

Armed Forces Pest Management Board

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DoD Entomological Operational Risk Assessments



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**AFPMB Technical Guide No. 46
DoD Entomological Operational Risk Assessments**

This Technical Guide provides a basis for performing entomological operational risk assessments (EORAs) for deployed locations in support of force health protection and combat effectiveness.

This DoD technical guide is the result of a team effort. The initial draft was prepared by Lt Col Terry Carpenter, USAF, BSC, Lt Col David Bowles, PhD, USAFR, BSC, Dr. Kevin Hanson, MD, MPH, CAPT, USN (Ret.), and Dr. Michael Sardelis, PhD, MAJ, US Army (Ret.). LTC William Sames, CDR Eric Hoffman, Maj Stephen Wolf, and Mr. Zia Mehr provided valuable reviews that significantly improved the final product. Ms. Sandra Alvey, COL, MSC, USAR, and LTC Jamie Blow, MSC, USA, provided key guidance and support of the development of this TG. The authors extend a special thanks to Mr. Richard D. Wells of the U.S. Army Public Health Command (formerly the US Army Center for Health Promotion and Preventive Medicine), Entomological Sciences Program (now retired), for conceiving and producing the first Entomological Operational Risk Assessment, published in September 2003 as US Army Technical Guide 288, upon which this DoD Technical Guide builds.

Access the AFPMB web site at <http://www.afpmb.org> for related information.

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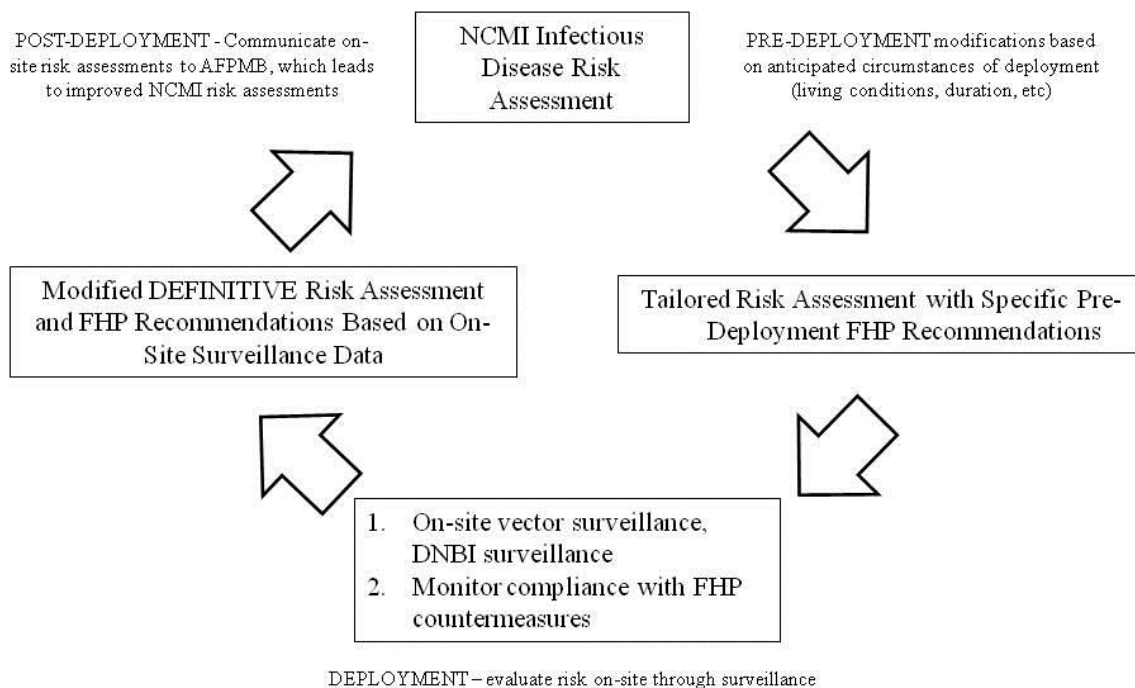
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Overview: The Entomological Operational Risk Assessment Cycle

Entomological operational risk assessment for deployed forces involves a continuous series of steps before, during, and after a deployment, which ultimately form a cycle.

