*, is the primary vector of both diseases. Plague is transmitted via the attempted bite resulting in a regurgitation of the bacillus organism. Endemic typhus is acquired through infective feces deposited as the flea feeds. The rickettsia must be rubbed into a break in the skin to produce infection.

Schistosomiasis: *Oncomelania hupensis quadrasi* is the intermediate host for *Schistosoma japonicum*. This small, amphibious snail can be found in a variety of stagnant and slow moving fresh water, including irrigation ditches and rice fields. The period of greatest cercarial shedding (infective free-swimming forms) occurs in the evening. This infection is a zoonosis, with a wide variety of animal reservoirs.

Disease and Vector Control Program

Prevention and Control: The conscientious use of personal protective measures will help to reduce the risk of many vector-borne diseases. Protection from mosquitoes and other biting flies can be accomplished by the use of screened eating and sleeping quarters (insect bar NSN 7210-00-266-9736) and by limiting the amount of outside activity during the evening/night hours whenever possible. If necessary, space spray with d-Phenothrin (NSN 6840-01-412-4634) within quarters.

Personal protective measures should be initiated at sundown in the prevention of malaria, JE and filariasis. Keeping the body covered, such as rolling shirtsleeves down, will deter mosquito biting.

The use of DEET 33% lotion (2 oz. tubes: NSN 6840-01-284-3982) during daylight and evening/night hours is recommended for protection against mosquitoes, sand flies, other biting flies and also against mites and fleas. Additional protection can be achieved through the use of DEET jackets (NSN 8415-01-035-0846 -Sm. 0847 -Med. 0848 -Lrg.) and through the use of 0.5% permethrin aerosol clothing repellent (NSN 6840-01-278-1336). Chemical control of vectors may be necessary in areas where avoidance is impractical.

The JE vector, *Culex tritaeniorhynchus*, has shown resistance to a wide variety of insecticides. ULV (ultra low volume) application of suitably registered compounds (malathion/chlorpyrifos/permethrin) will rapidly reduce biting mosquito attacks over wide areas. This is a temporary measure and will need to be repeated every few days if the problem persists. When using pesticides, be sure to always read and follow the label directions.

Avoid tick-infested areas when feasible. Using a buddy system, search total body area every 3-4 hours for attached ticks. Prompt removal of ticks may prevent potential disease transmission. DEET or permethrin aerosol spray may be used as a tick and mite repellent when applied to clothing. The blousing of trouser legs will deter tick biting. For scrub typhus, preventive measures include clearing campsites of non-woody vegetation, spraying with an appropriate acaricide, and use of insect repellent. DEET insect repellent should be applied to socks and around openings in the clothing such as near the waist, groin, neck and wrists. Permethrin aerosol clothing spray should also be considered. **Note:** ***This spray is applied to trousers and blouse but not to socks, undergarments or covers***.

The most important element of a vector control program involving *Aedes aegypti* and *Aedes albopictus* is SOURCE REDUCTION. The number of mosquitoes will be greatly reduced by the elimination of all water holding containers in areas close to human habitation. Tin cans, tires, broken pottery, plant vases and similar items must be emptied weekly, be eliminated or stored as to prevent further mosquito breeding. Sand or mortar can be used to fill tree holes and rock holes found near encampments. In areas where it is necessary to store water for drinking, ensure the container has a tight fitting lid or apply temephos (Abate) larvicide at 1 ppm.

Rodent control should be implemented only after satisfactory flea or mite control has been accomplished. Malaria and dengue vectors are susceptible to malathion. Adult *Culex quinquefasciatus* mosquitoes are resistant in Olongapo City (adjacent to Subic Bay). This may also apply to *Aedes aegypti*.

In reducing schistosomiasis transmission, personnel should limit contact with suspect fresh and stagnant water. Water contaminated with human fecal matter in known endemic areas should be avoided completely. If necessary, use of Niclos (NSN 6840-12-308-4377) for snail control is recommended. Effective elimination of reservoirs is not feasible during field operations.

Filth fly control should be considered a priority to prevent outbreaks of enteric infections such as shigellosis. Flytek® and/or Apache® fly baits (NSN 6840-01-183-7244) may be considered for use.

Users of This VECTRAP: Please notify NDVECC Bangor, or the appropriate NEPMU, if you acquire any medical entomology information that can be used to update this VECTRAP.