

Proposed ERG on the assessment of malariogenic potential to inform elimination strategies and plans to prevent re-establishment

Terms of Reference of the Evidence Review Group
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Background

Understanding the degree of risk of malaria transmission in a given geographical area provides the foundation for the design of cost-effective intervention programmes to decrease malaria burden, eliminate transmission and prevent re-establishment of malaria. The risk of malaria transmission is the product of receptivity, vulnerability and infectivity, and is referred to as the *malariogenic* potential [1]. The receptivity of an ecosystem to malaria transmission is determined by the presence of competent vectors, a suitable climate and a susceptible population. Vulnerability refers to the rate of importation of parasites through the movement of infected individuals or, occasionally, infected anopheline vectors. Infectivity, or vector susceptibility, depends on the compatibility between the anopheline vector and the infecting strain of *Plasmodium* [2].

The WHO *Framework for malaria elimination* recommends that transmission intensity, receptivity and vulnerability underpin subnational stratification to inform the selection of interventions for eliminating malaria transmission. Measurement of receptivity and vulnerability is also critical to prevent the re-establishment of transmission following elimination. The Framework recommends that vector control coverage be maintained after elimination in receptive areas where there is also a substantial risk of importation that can lead to onward transmission (i.e. high malariogenic potential). However, guidance on how to measure and classify receptivity and vulnerability is scant, leaving countries with no clear recommendations on methods or thresholds.

Vector susceptibility to imported parasites is a component of malariogenic potential that is not frequently considered, and yet there is evidence that parasite-vector specificity exists. Parasites imported from neighbouring countries are as likely to infect local anophelines as the strains of parasites circulating within the country. However, vector susceptibility to exotic infections that are imported from distant regions may be much lower than the transmissibility of parasites imported from neighbouring countries [2].

WHO's Global Malaria Programme (GMP) recognizes the increasing demand for guidance on the assessment of receptivity and vulnerability, especially in countries that are working to prevent re-establishment of transmission either at the subnational or national level. Development of normative guidance in this area is also timely, given the availability of more sophisticated methods, such as the use of model-based geostatistical frameworks paired with visualization of the results by means of risk maps, and the use of mobile phone

information and other remotely sensed data for population mobility. This task is also facilitated by the increasing amount of practical experience regarding the challenges of transitioning programmes from control activities to more targeted designs aimed at eliminating malaria or preventing its re-establishment.

Objectives of the ERG

1. To review current definitions of receptivity, vulnerability and malariogenic potential contained in the WHO glossary and, if required, recommend improvements to ensure that the definitions are valid and appropriate;
2. To review available methodologies for assessing receptivity and recommend appropriate and valid methodological approaches, including data requirements, for national malaria programmes to use to measure receptivity in their respective countries;
3. To advise WHO on options for classifying receptivity according to programmatically relevant categories aimed at guiding interventions to prevent re-establishment of transmission;
4. To review the validity and practicality of available methods for assessing vulnerability and recommend appropriate and valid methodological approaches, including data requirements, for national malaria programmes to use to assess vulnerability in their respective countries;
5. To review data on the regional receptivity of endemic anophelines to exotic strains of human malaria;
6. To advise WHO on approaches to combining measures of receptivity, vulnerability and infectivity in order to guide national malaria programmes in designing strategies to prevent re-establishment of transmission.

References

1. Receptivity to malaria and other parasitic diseases: report on a WHO working group, Izmir, 11–15 September 1978. Copenhagen, Denmark: World Health Organization Regional Office for Europe, 1979 (http://apps.who.int/iris/bitstream/10665/204466/1/EURO_RS_15_eng.pdf).
2. Poncon N, Tran A, Toty C, Luty AJF, Fontenille D. A quantitative risk assessment approach for mosquito-borne diseases: malaria re-emergence in southern France. *Malar J.* 2008;7:147. doi:10.1186/1475-2875-7-147.