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Letter to the Editor

Prospects of Malaria Elimination Gaps in Iran

Enayat Darabi [1]***, Saeid Fathi*** [2]***, Soudabeh Heidari*** [3]***, *Mehdi Nateghpour*** [1,4]

1. *Department of Medical Parasitology & Mycology, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran*
2. *Department of Parasite Vaccine Research and Production, Razi Vaccine and Serum Research Institute, Agricultural Research, Education and Extension Organization (AREEO), Karaj, Iran*
3. *Department of Medical Sciences, Shahrood Branch, Islamic Azad University, Shahrood, Iran*
4. *Research Center of Quran, Hadith and Medicine, Tehran University of Medical Sciences, Tehran, Iran*

***Corresponding Author:** Email: nateghpourm@sina.tums.ac.ir

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Dear Editor-in-Chief

Malaria has been one of the most important infectious diseases in the south and southeastern areas of Iran. The malaria elimination program has been launched in Iran since 2009 with the technical support of the WHO. The main goal of the malaria elimination program was to stop malaria transmission locally. Countries with at least 3 consecutive years without 1 case of indigenous malaria are eligible to apply for a malaria elimination permit. For the first time, the indigenous cases of malaria in Iran reached zero in 2018 (Fig. 1), (1,2). Although the national malaria elimination program in Iran has led to minimum indigenous malaria transmission, the current malaria perspective requires further understanding of the challenges and knowledge gaps in the pathway of the complete elimination of malaria in Iran.

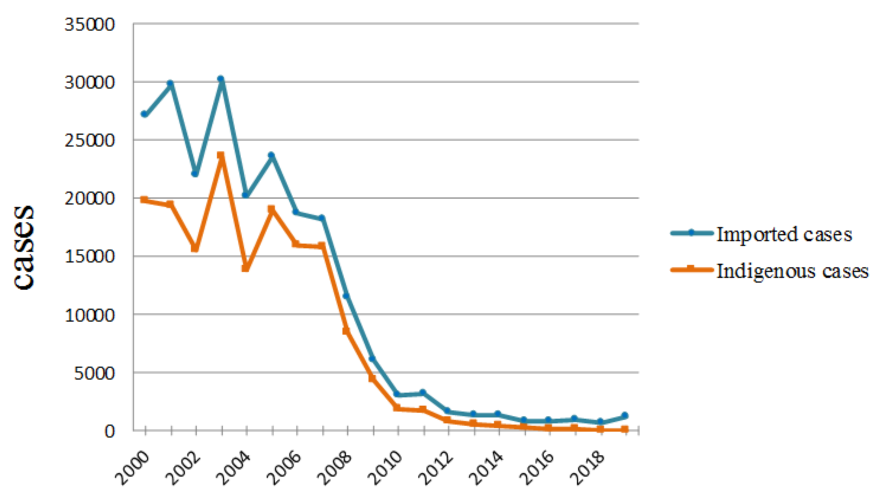

Fig. 1: Trend of indigenous and imported malaria cases in Iran, 2000-2018 (1, 2)

The microscopic technique as the gold standard diagnosing method requires high accuracy for routine diagnosis, and training of microscopists is of great importance in this regard. Furthermore, Rapid Diagnostic Tests (RDTs) are being applied, especially in remote areas, where there are many constraints on infrastructure and public services (3, 4), suggesting the importance of reference laboratory capacity. Diagnosing asymptomatic and sub-microscopic infections are more or less difficult. Thus, the use of molecular methods is necessary and inevitable, where can play a key role in early case finding, but these methods are also time-consuming and costly for malaria elimination strategy (5).

Both effective passive case detection (PCD) in all transmission settings (e.g., disease-free areas for preventing re-establishment of transmission) and active case detection in remote areas are required to reach the elimination.

Following decreased malaria transmission, high-risk populations (hot pops) or areas (hot spots) should be accurately identified and then targeted. Reactive Case Detection (RACD) has been adapted for screening family members and individuals in contact with passively detected cases (6, 7).

