



AMAZON MALARIA INITIATIVE

Malaria in Low-Incidence Settings

EPIDEMIOLOGICAL SURVEILLANCE: LOW PARASITE LOADS DIFFICULT TO DETECT

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Malaria endemic areas with a low incidence of clinical disease may have a significant occurrence of sub-clinical infections, meaning that infections are asymptomatic. In addition, most individuals with sub-clinical infections have a low parasite density in blood that is not detected through microscopy or with a rapid diagnostic test (RDT).¹ These diagnostic tests, however, are likely to underestimate the presence of malaria and leave a substantial proportion of the human parasite reservoir undetected. Only more sensitive methods like polymerase chain reaction (PCR) can detect low parasite density in the blood, yet these tests are more costly and complicated to apply in rudimentary conditions.

The following table provides recommendations for the application of diagnostic tests in low-transmission settings.

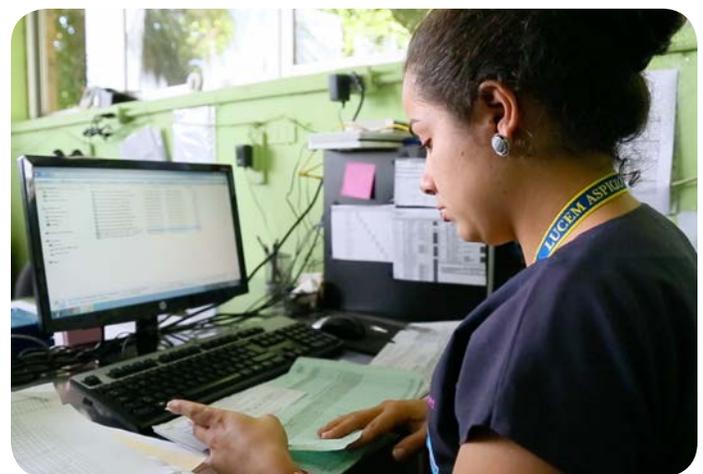


Photo: PAHO/WHO

Recommendations for diagnostic tests application in low-transmission settings²

Purpose	Diagnostic technique	Comments
Routine surveillance and case detection	High-performance microscopy and quality-assured RDTs	As long as microscopy is available, it is the preferred diagnostic method because it is reliable and relatively inexpensive.
Malaria epidemiological surveys	Classic PCR, quantitative PCR and Loop-mediated Isothermal Amplification (LAMP). Non-NAA-based (Nucleic Acid Amplification) tests with similar performance would be acceptable.	<p>A substantial proportion of infections are missed by microscopy and RDTs because of low parasite-density infections.</p> <p>NAA-based tests with an analytical sensitivity of about 2 parasites/μL provide better detection than microscopy.</p> <p>It is recommended that at least 50 μL of blood be collected from each individual and that the eluate used in the assay be derived from a minimum of 5 μL of blood.</p> <p>It might be acceptable to use smaller quantities of blood in assays with RNA (Ribonucleic acid) targets if the targets are homogeneously mixed into the extracted material.</p> <p>Rapid turn-around times are not a high priority.</p> <p>Internal and external quality assurance procedures should be in place.</p>

<p>Focus investigations; reactive infection detection after identification of an index case</p>	<p>Field-adapted classical PCR, quantitative PCR and LAMP methods are appropriate.</p>	<p>The NAA-based test should have an analytical sensitivity of 2 parasites/μL or 10 parasites in 5 μL of blood analyzed.</p> <p>A mobile laboratory may be a useful option.</p> <p>Results should be available within 48 hours to allow prompt follow-up and treatment of positive cases.</p> <p>The choice of providing high-throughput, highly sensitive services at a location far from the field or lower-throughput, less sensitive NAA-based testing close to the point of care with rapid results depends on the context.</p> <p>Quality assurance, including external quality assurance, should be in place for the analytical technique chosen.</p>
<p>Mass screening and treatment</p>	<p>Field-adapted classic PCR, quantitative PCR and LAMP methods are appropriate.</p>	<p>RDTs and microscopy are not sufficiently sensitive for mass screening and treatment programs in low-endemic settings.</p> <p>A moderate throughput test with an analytical sensitivity of 2 parasites/μL should be used to ensure identification of asymptomatic and low-density infections.</p> <p>A mobile laboratory may be a useful option.</p> <p>Results should ideally be available on the same day as testing, to maximize follow-up of individuals and treatment of positive cases.</p> <p>Quality assurance, including external quality assurance, should be in place for the analytical technique chosen.</p>
<p>Screening of key populations (e.g. at border crossings)</p>	<p>If screening of key populations is deemed appropriate, RDT or microscopy should be used for symptomatic infections only, and NAA-based tests with an analytical sensitivity of 2 parasites/μL should be used to detect infection in asymptomatic individuals.</p>	<p>The local context will determine the most appropriate, cost-effective tools and whether screening at borders is feasible and useful.</p> <p>Results should be provided on the same day in order to minimize loss to follow-up.</p>



Photos: PAHO/WHO

- 1 Vallejo A, et al. 2015. High prevalence of sub-microscopic infections in Colombia. *Malaria Journal* 14:201.
- 2 World Health Organization. September 2014. *Policy brief on malaria diagnostics in low-transmission settings*.
- 3 Key populations are those that suffer major malaria incidence, have lower access to health services, and/or are socially marginalized.