Entomological Operational Risk Assessment Cycle



The steps of the cycle include:

1. **Predeployment** - Obtain the best possible information about entomological and other infectious disease risks to U.S. forces. Determine from the unit operational planners the anticipated living and working conditions and other specific circumstances for the deployment as they pertain to possible vector exposures.

1.1. The source providing the most highly authoritative, operationally relevant and specifically tailored information is the National Center for Medical Intelligence (NCMI). NCMI produces detailed baseline Infectious Disease Risk Assessments and other medical intelligence products for every operationally significant country worldwide. Risk assessments assume that personnel will be in field conditions without any countermeasures, and are specifically designed to support Force Health Protection (FHP) planning. Information from NCMI can be augmented by a variety of secondary sources such as the Centers for Disease Control and Prevention (CDC), World Health Organization (WHO), and published scientific literature.

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1.2. Based on the assessed vector-borne infectious disease risks as outlined by NCMI, and the exposures anticipated for the deployment, formulate predeployment recommendations through the appropriate medical chain of command to the Command to gain support for the necessary FHP countermeasures. These include such measures as:

1.2.1. Inclusion of qualified entomologic personnel equipped for vector surveillance and control measures on the deployment,

1.2.2. Procurement and distribution of personal protective measures (PPMs) such as DEET, permethrin treated uniforms, bednets,

1.2.3. Appropriate training to the command structure and the troops in use of PPMs,

1.2.4. Procurement and distribution of chemoprophylaxis as needed,

1.2.5. Immunization as necessary.

2. During deployment - As soon as practical after arrival at the deployment site, conduct on-site entomological surveillance to verify or refute the predeployment risk assessment. This surveillance should be ongoing, as conditions affecting risk are likely to change with weather, unanticipated changes in the mission profile taking troops into new areas, etc.

2.1. In addition to vector surveillance, data from unit level Disease and Non-Battle Injury (DNBI, or Disease and Injury, D&I) surveillance should also be reviewed regularly, to identify and investigate possible instances of vectorborne illness. Illness rates in U.S. forces are a measure of the residual risk after implementation of countermeasures. They also may be an indicator of non-compliance with countermeasures.

2.2. On-site assessments should also be made directly on compliance with FHP countermeasure (e.g. percent using bednets, etc), with results reported back to the Commander.

2.3. Properly conducted and ongoing on-site assessment of vectors, breeding sites, reservoirs, and actual cases of disease supercedes the initial risk assessment from NCMI or other sources.

2.4. Based on solid on-site surveillance data, modifications to the initial FHP policies can be recommended to the Commander through the appropriate medical chain of command, such as discontinuation of malaria chemoprophylaxis, reduced emphasis on PPM, etc.

3. Postdeployment - There is no better or more authoritative data than that gathered by qualified entomologists and PM personnel directly on-site.

3.1. It is imperative that this information be shared as widely as possible, both within the operational chain of command, and with the agencies responsible for risk assessments worldwide, including the AFPMB and NCMI.

3.2. Sharing the information is particularly essential if it differs from that provided by NCMI.

1. Predeployment Entomological Operational Risk Assessment

1.1. Review the NCMI Infectious Disease Risk Assessment (IDRA) on the NCMI webpage at <https://www.intelink.gov/ncmi/index.php> for the location to which you are deploying. No password is required if accessing this site from a “.mil” or “.gov” address. You may also access the NCMI website on SIPRNET (SECRET level) at <http://www.ncmi.dia.smil.mil>, and the JWICS (TOP SECRET level) at <http://www.ncmi.dia.ic.gov>. If internet connectivity is not possible, contact NCMI Operations at (301) 619-7574 or DSN 343-7574 for alternative access.