Strategies based on strengthening infrastructure monitoring systems for decision making at the regional and national levels of Iran (e.g., a system capable of integrating multiple sources in real-time, mobile technology, using leverage tools [GIS-based spatial decision support system or SDSS technology], automatically extract data, etc.), experience and investment are very important to achieve the target program (7-9).

The imported malaria cases from the eastern neighbors of Pakistan and Afghanistan is another obstacle in the way of eliminating malaria in Iran. In particular, a further increase in illegal immigration from Afghanistan to Iran could encounter the eliminating malaria program with some problems due to recent changes in the Afghan government. Although, most of the registered cases are hypothetical imports, the exact methods of confirming such a hypothesis are difficult. For example, most migrants, including Afghans, are mostly smuggled in without a passport or ID card, so it is difficult to tell if their illness originated in their own country or in Iran. Therefore, it is difficult to estimate the actual rate of malaria in Iran. Most migrants in malarious areas can get caught further in a poverty cycle, and faced with poor access to treatment, suggesting a strong case detection system for such migrants in eastern borderline areas and a high-resolution surveillance response via identifying human mobility patterns.

The national malaria guidelines suggested first-line treatment including chloroquine, primaquine, and artesunate along with sulfadoxine/pyrimethamine for *Plasmodium vivax* and *P. falciparum* respectively (4). Therefore, active chloroquine resistance surveillance should be considered.

Asymptomatic malaria infections usually remain undiagnosed and untreated and then become the most challenging issues in malaria elimination programs through mass screening due to low parasitemia and symptomless forms.

Climate changes affect the El Niño cycle, which may be linked to an increased risk of some mosquito-borne diseases such as malaria. Heavy and seasonal rainfall in recent years may provide mosquito breeding conditions in some areas such as arid and semiarid areas of the country. Thus, the prediction of ecological niches under climate changes can be of great importance for future national malaria elimination programs in Iran to bring indigenous malaria to zero, where major steps have been taken to eradicate malaria. If Iran overcomes the existing challenges in the future and eliminates the disease, it will achieve an important regional health achievement.

We believe that an effective elimination can be facilitated by a synergistic collaboration including multispectral and multi-disciplinary approaches via illustrating the related bottlenecks and all gaps.

Conflict of interest

The authors declare that there is no conflict of interests.

References

1. WHO (2020). World malaria report 2020. Available from: https://www.who.int/teams/global-malaria-programme/reports/world-malaria-report-2020
2. WHO (2015). World malaria report 2015. Available from: https://reliefweb.int/report/world/world-malaria-report-2015
3. WHO (2019). World malaria report 2019. Available from: https://www.who.int/publications/i/item/9789241565721
4. Schapira A, Zaim M, Raeisi A (2018). *History of the successful struggle against malaria in the Islamic Republic of Iran. Tehran*. Neekpey Press: 27-28.
5. Herrera S, Ochoa-Orozco SA, González IJ, et al (2015). Prospects for Malaria Elimination in Mesoamerica and Hispaniola. *PLoS Negl Trop Dis*, 9(5): e0003700.
6. Sturrock HJW, Novotny JM, Kunene S, et al (2013). Reactive Case Detection for Malaria Elimination: Real-Life Experience from an Ongoing Program in Swaziland. *PLoS One*, 8(5):e63830.
7. Hemingway J, Shretta R, Wells TNC, et al (2016). Tools and Strategies for Malaria Control and Elimination: What Do We Need to Achieve a Grand Convergence in Malaria? *PLoS Biol*, 14(3): e1002380.
8. Kelly GC, Tanner M, Vallely A, et al (2012). Malaria elimination: Moving forward with spatial decision support systems. *Trends Parasitol*, 28(7):297–304.
9. Kelly GC, Hale E, Donald W, et al (2013). A high-resolution geospatial surveillance-response system for malaria elimination in Solomon Islands and Vanuatu. *Malar J*, 12(1):1–14.