A review on spatial technologies for enhancing malaria control: concepts, tools, and challenges

ABSTRACT

This paper presents a review of numerous studies conducted on spatial technologies, tools, and applications for controlling malaria epidemiology. This paper mainly focuses on using statistical or machine learning-based models and geographic information science (GIS) and remote sensing (RS) technology for monitoring malaria disease outbreaks. The literature review includes all articles obtained from journals and conference proceedings published from 2000 through 2020 in Scopus indexed databases (e.g., Elsevier, Springer, IEEE eXplore, ACM, Wiley, and PubMed). We completed this systematic literature review using "Enhancing Malaria Control," "GIS and Malaria Control" and "Spatial Technologies for Monitoring Malaria Disease Outbreaks" search terms. We found a total of 188 articles published in peer-reviewed journals listed in the Scopus indexed databases. After a detailed review, 152 articles were excluded because they did not meet our inclusion criteria; 36 articles were selected for the final evaluation. Several concepts and tools related to GIS applications in monitoring the malaria outbreak's spread is discussed. The discussion is categorized into four categories: a) Application of Spatial Technologies, b) Applications of Machine Learning Algorithms, c) Applying Multiple Sources of Data, and d) Applications of Smartphone Technologies. A spatial technologies framework for enhancing malaria monitoring is also proposed where it identifies the role of spatial technologies and applications in monitoring malaria disease outbreaks. The paper is concluded by providing some of the main challenges related to the issues in controlling the spread of malaria disease outbreaks.