1.1.1. The IDRA prioritizes all significant infectious disease risks for the country in a summary table, which includes an estimate of the potential attack rates (cumulative incidence of infection in a group of people observed over a period of time during an epidemic) of vector-borne and other diseases in the absence of countermeasures. These estimates are based on the exposures anticipated for personnel living in field conditions. Detailed information on each disease and its occurrence in the area is linked. NCMI risk levels are determined using all-source intelligence and the NCMI Baseline Infectious Disease Risk Assessment Methodology which guides and structures baseline infectious disease risk assessment to provide the most-informed and accurate assessments—additional details are accessible at <https://www.intelink.gov/ncmi/document.php?id=92162>.

1.1.2. The IDRA provides the foundation for developing risk-based FHP measures. Attached to each IDRA is a summary of general FHP measures relevant to that country.

1.1.3. The IDRA aids the preventive medicine professional in justifying the inclusion of supplies and equipment needed for on-site vector surveillance and control measures.

1.1.4. The IDRA also contains detailed risk maps for malaria, dengue fever, Japanese encephalitis, yellow fever, and other vector-borne diseases.

1.1.5. Review other NCMI products relevant to the deployment AOR, to include:

1.1.5.1 Medical Intelligence Notes and Defense Intelligence Notes (assessments of recent outbreaks or disease events, and brief analyses of medical issues in the area).

1.1.5.2. Defense Intelligence Analyses, Defense Intelligence Reports, and Defense Intelligence Studies (in-depth analysis of medical issues in the area).

1.1.6. Contact NCMI Operations (commercial 301-619-7574 or DSN 343-7574) for specific COCOM or if you have any additional questions.

1.2. Work with operational planners to determine anticipated living conditions and exposures associated with each of the deployment phase (e.g. staging, field training, off-duty exposures).

1.3. The initial **Entomological Operational Risk Assessment** (EORA) involves tailoring the risks and potential attack rates outlined in the IDRA to the specific circumstances anticipated for

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the deployment. If living conditions differ significantly from field conditions, exposures to vector-borne diseases may be different, lowering the potential rates of illness.

1.3.1. Evaluate the potential attack rate for each vectorborne disease listed in the IDRA in light of anticipated exposures, and adjust accordingly. See examples following.

1.3.2. Examples of tailoring potential attack rates in the IDRA

1.3.2.1. Anticipated circumstances: Personnel will be housed in host nation military barracks on a host nation base located on the outskirts of a medium-sized city. Activities will be primarily on the base during daytime, cross-training with host nation forces; no overnight field training will be conducted. Personnel will be able to spend off-duty time at night in the nearby urban area.

1.3.2.1.1. The NCMI risk assessment indicates that malaria rates of 1-10% per month could occur under field conditions in the absence of countermeasures. Based on the activities described, it is likely that exposure to vectors will be substantially lower than for field conditions, even in the absence of specific countermeasures such as DEET, permethrin, and chemoprophylaxis. The potential rate for malaria should be adjusted accordingly both for the lower risk circumstances and the shorter exposure (2 weeks vs. 1 month). For these circumstances, the preventive medicine expert onsite could predict malaria attack rates to be lower than 1%.

1.3.2.1.2. The NCMI risk assessment indicates that dengue rates of 1-10% per month could occur under field conditions. It is likely that personnel living for 2 weeks in barracks without night rural exposures will still have comparable exposures to *Aedes* mosquitoes compared to field conditions, since the vector is more likely to be found in the vicinity of buildings such as barracks, and the vector bites primarily during the day. The potential rates of 1-10% per month likely still applies, although the potential attack rate for the 2 week deployment will be lower (approximately half) of the monthly rate.

1.3.2.2. The NCMI risk assessment indicates “rare cases (<0.1% per month)” of tick-borne encephalitis (TBE) could occur in personnel in field conditions, but tick exposures are far less likely under the primarily urban circumstances for this deployment (even without countermeasures), making the actual risk much lower than NCMI projections for field exposures, far less than 0.1%.

1.3.3. Once the potential rates for the deployment have been adjusted for the duration of the deployment and the circumstances, the need for entomological support and FHP countermeasures should be evaluated. Examples of specific issues to be considered include:

1.3.3.1. Based on the anticipated conditions, duration of deployment, and any other relevant factors, is the deployment of an entomologist with vector surveillance and control supplies and equipment warranted?

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1.3.3.2. Based on the anticipated living conditions, are bednets warranted?

NOTE: Might they be required if unforeseen changes in billeting arrangements are possible?

1.3.3.3. Based on the exposures and potential attack rates for malaria, is chemoprophylaxis warranted? If so, recommendations should be tailored in light of the drug resistance information contained in the IDRA.

1.3.3.4. What type of predeployment briefings are needed?

1.4. Prepare a Predeployment Entomological Operational Risk Assessment using the following form:

Predeployment Entomological Operational Risk Assessment

Location: _____
 Deployed Dates: _____
 Date of Assessment: _____

Status	
Red	= High
Orange	= Intermediate
Green	= Low

Disease (by Risk Level)	Baseline	Baseline	Risk modifiers: evidence that contributes to increasing, maintaining, or lessening risk	Modified Based on Anticipated Conditions	
	Risk Level	Potential Attack Rates		Risk Level	Potential Attack Rates per Month
A	High	Potentially 11-50%	A, B, C	High	>50%, 11-50%, 1-10%, <1%, <0.1%, unknown
B	Intermediate	Present, level unknown	A, B, C	Intermediate	Present, level unknown
C	Low	Unknown - rare cases possible	A, B, C	Low	Unknown - rare cases possible

2. On-Site Operational Risk Entomological Assessment

2.1. Properly conducted and ongoing on-site assessment of vectors, breeding sites, reservoirs, and actual cases of disease, to include trap and or survey counts, breeding site and reservoir animal surveys, and local case surveillance, supercedes the initial risk assessment from NCMI or other sources. This is an essential step of operational entomological assessment, validating or refuting the overall NCMI risk assessment, and tailoring FHP measures to the situation on the ground.

2.2. Base camps, billeting areas, or other locations where personnel spend prolonged periods of time are a priority for on-site entomological risk assessment. An initial entomological survey should be conducted as soon as possible, in the first days of a deployment. The need and frequency of subsequent surveys is dependent on the results of the initial survey and changes over time in the overall situation.

2.2.1. Complete the applicable parts of the following Defense Occupational and Environmental Health Readiness System (DOEHRS) survey checklists:

2.2.1.1. [Entomology Survey \(Appendix 1\)](#),

2.2.1.2. [Vector Surveillance Survey \(Appendix 2\)](#),

2.2.1.3. [Pest Surveillance Survey \(Appendix 3\)](#), and

2.2.1.4. [Pesticide Application Survey \(Appendix 4\)](#).

2.3. In many deployments, personnel conduct patrols, maneuvers, convoys, or other activities outside of the base camp or billeting areas. Activities may occur across a wide geographic area, where conditions and entomological risk differ significantly. In most instances, it will be impossible to conduct entomological surveillance across wide areas where troops may be exposed over the course of the deployment.

2.3.1. As the situation permits, entomological personnel should accompany troops as they travel to other areas, and conduct a rough evaluation of the conditions with respect to potential vector exposures.

2.3.2 Entomological risk assessment on these areas will likely have to be more general, based on brief on-site observations rather than on actual entomological surveillance.

2.4. *Once a sufficient baseline of on-site entomological surveillance data has been collected for the base camp, billeting area, or other location where personnel spend prolonged periods of time, the initial predeployment risk assessment can be modified to reflect either higher or lower risk associated with that area.* The modified surveillance-based assessment should be used to make necessary adjustments to FHP countermeasure recommendations through the appropriate medical chain of command to the Commander.

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2.4.1. If sufficient on-site information can be gathered about entomological risks and exposures across the wider area of operations where troops conduct activities, consideration can be given to modifying overall FHP recommendations.

Note: Caution should be used when modifying FHP recommendations for units or personnel who conduct patrols or maneuvers across a wide area. For example, a low observed risk of vector-borne disease at a forward operating base does not necessarily indicate the risk is low in the entire region. Troops may encounter a variety of conditions with varying degrees of risk in their individual sector or patrol area.

2.5. Current information about diseases, vectors, and other medical issues is especially important for continuous assessment of risks, and in planning for follow-on deployments by other personnel. These include at a minimum:

2.5.1. Vector surveillance and medically important pest reports.

2.5.2. Case reports for medical treatment of deployed personnel and local nationals who experience disease or medical injury due to arthropods or other hazardous animals or plants.

2.5.3. All data, formal or informal, that address the preventive medicine situation should be acquired, evaluated, and applied to the assessment of current and future risks.

2.6. Retain records for after-action reporting, or forward them as received to the AFPMB Contingency Liaison Officer (CLO) for archiving and reference upon redeployment. The AFPMB CLO is accessible at:

Web: <http://www.afpmb.org/contact>

Telephone: 301-295-7476

Fax: 301-295-7473

By postal or other carrier at:

AFPMB, Forest Glen Annex
Attn: Contingency Liaison Officer
Bldg 172, Forney Road, Forest Glen Annex
c/o WRAMC, 6900 Georgia Ave. NW
Washington, DC 20307-1230

Note: If you need assistance in transmitting items to the AFPMB, contact the CLO. Shipping assistance for bulk records may be accommodated.

3. Postdeployment Entomological Operational Risk Assessment

3.1. The combat effectiveness of follow-on and future forces depends on having the most accurate and current information about the operating conditions on which to base risk assessments. Accuracy and currency directly depend on having comprehensive up-to-date information about the force health protection conditions at the deployed site. Information relevant to the infectious disease situation you experienced during the deployment is essential to this effort. This information includes at a minimum:

- 3.1.1. Vector surveillance data,
- 3.1.2. Patient case data,
- 3.1.3. Reports filed by other units in the AOR.

3.2. Any changes made to the initial operational risk assessment of specific sites during the deployment and any resultant changes to FHP countermeasures should be shared as widely as possible, both within the theater, and with the AFPMB. At a minimum, assess the operational risk in retrospect in comparison to your predeployment risk assessment, and annotate significant differences between the expected and the experienced risks.

3.3. Provide the compiled data and your assessment to the AFPMB Contingency Liaison Officer (CLO). The AFPMB Contingency Liaison Officer is accessible at:

Web: <http://www.afpmb.org/contact>
Telephone: 301-295-7476
Fax: 301-295-7473
By postal or other carrier at:

AFPMB, Forest Glen Annex
Attn: Contingency Liaison Officer
Bldg 172, Forney Road
Silver Spring, MD 20910-1230

Note: If you need assistance in transmitting items to the AFPMB, contact the CLO. Shipping assistance for bulk records may be accommodated.

Glossary of Terms and Acronyms

- AFPMB** – Armed Forces Pest Management Board, Office of the Under Secretary of Defense for Installations and Environment
- Attack Rate** – the cumulative incidence of infection in a group of people observed over a period of time during an epidemic.
- CLO** – Contingency Liaison Officer, AFPMB
- COCOM** – Combatant Command
- DEET** – N,N-Diethyl-meta-toluamide arthropod repellent
- DIA** – Defense Intelligence Analysis, assessment of recent outbreaks or disease events and brief analyses of medical issues in the area; a product of NCMI
- DIN** – Defense Intelligence Notes assessment of recent outbreaks or disease events and brief analyses of medical issues in the area; a product of NCMI
- DIR** – Defense Intelligence Report, in-depth analysis of medical issues in the area; product of NCMI
- DIS** – Defense Intelligence Study, in-depth analysis of medical issues in the area; product of NCMI
- DVEP** – Disease Vector Ecology Profile, a product of the AFPMB
- EORA** – Entomological Operational Risk Assessment
- FHP** – Force Health Protection, services performed, provided, or arranged by the Services to promote, improve, conserve, or restore the mental or physical well-being of personnel
- IDRA** – Infectious Disease Risk Assessment, product of NCMI
- MEDIC** – Medical Environmental Disease Intelligence and Countermeasures, a product of NCMI
- MIN** – Medical Intelligence Note, assessment of recent outbreaks or disease events, and brief analyses of medical issues in the area; product of NCMI
- NCMI** – National Center for Medical Intelligence, formerly the Armed Forces Medical Intelligence Center (AFMIC)
- TG** – Technical Guide, a product of the AFPMB